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

1.1 Product identifier

Product name:	Fuel Diesel
CAS Number	not applicable (mixture)
EC Number	not applicable (mixture)
Index number	not applicable (mixture)
Registration number	not applicable (mixture)
Molecular formula	not applicable (mixture)
Molecular weight	not applicable (mixture)
Unique Formula Identifier (UFI)	F410-H0EY-P00N-824T

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

Relevant identified uses: Use in fuels (fuel for engines) and other industrial uses

Identified uses in the chemical safety report: generic list of applications:

Life cycle:

Manifacture:	Manifacture of substance
Formulation or re-packing:	Formulation & (re)packing of substances and mixtures
Uses at industrial sites:	Use in fuels
Widespread uses by professional workers:	Use in fuels
Consumer uses:	Use in fuels
Uses advised against:	Use in Oil and Gas field drilling and production operations, with drilling mud. (re-)formulation: Industrial and Professional onshore and offshore

Reasons why uses advised against: Unsafe uses for human health**.**

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

1.3 Details of the supplier of the safety data sheet

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

1.4 Emergency number

Emergency Phone:

In case of poisoning, call the following numbers, available 24/7:
NHS 111 (England)
NHS 24 (Scotland)
NHS Direct (Wales)
Poisons information center of Ireland 01 809 2566

American Association of Poison Control Centers
1-800-222-1222

For Appropriate National Emergency Information Services see the following link:

https://echa.europa.eu/support/helpdesks

SECTION 2. HAZARDS IDENTIFICATION

Physico-chemical hazards:	Flammable liquid and vapour
Human health hazard:	Causes skin irritation, harmful if inhaled. Due to its low viscosity, the product can be aspirated into the lungs directly after ingestion, or if vomiting occurs spontaneously or is induced. This can lead to chemical pneumonia. May cause damage to organs throught prolonged or repeated exposure.
Environmental hazard:	Toxic to aquatic life with long lasting effects.

2.1 Classification of the substance or mixture

Flam. Liq. 3	H226
Asp. Tox. 1:	H304
Skin Irrit. 2	H315
Acute Tox 4	H332
Carc.2:	H351
Repr. 1B:	H360FD
STOT RE 2	H373 (liver, thymus, bone marrow)
Aquatic Chronic 2	H411

Note: Classification of the substance has been performed considering the following: CLP1: Viscosity ≤ 20,5 mm^2/s at 40 °C and flash point ≥ 23 °C and ≤ 75 °C

Full text of hazard statements And EUH-phrases: see section 16.

2.2 Label elements

SIGNAL WORD: DANGER

Hazard Statement(s):

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.

H360FD: May damage fertility. May damage the unborn child.

H373: May cause damage to organs throught prolonged or repeated exposure (liver and thymus.bone marrow)

H411: Toxic to aquatic life with long lasting effects.

Precautionary Statement(s):

Prevention:

P201: Obtain special instruction before use

P202: Do not handle until all safety precautions have been read and understood.

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P260: Do not breathe vapours/mist.

P273: Avoid release to the environment

P280: Wear protective gloves/protective clothing

Response:

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P308+P313: IF exposed or concerned: Get medical advice/attention.

P331: Do NOT induce vomiting.

Storage

P405: Store locked up.

Disposal:

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

Supplemental hazard information

Supplemental hazard statements: n.a

Authorization number: n.a.

Product Name : FUELS, DIESEL

Unique Formula Identifier (UFI) F410-H0EY-P00N-824T

2.3 Other hazards

Hot product may form explosive and flammable vapour-air. The vapour product is heavier than air and in the event of a leak, vapour may accumulate in confined spaces and low lying areas where it may easily be accidentally ignited and can create fire and explosion risks even from a distance.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Components	% w/w	CE	CAS	Index	Registration	Classification
FUELS DIESEL[1]	0-100	269-822-7	68334-30-5	649-224-00-6 (Note N)	01-2119484664-27-XXXX	Flam. Gas 3: H226 Asp. Tox. 1: H304 Skin Irrit.2: H315 Acute Tox 4: H332 Carc.2: H351 Repr. 1B: H360FD STOT Rep.Exp.2: H373 Aquatic Chronic 2: H411
Petroleum gas oil, co-processed with renewable hydrocarbons of plant and/or animal origin[2]	0-5	941-364-9			01-2120091562-55-XXXX	Flam. Liquid 3; H226 Asp. Tox. 1; H304 Skin Irrit. 2; H315 Acute Tox 4; H332 Carc.2; H351 STOT RE 2; H373 (hymus, Liver, Bone marrow) (dermal) Aquatic Chronic 2; H411

[1] UVCB substance "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°"

[2] A complex combination of hydrocarbons produced by the co-processing (hydrotreating) of a petroleum gas oil with vegetable oils and/or animal fats. It consists predominantly of linear alkanes, branched alkanes, cyclic alkanes and monoaromatic hydrocarbons. The carbon numbers are predominantly in the range of C9 – C26.

Components	% w/w	CE	CAS	Index	Registration	Classification
Renewable hydrocarbons (diesel type fraction)	0-20	700-571-2			01-2120043692-58-XXXX	Flam. Liquid 3; H226 Asp. Tox. 1; H304 EUH066
BIODIESEL (methyl esters of fatty acids)	0-7	272-606-8 267-007-0 267-015-4	68990-52-3 67762-26-9 67762-38-3	-	01-2119485821-32-0031 01-2119471662-36-0024 17-2119848856-20-0000	Not classified

SECTION 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. Irrigate exposed eyes with 0.9% normal saline if available or water for at least 15 minutes. Irrigate before and after removing the lenses to prevent a carry-over of the mixture to the shielded area of the lens

Skin contact: Remove contaminated clothing, contaminated footwear and dispose of safely. Wash area with soap and water for 10 to 15 minutes

Swallowing: 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 at ambient temperature is unlikely because of the low vapour pressure of the mixture. Exposure to vapours may however occur when the mixture is handled at high temperatures with poor ventilation.

If breathing is difficult, move the victim to a well-ventilated area. Monitor for respiratory distress, administer oxygen, and provide ventilation as needed by trained personnel. In case of accident or illness, seek medical attention immediately (provide the SDS). Regularly monitor vital signs and act accordingly.

4.2 Most important symptoms and effects, both acute and delayed

Skin contact symptoms: may cause skin irritation,

Eye contact symptoms: may cause mild reversible eye irritation.

Inhalation symptoms of vapours: may cause headache, nausea, dizziness. Acute, high dose exposure may cause: central nervous system depression, confusion, altered mental status, seizures, cardiac arrhythmias.

Ingestion (swallowing) symptoms: nausea and diarrhea ma.y occur. Aspiration hazard; may be fatal if it enters the airways after swallowing.

4.3 Indication of any immediate medical attention and special treatment needed

If exposed or feared, seek medical advice.

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

SECTION 5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Small fires: sand or earth, carbon dioxide), foam, dry chemical powder.

Large fires: foam , water mist. The use of fractional jet water (spray water) and foam is reserved for specially trained personnel. Other inert gases (as permitted by law).

Unsuitable extinguishing media: do not use direct water jets on the burning product; they could cause splattering and spread the fire. Avoid using foam and water simultaneously on the same surface as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Incomplete combustion could generate a complex mixture of solid and liquid airborne particles and gases, including carbon monoxide and other unidentified organic and inorganic compounds.

5.3 Advice for firefighters

In case of large fire or confined or poorly ventilated spaces, wear a garment complete with fire protection and an autonomous respirator equipped with a complete mask working in positive pressure.

Attention: this mixture will float and can be reignited on surface water.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For NON-emergency personnel:

If safety conditions permit, stop or contain the leak at source. Avoid direct contact with the released material. Stay windward. In the event of large spills, warn residents of leeward areas. Remove uninvolved personnel from the spill area. Warn emergency teams.

Except in the case of small payments, the feasibility of the interventions must always be evaluated and approved, if possible, by qualified and competent personnel in charge of managing the emergency. Eliminate all sources of ignition if safety conditions allow (e.g. electricity, sparks, fires, torches). If required, communicate the event to the relevant authorities in accordance with the applicable legislation.

For emergency personnel:

Small spills: Traditional antistatic work clothes are generally appropriate.

Large spills: total protection garment resistant to chemical agents and made of antistatic material.

Work gloves that provide adequate resistance to chemical agents, in particular aromatic hydrocarbons. Gloves made of PVA (Polyvinyl alcoholol) are not water resistant and are not suitable for emergency use.

Protective helmet.

Antistatic and non-slip safety shoes or boots rexisting to chemical agents.

Goggles or face protection equipment if splashes or contact with eyes are possible or foreseeable.

Respiratory protection: A half-mask or a whole mask equipped with a brown AX filter for organic vapours with low boiling point or a stand-alone respirator can be used depending on the extent of the spillage and the foreseeable level of exposure. In the event that the situation cannot be fully assessed or if there is a risk of oxygen starvation, use only a self-respirator.

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

Soil: 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. Collect free product with suitable means. Transfer collected product and other contaminated materials to suitable containers for recycle, recovery or safe disposal. In case of soil contamination, remove contaminated soil and treat in accordance with local regulations.

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. If this is 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. Collect recovered product and other materials in suitable tanks or containers for recovery or safe disposal.

The recommended measures are based on the most likely spill scenarios for this product. Local conditions (wind, air temperature, direction and speed of waves and currents) can, however, significantly affect the choice of action to be taken. Therefore, consult local experts if necessary. Local legislation may establish or limit the actions to be carried out.

6.4 Reference to other sections

For more information on personal protective equipment, refer to section 8 "Exposure controls/personal protection”.

For more information on disposal, refer to section 13 " Disposal considerations”.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures (containment and preventive measures)

Ensure that all relevant regulations regarding handling 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. No smoking. Use only non-sparking tools. Use only bottom loading for tanks, in accordance with relevant European legislation. Do not use compressed air for filling, discharging, or handling operations. 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. Avoid release to the environment.

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

7.1.2 General recommendations on 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. Do not breathe mist/vapours/aerosol. Avoid contact with skin. Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling. Do not reuse contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

The structure of the storage area, the characteristics of the tanks, the equipment and the operating procedures must comply with the relevant legislation at European, national or local level. Storage facilities must be equipped with appropriate systems to prevent contamination of soil and water in the event of leaks or spills. The activities of cleaning, inspection and maintenance of the internal structure of the storage tanks must be carried out by qualified and properly equipped personnel, as established by national, local, or company regulations, after reclamation of the tank.

Recommended materials: mild steel or stainless steel for containers and coatings. Some synthetic materials may not be suitable for containers or coatings based on the characteristics of the material and the intended uses. Check the compatibility of the materials with the manufacturer in relation to the conditions of use.

If the product is supplied in containers, store only in the original containers or in a container suitable for the type of product.

Store containers carefully closed and properly labeled. Protect from sunlight. Store locked up.

Light hydrocarbon vapors can accumulate at the top of the containers. This can cause danger of fire or explosion. Empty containers may contain combustible product residues. Do not weld, braze, drill, cut or incinerate empty containers unless they have been properly reclaimed.

7.3 Specific end uses

See attached exposure scenarios

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Component	Occupational exposure limit values	Reference
FUELS, DIESEL	TLV®-TWA: 100 mg/m^3	ACGIH 2026

Recommended Monitoring procedures: refer to Dir 98/24/EC. Good industrial heath practices in the work place

DNEL (Derived No Effect Level): Hazard conclusions:

Information regarding the main component: FUELS DIESEL (EC: 269-822-7)

	DNEL for workes				DNEL for the general population			
Route	Systemic effects Long term	Systemic effects Acute	Local effects Long term	Local effects Acute	Systemic effects Long term	Systemic effects Acute	Local effects Long term	Local effects Acute
Oral	n.a.	n.a.	n.a.	n.a.	DNEL 0.83 mg /kg Most sensitve end point: Repeated dose toxcity (oral)***	No hazard identified	n.a.	n.a.
Dermal	DNEL 2.91mg /kg Most sensitve end point: Repeated dose toxcity (dermal)	No hazard identified	High hazard (no threshold derived)*	Low hazard (no threshold derived)**	DNEL 1.25 mg /kg Most sensitve end point: Repeated dose toxcity (dermal)	No hazard identified	High hazard (no threshold derived)*	Low hazard (no threshold derived)**
Inhalation	DNEL 5.49 mg/m³ Most sensitve end point: Repeated dose toxicity (Oral)***	DNEL 4288 mg/m³ Most sensitve end point: Acute toxicity (inhalation)	No hazard identified	No hazard identified	DNEL 1.16 mg/m³ Most sensitve end point: Repeated dose toxicity (Oral)***	DNEL 2572.8 mg/m³ Most sensitive end point: Acute toxicity (inhalation)	No hazard identified	No hazard identified
Eyes	n.a.	n.a.	n.a.	No hazard identified	n.a.	n.a.		No hazard identified

* For chronic exposures (dermal carcinogen): no threshold effect and/or dose-response information available.

** The value cannot be calculated due to the lack of a dose-response curve; substance is classified as irritating.

*** Combined sub-acute toxicity study and reproduction screening study

PNEC(S) (Predicted No Effect Concentration)

Informazioni relative al componente principale: Gasolio (EC: 269-822-7)

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

DNEL (Derived No Effect Level): Hazard conclusions:

Information regarding the main component: Petroleum gas oil, co-processed with renewable hydrocarbons of plant and/or animal origin (EC:941-364-9)

	DNEL for workes				DNEL for the general population			
Route	**Systemic effects Long term**	**Systemic effects Acute**	**Local effects Long term**	**Local effects Acute**	**Systemic effects Long term**	**Systemic effects Acute**	**Local effects Long term**	**Local effects Acute**
Oral	n.a.	n.a.	n.a.	n.a.	DNEL 1.25 mg /kg bw/day Most sensitve end point: *Repeated dose toxcity (dermal)*	No hazard identified	No hazard identified	No hazard identified
Dermal	DNEL 2.91mg /kg bw/day Most sensitve end point: Repeated dose toxcity (dermal)	No hazard identified	High hazard (no threshold derived)*	Low hazard (no threshold derived) **	DNEL 1.25 mg /kg bw/day Most sensitve end point: Repeated dose toxcity (dermal)	No hazard identified	High hazard (no threshold derived)	Low hazard (no threshold derived)
Inhalation	DNEL 68.34 mg/m³ Most sensitve end point: *Developmental toxicity / teratogenicity (Dermal)*	DNEL 4288 mg/m³ Most sensitve end point: Acute toxicity (inhalation)	No hazard identified	No hazard identified	DNEL 20.22 mg/m³ Most sensitve end point: *Developmental toxicity / teratogenicity (Dermal)*	DNEL 2572.8 mg/m³ Most sensitive end point: Acute toxicity (inhalation)	No hazard identified	No hazard identified
Eyes	n.a.	n.a.	No hazard identified	No hazard identified	n.a.	n.a.	n.a.	No hazard identified

PNEC(S) (Predicted No Effect Concentration)

Information regarding the main component: Petroleum gas oil, co-processed with renewable hydrocarbons of plant and/or animal origin (EC:941-364-9)

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

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Minimize exposure to mists/vapours/aerosols. The usage preferably in enclosed systems. Accidently released gases and vapours have to be extracted. Before accessing the storage tanks and starting any type of intervention in a confined space, check the atmosphere, check the oxygen content and check the degree of flammability. Account fot the presence of emergency showers and eye washes.

8.2.2 Individual protection measures, such as personal protective equipment

(a) Eye/face protection: If splashing is likely, full head and face protection (protective shield and/or safety goggles) should be used. (EN 166)

(b) Skin protection: i) Hand protection:In the absence of containment systems and in case of possibility of contact with the skin, use gloves with high hydrocarbon-resistant cuffs, ferned internally, if necessary thermally insulated. Presumably adequate materials: nitrile rubber (layer thickness 0.4 mm, breakthrough time ≥ 120 min), fluoro rubber (layer thickness 0.7 mm, breakthrough time ≥ 480 min). The given values are laboratory values. The breakthrough times can fall below the given values under realistic conditions. Use gloves in compliance with the conditions and limits set by the manufacturer. If so, refer to UNI EN 374-1:2018. Gloves must be periodically inspected and replaced in case of wear, perforation or contamination.

ii) Select protective clothing in accordance with the requirements concerning protection from chemicals, heat- and flame-protection as well as protection against electrostatic charging (EN 13034. EN ISO 14116. EN ISO 11612 and EN 1149-5). Safety shoes should meet at least the requirements of category S2 (antistatic, resistant to gasoline or oil and waterproof, EN ISO 20345).

(c) Respiratory protection: Open or well-ventilated spaces: wear approved respiratory protection devices: full face masks equipped with type A filter cartridge (for organic vapors) (UNI EN14387: 2021). In the absence of containment systems, if exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA's should be used (UNI EN 11719: 2018).

(d) Thermal hazards: see point b above

For additional information on personal protective equipment and operational conditions, please refer to the exposure scenarios.

8.2.3 Environmental exposure controls

Do not release into the environment. Storage facilities must be equipped with appropriate systems to prevent contamination of soil and water in the event of leakage or spillage. For more details, see the all-related exposure scenarios.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Physical state	liquid
b)	Color	red, green, yellow
c)	Odor	Petroleum odor
d)	Melting point/freezing point	From -40 to +6°C (Concawe, 2010a), (component FUELS DIESEL EC 269-822-7) -6°C (ASTM D-97 – range from < -20 to -4°C, (CSR 2025 component EC:941-364-9))
e)	Boiling point or initial point and boiling range	From 141 to 462°C (Concawe, 2010a), (component FUELS DIESEL EC 269-822-7) 160°C (ASTM D-2887 – range from 160 to 360°C (CSR 2025 component EC:941-364-9))
f)	Flammability	Flammable liquid and vapours
g)	Lower and upper explosion limit	Study scientifically not necessary (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 molecule) - non explosive (components FUELS DIESEL EC 269-822-7 and EC:941-364-9))
h)	Flash point	>56 °C (CONCAWE, 2010a), (component FUELS DIESEL EC 269-822-7) 79°C at 1013 hPa, EN ISO 2719, (CSR 2025, componente EC 941-364-9)
i)	Auto-ignition temperature	>225°C (Concawe, 2010a), (component FUELS DIESEL EC 269-822-7) 222°C at 1013 hPa, EU A.15, (CSR 2025, componente EC 941-364-9)
j)	Decomposition temperature	Data not applicable
k)	pH	Data not applicable
l)	Kinematic Viscosity	≥1,5 mm^2/s (Concawe, 2010a), (component FUELS DIESEL EC 269-822-7) 3.9 mm^2/s (static) at 20°C, ASTM D-445, (CSR 2025 component EC:941-364-9))
m)	Solubility	Not applicable to petroleum UVCB substances. 2.69E-12 – 2000 mg/L (calculated range-QSAR) (component FUELS DIESEL EC 269-822-7) 2 mg/L at 25°C, EU Test A6, (CSR 2025, component EC:941-364-9)
n)	Partition coefficient: n-octanol/water (log value)	Not applicable to petroleum UVCB substances. 1.99-18.2 (calculated range - QSAR) (component FUELS DIESEL EC 269-822-7) Log Kow (Log Pow): 5.7 (CSR 2025, component EC:941-364-9)
o)	Vapor pressure	0.4 kPa at 40 °C (CONCAWE 1996), (component FUELS DIESEL EC 269-822-7) 0.4 kPa at 25 °C (ASTM D—1120-72) (CSR 2025, componente EC:941-364-9)
p)	Density and/or relative density	0.8-0.91 g/cm^3 (Concawe, 2010a), (component FUELS DIESEL EC 269-822-7) 0.845 at 20°C, , ASTM D-4052, (CSR 2025, componente EC:941-364-9)
q)	Relative vapor density	Data not available
r)	Particle characteristics	Not applicable

9.2 Other information

9.2.1 Information with regard to physical hazard classes

No chemical group associated with the molecule with explosive properties. Non-oxidant (based on the chemical structure, the product is not able to react exothermically with combustible materials.

9.2.2 Other safety characteristics

The heated product emits vapours which may form flammable and explosive mixtures with air. The vapour product is heavier than air and in the event of a leak, vapour may accumulate in confined spaces and low lying areas where it may easily be accidentally ignited and can create fire and explosion risks even from a distance

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

The mixture does not present any further reactivity hazards than those reported in subsequent subtitles

10.2 Chemical stability

This mixture is stable in relation to its intrinsic properties.

10.3 Possibility of hazardous reactions

Contact with strong oxidants (such as peroxides and chromates) can cause a fire hazard. A mixture with nitrates or other strong oxidants (such as chlorates, perchlorates and liquid oxygen) can generate an explosive mass. Sensitivity to heat, friction and shock cannot be assessed in advance.

10.4 Conditions to avoid

Preserve separated from oxidizing agents . Keep away from heat sources/sparks/open flames/hot surfaces. Don't smoke. Avoid the 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.

SECTION 11. TOXICOLOGICAL INFORMATION

Note: the information below refers to the dangerous components: EC 269-822-7 and EC 941-364-9/CAS 68334-30-5 belonging to the diesel fuel category VGOs/HGOs/Distillate Fuels

Information on toxicokinetics on metabolism and distribution

No experimental data were located on the toxicokinetics of gas oils in vivo.

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 gas oils, however the occurrence of systemic tissue changes in repeated dose toxicity studies indicates that some absorption across the skin is possible 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 conservatively.

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

a) Acute toxicity:

Acute Oral Toxicity:

Toxicity was evaluated on samples of products in this category, VGOs/HGOs/Distillate fuels. These studies have shown an oral LD50 > 2000 mg/kg bw. Therefore no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Acute Toxicity - Oral			
Method	Results	Remarks	Reference
RAT (M/F) ((Sprague-Dawley) oral: gavage OECD Guideline 401	LD50: 21.1 mL/kg bw (male/female) (approx 17.900 mg/kg bw)	1 (reliable without restriction) key study CAS 68476-30-2	American Petroleum Institute (API) 1980

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Acute Toxicity - Oral			
Method	Results	Remarks	Reference
RAT (M/F) ((Sprague-Dawley) oral: gavage OECD Guideline 420	LD50: 9 mL/kg bw (male/female) (approx 7600 mg/kg bw)	1 (reliable without restriction) key study EC: 941-364-9	American Petroleum Institute (API) 1980

The component EC 700-571-2 (renewable hydrocarbons diesel-type fraction) has an oral LD50 RAT ≥ 2000 mg/kg of body weight (EU Method B.1 - Mullaney T., 2005) (Read-across)

Acute Inhalation Toxicity

Rat studies are available to assess the acute inhalation toxicity of products belonging to the VGOs/HGOs/Distillate Fuels category. The results lead to the classification. The results lead to the classification as Acute tox. 4; H332 according to CLP Regulation

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Acute Toxicity - Inhalation			
Method	Results	Remarks	Reference
RAT (M/F) Mixture of aerosols and vapors OECD Guideline 403	LC50 mg/l/4 hours: 3.6 (F) CL50 mg/l/4 hours: 5.4 (M) LC50 mg/l/4 hours: 4.1 (M/F)	Key study CAS 68334-30-5 Reliable without restrictions	Atlantic Richfield Company (ARCO) 1988a

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Acute Toxicity - Inhalation			
Method	Results	Remarks	Reference
RAT (M/F) Mixture of aerosols and vapors OECD Guideline 403	LC50 mg/l/4 hours: 3.6 (F) CL50 mg/l/4 hours: 5.4 (M) LC50 mg/l/4 hours: 4.1 (M/F)	Key study EC: 941-364-9 Reliable without restrictions	Atlantic Richfield Company (ARCO) 1988a

The component EC 700-571-2 (renewable hydrocarbons diesel-type fraction) has an oral LC50 RAT = 4667 ppm (23.4 mg/L)(OECD 436 - Nilsen, OG; Haugen, OA; Zaglsen, K et al., 1988) (Read Across)

Acute Dermal Toxicity

The acute oral toxicity of samples belonging to the VGOs/HGOs/Distillate Fuels category has been evaluated in a number of studies. All studies have shown a cutaneous LD50 > 2000 mg/kg, therefore no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Acute Toxicity - Dermal			
Method	Results	Remarks	Reference
RABBIT OECD Guideline 434	LD50>5 ml/kg (M/F) (approx> 4300 mg/kg)	Key study CAS 68334-30-5 Reliable without restrictions	American Petroleum Institute (API) 1980b

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Acute Toxicity - Dermal			
Method	Results	Remarks	Reference
RABBIT OECD Guideline 434	LD50>5 ml/kg (M/F) (approx> 4300 mg/kg)	Key study EC:941-364-9 Reliable witho restrictions	American Petroleum Institute (API) 1980

The EC 700-571-2 component (Renewable hydrocarbons (diesel type fraction) has a dermal LD50 RABBIT ≥ 2000 mg/kg (EU Method B.3 - Sanders, A, 2006) (Read-across)

b) Skin corrosion/irritation:

Specific studies on the corrosivity of the VGOs/HGOs/Distillate Fuels category are not available. Considering the information from available animal studies and the nature of the mixture, no corrosive action is expected.

The potential for skin irritation of samples belonging to the category of this product has been tested in a large number of studies typically conducted on rabbits. The conclusions of all these studies indicate evidence of skin irritation and lead to the classification as Skin Irrit. 2; H315 according to CLP Regulation.

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Skin corrosion /irritation			
Method	Results	Remarks	Reference
RABBIT Occlusive treatment (on each animal two sites with intact skin and 2 sites with abraded skin) Observation at 24/72 hours OECD Guideline 404	Irritating Mean erythema score: 4 (on intact skin at 24 h), 3.83 (on intact skin at 72 h) Average edema score: 3 (on intact skin at 24 h), 2.92 (on intact skin at 72 h)	Key study Reliable with restrictions CAS 68334-30-5	American Petroleum Institute (API) 1980b

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Skin corrosion /irritation			
Method	Results	Remarks	Reference
RABBIT Occlusive treatment (on each animal 2 sites were abraded and 2 sites were intact skin) Observation at 24/72 hours OECD Guideline 404	Irritating Mean erythema score: 3.9 of max 4 (on intact skin at 24 h/ 72h), Average edema score: 2.96 of max 4 (on intact skin at 24 h/72h),	Key study EC:941-364-9 Reliable with restrictions	American Petroleum Institute (API) 1980

c) Serious eye damage/irritation:

The potential for eye irritation of samples belonging to the VGOs/HGOs/Distillate Fuels category has been tested in a large number of studies typically conducted on rabbits. The conclusions of these studies indicate an absence of significant irritation on the eyes and therefore no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Serious eye damage/irritation			
Method	**Results**	**Remarks**	**Reference**
RABBIT Observation at 24/48/72 hours OECD Guideline 405	Non-irritating Cornea opacity score: 0 Iris score: 0 Conjunctivae score: 0 Chemosis score: 0	Key study Reliable without restrictions CAS 68334-30-5	American Petroleum Institute (API) 1980b

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Serious eye damage/irritation			
Method	**Results**	**Remarks**	**Reference**
RABBIT Observation at 24/48/72 hours OECD Guideline 405	Non-irritating Cornea opacity score: 0 Iris score: 0 Conjunctivae score: 0.11 Chemosis score: not measured/tested	Key study Reliable without restrictions EC:941-364-9	American Petroleum Institute (API) 1980b

d) Respiratory or skin sensitization

Respiratory sensitization

Information not available. This endpoint is not a REACH requirement.

Skin sensitization

Numerous skin sensitization studies have been conducted on samples belonging to the category of VGOs/HGOs/Distillate Fuels. The results obtained from these studies indicate the absence of skin sensitisation potential, therefore no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Skin sensitization			
Method	**Results**	**Remarks**	**Reference**
Guinea pig (Hartley) male *In vivo* (non-LLNA) OECD Guideline 406	Not sensitising	1 (reliable without restriction) key study CAS 68334-30-5	American Petroleum Institute (API) 1980

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Skin sensitization			
Method	**Results**	**Remarks**	**Reference**
Guinea pig (albino) male *In vivo* (non-LLNA) OECD Guideline 406	Not sensitising	1 (reliable without restriction) key study EC:941-364-9	American Petroleum Institute (API) 1980

e) Germ cell mutagenicity:

The mutagenic potential of samples belonging to the VGOs/HGOs/Distillate Fuels category has been extensively studied in a series of in vivo and in vitro tests. Most studies showed no consistent evidence of mutagenic activity, so no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Germ cell mutagenicity			
Method	**Results**	**Remarks**	**Reference**
In vitro data			
In vitro genic mutation in *Salmonella thyphimurium* TA 1535. TA 1537. TA 98. TA 100 and E. coli WP2 (Test di Ames, Bacterial reverse mutation assay) Dose: 5000 µl/plate OECD Guideline 471 Equivalent or similar to guideline ASTM E 1687-10	Negative	Key study Reliable without restriction (Distillates (petroleum), solvent-refined light paraffinic)	Covance Study director 2021
In vitro genic mutation in *Salmonella thyphimurium* TA 98 Doses: 0. 12. 24. 36. 48. 60 µl/plate OECD Guideline 471	Negative	Key study Reliable without restriction CAS: 64741 -43 -1	May K.(2013)
In vivo data			
Micronucleus assay (chromosome aberration) MOUSE (M/F) oral Doses: 1.0. 2.5. 5.0 g/kg equivalent or similar to OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)	Negative	2 (reliable with restrictions) key study CAS 68476-30-2	McKee, R.H., Amoruso, M.A., Freeman, J.J., Przygoda, R.T. 1994

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Germ cell mutagenicity			
Method	**Results**	**Remarks**	**Reference**
In vitro data			
In vitro genic mutation in *Salmonella thyphimurium* TA 1535. TA 1537. TA 98. TA 100 and E. coli WP2 (Test di Ames, Bacterial reverse mutation assay) OECD Guideline 471 EU Method B.13/14 EPA OPPTS 870.5100	Negative	Key study Reliable without restriction EC: 941-364-9	Christine Mee 2021
in vitro mammalian cell micronucleus tes on human lymphoblastoid cells (TK6) OECD Guideline 487	Negative	Key study Reliable without restriction EC: 941-364-9	Clare K. 2021
In vivo data			
No relevant information available			

f) Carcinogenicity

VGOs/HGOs/Distillate Fuels exhibit various levels of activity in carcinogenicity assays: some components have a low carcinogenic potential, while others have a marked potential. Carcinogenic activity has always been found in the presence of dermal irritation. However, given the dubious adequacy of studies on polycyclic aromatic hydrocarbons and the high levels of phenanthrene and pyrene in some samples tested in key studies, a genotoxic mechanism by VGOs/HGOs/Distillate Fuels gas oils cannot be excluded. Therefore it is assigned the classification Carc. 2; H351 according to CLP Regulation.

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Carcinogenicity			
Method	**Results**	**Remarks**	**Reference**
MOUSE (males) Route of exposure: Dermal Servings: 25 µl Exposure half life (3 times a week) During the course of the study, investigations were carried out on skin tumors. At the end of the study, animals were also observed for internal tumors.	Development of skin tumors has been found.	Key study Reliable with restrictions CAS 68476-30-2	Biles, R.W., Mckee, R.H., Lewis, S.C., Scala, R.A., DePass, L.R. (1988)

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Carcinogenicity			
Method	**Results**	**Remarks**	**Reference**
MOUSE (males) Route of exposure: Dermal Servings: 25 µl Exposure half life (3 times a week) During the course of the study, investigations were carried out on skin tumors. At the end of the study, animals were also observed for internal tumors.	Development of skin tumors has been found.	Key study Reliable with restrictions EC: 941-364-9	Biles, R.W., Mckee, R.H., Lewis, S.C., Scala, R.A., DePass, L.R. (1988)

g) Reproductive toxicity

Reproductive toxicity effects have been observed in numerous studies.

An oral rat study on CAS 64741-58-8 showed developmental toxicity (increased resorptions) and delayed ossification.

In three oral studies on substances belonging to the category with the highest content of 3+ ring PAHs (polyaromatic hydrocarbons) (CAS numbers 64741-58-8. 68476-31-3. and 64741-49-7), severe and irreversible embryonic/fetal lethality was observed at doses above 300 mg/kg/day.

The observed effects do not appear to be related to maternal toxicity.

Considering whether the classifiable changes can be categorised into development or sexual function and fertility effects, it is also concluded that effects cannot be clearly assigned. This reflects that there are classifiable effects across both categories, namely, the numbers of implantations (a fertility change), adverse pregnancy outcome (a fertility change), death of the developing organism (a development change) and altered growth (a development change).

Therefore it is assigned the classification Repr. 1B; H360FD according to CLP Regulation.

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Toxicity for reproduction–Effects on Fertility			
Method	**Result**	**Comments**	**Source**
RAT (Wistar) M/F Screening for reproductive / developmental toxicity oral: feed Doses: 100. 300. 750. 1000 mg/kg OECD Guideline 422	**First parental generation (P0)** NOAEL: 100 mg/kg (reproductive performance) **F1 generation:** NOAEL: 300 mg/kg (body weight and weight gain associated with poor maternal weight gain) **Overall reproductive toxicity:** YES (Lowest effective dose / concentration: 300mg/kg bw/day (nominal))	Key study Reliable without restriction CAS 64741-58-8	Adgyl Lifesciences Study Director (2023)
RAT (Wistar) M/F Screening for reproductive / developmental toxicity oral: feed Doses: 100. 300. 750. 1000 mg/kg OECD Guideline 422	**First parental generation (P0)** NOAEL: 750mg/kg (male) (no adverse effects) NOAEL: 300 mg/kg (female) (body weight and weight gain; food consumption and compound intake ; reproductive performance - number of implants and mean litter size) **F1 generation:** NOAEL: 750 mg/kg (no adverse effects) **Overall reproductive toxicity:** YES (Lowest effective dose / concentration: 750mg/kg bw/day (nominal))	Key study Reliable without restriction CAS 64741-49-7	Adgyl Lifesciences Study Director (2023)
Toxicity for reproduction – Developmental toxicity			

Toxicity for reproduction–Effects on Fertility			
Method	**Result**	**Comments**	**Source**
RAT (Wistar) M/F Developmental toxicity / teratogenicity study Orale: gavage Doses: 0. 100. 300. 1000 mg/kg Exposure: Gestation day 5 to Gestation day 19 (daily) OECD Guideline 414	**Maternal toxicity:** NOEL: 100 mg/kg (body weight and food consumption **Developmental toxicity:** NOEL: 100 mg/kg (increase in the number of resorptions) **Teratogenicity:** NOAEL: 1000 mg/kg (fetal external, visceral, and skeletal examinations did not reveal any teratogenic effect due to treatment) NOEL: 300 mg/kg (delayed ossification) **Tossicità per lo sviluppo complessiva:** yes Lowest effective dose / concentration: 300mg/kg bw/day Relation to maternal toxicity: not specified	Key study Reliable without restriction CAS 64741-58-8	Adgyl Lifesciences Study Director (2024)

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Toxicity for reproduction–Effects on Fertility			
Method	**Result**	**Comments**	**Source**
RAT (Wistar) M/F Screening for reproductive / developmental toxicity oral: feed Doses: 0; 100; 300; 1000 mg/kg OECD Guideline 422 EPA Health Effects Test Guideline OPPTS 870.3650	**First parental generation (P0)** NOAEL ≥ 1000 mg/kg (male/female) (Based on the lack of adverse treatment-related effects observed at the highest dose tested) **F1 generation:** NOAEL: ca.300 mg/kg (body weight and weight gain associated with poor maternal weight gain) **Overall reproductive toxicity:** NO (Lowest effective dose / concentration)	Key study Reliable without restriction EC: 941-364-9	van Vessem, B.S. 2022
Toxicity for reproduction – Developmental toxicity			
Method	**Result**	**Comments**	**Source**
RAT (Wistar) M/F Developmental toxicity / teratogenicity study Orale: gavage Doses: 0. 100. 300. 1000 mg/kg Exposure: Daily from day 6 to 20 post coitum OECD Guideline 414 EU Method B.31 EPA OPPTS 870.3700	**Maternal animals:** NOEL ≥ 1000 mg/kg bw/ day (Maternal abnormalities no effects observed localization) **Fetuses:** NOEL ≥ 1000 mg/kg bw/ day (Fetal abnormalities effects observed, non-treatment-related) **Overall developmental toxicity:** NO (Lowest effective dose / concentration)	Key study Reliable without restriction EC: 941-364-9	Langedijk, J. and Hartman-Van Dycke, K 2022

h) STOT-single exposure

VGOs/HGOs/Distillate fuels do not present specific toxicity for particular organs, therefore no classification is necessary according to CLP Regulation (based on available data, the classification criteria are not met).

i) STOT-repeated exposure:

The results of oral studies showed a NOAEL of 100 mg/kg and do not require the assignment of a classification for repeated dose toxicity.

For sub-chronic inhalation toxicity of VGOs/HGOs/Distillate fuels, a conservative sub-chronic NOAEC of 880 mg/m3 was determined for local effects on the lung (increased relative wet weight in the absence of histopathological change). A NOAEC of >1710 mg/m3 was established for systemic effects, based on no significant findings at this level (OECD 413). A NOAEL of 30 mg / kg / day by the dermal exposure route, associated with liver and thymus effects.

The overall weight of evidence indicates it is necessary to assign the classification Rep.Exp.2 H373 according to CPL regulations.

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

STOT - repeated exposure			
Method	**Result**	**Comments**	**Source**
Oral			
RAT (M/F) sub-chronic toxicity: oral oral: feed (90 consecutive days) Vehicle: powdered rodent diet Diet was available ad libitum. Doses: 100. 300. 1000 mg/kg bw/day OECD Guideline 408	NOAEL: 100 mg/kg bw/day (body weight and weight gain)	Key study Reliable without restriction CAS 64741-58-8	Adgyl Life Sciences Study Director 2025:
Inhalation			
Method	**Result**	**Comments**	**Source**
RAT (M/F) Inhalation (aerosol) Doses / Concentrations: 0. 0.25. 0.75. or 1.50 mg/L Basis: nominal conc. Exposure: 13 weeks (sub-chronic) 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 CAS 68334-30-5	Lock, S., Dalbey, W. Schmoyer, R., Griesemer, K. (1984)
Dermal			
Method	**Result**	**Comments**	**Source**
RAT (M/F) sub-chronic toxicity: (13 weeks (5 days per week)) Doses: 100. 300. and 600 mg/kg/day OECD Guideline 411	NOEL: 600 mg/kg (no adverse effects noted at top dose tested)	Key study Reliable without restriction CAS 68334-30-5	WIL Study Director 2012
RAT (M/F) Exposure: subchronic (continuous for 13 weeks (5 days a week)) Doses: 30. 125. and 500 mg/kg/day OECD Guideline 411	NOAEL (clinical signs; body weight; haematology; clinical chemistry; organ weights): 30 mg/kg/day (M/F)	Key study Reliable with restrictions CAS 64741-49-7	Mobil 1989a

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

STOT - repeated exposure			
Method	**Result**	**Comments**	**Source**
Oral			
RAT (M/F) sub-chronic toxicity: oral oral: feed (90 consecutive days) Vehicle: powdered rodent diet Diet was available ad libitum. Doses: 0. 100. 300. 1000 mg/kg bw/day OECD Guideline 408 EPA OPPTS 870.3100 EU Method B.26 OECD Guideline 422 EPA Health Effects Test Guideline OPPTS 870.3650 EU Method B.7	NOAEL: ca.100 mg/kg bw/day (nominal) (male): Taking into consideration the alpha 2µ-globulin nephropathy observed in the kidney of male rats at 300 and 1000 mg/kg/day. NOAEL: ≥1000 mg/kg bw/day (male/female) based on the lack of adverse treatment-related effects observed at the highest dose tested	Key study Reliable without restriction EC: 941-364-9	van Vessem, B.S. 2022
Inhalation			
No relevant information available.			
Dermal			
No relevant information available.			

The component EC 700-571-2 (Renewable hydrocarbons (diesel type fraction), has a NOAEL (oral, rat, 90 days) ≥ 1000 mg/kg body weight/day (OECD 408 - (Read-across) (Dhinsa, NK; Brooks, P and Watson, P; 2009

j) aspiration hazard:

Since the gas oil have a viscosity <20.5 mm2/s at 40°C, according to CLP Regulation, it is assigned the classification Asp. Tox. 1; H304

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

The mixture is not classified for endocrine disruption to health due to lack of data.

11.2.2 Other information

The product has moderate ability to provoke photo irritation.

SECTION 12: ECOLOGICAL INFORMATION

The information given in this section is related to the dangerous components of the mixture UVCB substance: Gas Oil (CAS 68334-30-5) and Petroleum gas oil, co-processed (EC: 941-364-9)

Based on the ecological information below (the toxicity of fish, invertebrate and algae), according to CLP regulation it is assigned the classification Aquatic Chronic 2; H411

12.1 Toxicity

Below is a summary of the most representative studies of the Registration Dossier for the main dangerous component UVCB: FUELS DIESEL (EC: 269-822-7)

Aquatic toxicity		
Endpoint	**Result**	**Comments**
Invertebrates *Daphnia magna* Short term	EL50 48/h: 2.82 – 757.45 mg/l (CAS 64741-49-7) EL50 48/h: 16.68 - 1000 mg/l (CAS 64741-58-8) EL50 48/h: 4.23 - 1000 mg/l (CAS 64741-77-1) EL50 48/h: 6.73 - 1000 mg/l (CAS 68334-30-5 EL50 48/h: 3.81- 1000 mg/l (CAS 68476-30-2) EL50 48/h: > 1000 mg/l (CAS 68476-31-3) EL50 48/h: 26.48 – 194.81 mg/l (CAS 68476-34-6)	Key study Reliable with restrictions QSAR. Redman, et Al.(2017)
Invertebrates *Daphnia magna* Long term	EL10 (21 d): 0.15-0.32 mg/l (CAS 64741-49-7) EL10 (21 d): 0.19 - 1000 mg/l (CAS 64741-77-1) EL10 (21 d): 0.24 - 1000 mg/l (CAS 64741-58-8) EL10 (21 d): 0.21 – 1.14mg/l (CAS 68334-30-5 EL10 (21 d): 0.18 – 3.3 mg/l (CAS 68476-30-2) EL10 (21 d): 0.9 – 4.55 mg/l (CAS 68476-31-3) EL10 (21 d): 0.34 – 0.63 mg/l (CAS 68476-34-6)	Key study Reliable with restrictions QSAR. Redman, et Al.(2017)
Algae *Raphidocelis subcapitata*	EL50 72/h: 2.64 – 138.8 mg/l (CAS 64741-49-7) EL10 72/h: 0.17-0.37 mg/l (CAS 64741-49-7) EL50 72/h: 13.93 - 1000 mg/l (CAS 64741-58-8) EL10 72/h: 0.28 - 1000 mg/l (CAS 64741-58-8) EL50 72/h: 3.83 - 1000 mg/l (CAS 64741-77-1) EL10 72/h: 0.22 - 1000 mg/l (CAS 64741-77-1) EL50 72/h: 6.06 – 1000 mg/l (CAS 68334-30-5 EL10 72/h: 0.24 – 1.31 mg/l (CAS 68334-30-5 EL50 72/h: 3.44 – 1000 mg/l (CAS 68476-30-2) EL10 72/h: 0.2 – 3.68 mg/l (CAS 68476-30-2) EL50 72/h: >1000 mg/l (CAS 68476-31-3) EL10 72/h: 1.07 – 5.03 mg/l (CAS 68476-31-3) EL50 72/h: 20.86 – 115.15 mg/l (CAS 68476-34-6) EL10 72/h: 0.38 – 0.69 mg/l (CAS 68476-34-6)	Key study Reliable with restrictions QSAR. Redman, et Al.(2017)
Fish *Pimephales promelas* Short term	LL50 96/h: 3.27 - 1000 mg/l (CAS 64741-49-7) LL50 96/h: 23.32 - 1000 mg/l (CAS 64741-58-8) LL50 96/h: 4.94 - 1000 mg/l (CAS 64741-77-1) LL50 96/h: 8.21 - 1000 mg/l (CAS 68334-30-5) LL50 96/h> 1000 mg/l (CAS 68476-31-3) LL50 96/h: 4.44 - 1000 mg/l (CAS 68476-30-2) LL50 96/h: 36.62 – 475.86 mg/l (CAS 68476-34-6)	Key study Reliable with restrictions QSAR. Redman, et Al.(2017)
Fish *Pimephales promelas* Long term	EL10 (32 d): 0.16 – 0.36 mg/l (CAS 64741-49-7) EL10 (32 d): 0.26 - 1000 mg/l (CAS 64741-58-8) EL10 (32 d): 0.21 - 1000 mg/l (CAS 64741-77-1) EL10 (32 d): 0.23- 1.32 mg/l (CAS 68334-30-5) EL10 (32 d): 0.2- 4.05 mg/l (CAS 68476-30-2) EL10 (32 d): 1.04-5.73 mg/l (CAS 68476-31-3) EL10 (32 d): 0.37 – 0.7 mg/l (CAS 68476-34-6)	Key study Reliable with restrictions QSAR. Redman, et Al.(2017)

Below is a summary of the most representative studies of the Registration Dossier for the dangerous component UVCB: Petroleum gas oil, co-processed (EC: 941-364-9)

Aquatic toxicity		
Endpoint	**Result**	**Comments**
Invertebrates *Daphnia magna* Short term	EL50 24/h > 1000mg/L EL50 48/h: 210 mg/L NOEL 48/ h: 46 mg/L	Key study Reliable with restrictions EC: 941-364-9 Girling, A and Cann, B; 1996
Invertebrates *Daphnia magna* Long term (Q)SAR: PETROTOX computer model (versionE 4.01)	EL10 (21 d): 0,65 mg/L	Key study Reliable with restrictions EC: 941-364-9 Concawe
Algae *Raphidocelis subcapitata* OECD Guideline 201 EU Method C.3	EbL50 24/h > 30 mg/L EbL50 48/h: 18 mg/L EbL50 72/h: 10 mg/L ErL50 24/h > 30 mg/L ErL50 48/h: 28 mg/L ErL50 72/h: 22 mg/L NOEL 24/h: 10 mg/L NOEL 48/h: 3 mg/L NOEL 72/h: 1 mg/L NOEL 24/h > 30 mg/L NOEL 48/h: 10 mg/L NOEL 72/h: 3 mg/L	Key study Reliable with restrictions EC: 941-364-9 Girling, A and Cann, B; 1996
Fish *Pimephales promelas* Short term OECD Guideline 203 EU Method C.1	LL50 24/h >1000 mg/L LL50 48/h: 180 mg/L LL50 72/h: 150 mg/L LL50 96/h: 65 mg/L	Key study Reliable with restrictions EC: 941-364-9 Girling, A and Cann, B; 1996
Fish *Pimephales promelas* Long term (Q)SAR: PETROTOX computer model (versionE 4.01)	EL10 (28 d): 0,26 mg/L	Key study Reliable with restrictions EC: 941-364-9 Concawe

12.2 Persistence and degradability

Abiotic degradability

Hydrolysis:

FUELS DIESEL (EC: 269-822-7): Gas oils are resistant to hydrolysis due to the lack of a functional group that is hydrolytically reactive. Therefore, this process will not contribute to a measurable loss of degradation of the substance in the environment. Test not applicable to UVCB substances. The calculated daily degradation rate constants for representative structures of the substances range between 0.08 and 9.76.

Petroleum gas oil, co-processed (EC: 941-364-9): The chemical constituents of diesel/gas oil fractions consist entirely of carbon and hydrogen and do not contain hydrolyzable groups. As such, they have a very low potential to hydrolyze. Therefore, this degradation process will not contribute to their removal from the environment.

Photolysis in the air:

Test not applicable to UVCB substances.

FUELS DIESEL (EC: 269-822-7):	The calculated daily degradation rate constants for representative structures of the substances range between 0.08 and 9.76.
Petroleum gas oil, co-processed (EC: 941-364-9):	This endpoint is not a REACH requirement.

Photolysis in water and soil:

FUELS DIESEL (EC: 269-822-7):	Test not applicable to UVCB substances. Direct photolysis was found to be only relevant for substances with aromatic ring structures that absorb sunlight. The predicted direct photolysis rates ranged from approximately 0.001 d-1 for substances like dibenzothiophene, to >1 d-1 for anthracene, benzo[a]pyrene, and phenylamine. The indirect rates ranged from approximately 0.003 d-1 to 0.2 d-1.
Petroleum gas oil, co-processed (EC: 941-364-9):	This endpoint is not a REACH requirement.

Biotic degradation

FUELS DIESEL (EC: 269-822-7):	In the study conducted with the two gas oils, approximately 55-75% and approximetely 70-80% of the initial mass as measured by the GCxGC analysis was lost, after 28 days, for VHGO and SRGO, respectively, while 73–81% and 84–88% of the initial mass had been lost at the end of the incubation period (day 64), respectively. Therefore, the results indicate that the majority of the constituents of the gas oils undergo rapid biodegradation in marine environment.
Petroleum gas oil, co-processed (EC: 941-364-9):	Ready biodegradability: 69% after 28d (OECD Guideline 301 F)
Renewable hydrocarbons (diesel type fraction) (EC: 700-571-2):	Readily biodegradable. Biodegradation: 82 % (28 days) (OECD 301B - Read-across) (Clarke, N, 2008)

12.3 Bioaccumulative potential

The test methods for this endpoint are not applicable to UVCB substances.

FUELS DIESEL (EC: 269-822-7):	The predicted BCF for representative constituents of VHGO category substances range from 3.16 to 70.794.58 L/kg using the BCFBAF model and 0.78 to 17.432 L/kg using the Arnot-Gobas BCFBAF model. It should be borne in mind that this is the full range of predicted values, and that this may not be representative of the properties of the UVCB substances as a whole. The range should therefore be treated with caution and not taken out of context.
Petroleum gas oil, co-processed (EC: 941-364-9):	The estimated BCF values of representative constituents range from 3.16 to 19,055 L/kg and 0.42 to 1,411 L/kg using the Arnot-Gobas BCFBAF model. The predicted BCFs for hydrocarbons are generally overly conservative since biotransformation is not quantitatively taken into account. Therefore, indirect exposure and resulting risk estimates predicted by PETRORISK are likely to be overestimated.
Renewable hydrocarbons (diesel type fraction) (EC: 700-571-2):	Log Kow: ≈ 8.4 (20 °C) - EU A8. . The test methods for this endpoint are not applicable to UVCB substances.

12.4 Mobility in soil

FUELS DIESEL (EC: 269-822-7):	Calculated log Koc for constituents of the VHGO substances range between 1.73 and 11.06. It should be borne in mind that this is the full range of predicted values, and that this may not be representative of the properties of the UVCB substances as a whole. The range should therefore be treated with caution and not taken out of context.
Petroleum gas oil, co-processed (EC: 941-364-9):	Testing is not scientifically necessary and the endpoint has been fulfilled using QSAR calculations for relevant constituents. PETRORISK model (version 8.01) predicted a log Koc to be between 2.26 and 11.1.
Renewable hydrocarbons (diesel type fraction) (EC: 700-571-2):	Log Koc > 5.63. (O'Connor B J, Woolley S M 2009)

12.5 Results of PBT and vPvB assessment

The gas oil component does not meet the PBT or vPvB classification criteria set out in Annex XIII of Regulation (EC) No. 1907/2006 and s.m.i. (REACh) and Annex I of Regulation 1272/2008 and s.m.i. (CLP).

Some polyaromatic hydrocarbons (PAH) and naphthenic polyaromatic hydrocarbon (NPAH) substances have been identified by ECHA as PBT and/or vPvB via the process of substance inclusion on the Candidate List of substances of very high concern (SVHCs) for Authorisation.

However, the available analytical methodology has not yet been validated for classification purposes to provide a conclusive measurement of constituents that are SVHC or selected as PBT/vPvB in UVCB substances.

Some samples of the UVCB substance EC 269-822-7 may contain substances listed on the SVHC list as PBT/vPvB at concentrations above 0.1% (PHA - Concawe_Evaluation of PBT for Petroleum Hydrocarbons, Revision 2 July 2019). No other representative hydrocarbon structures were found that meet the PBT/vPvB criteria (Concawe document "*An Evaluation of the Persistence, Bioaccumulation, Mobility and Toxicity of Petroleum Hydrocarbons*" – Revision 3 - 2024).

The other two hazardous components of the mixture: Petroleum gas oil, co-processed (EC: 941-364-9) and Renewable hydrocarbons (diesel type fraction) (EC: 700-571-2) do not meet the PBT or vPvB classification criteria set out in Annex XIII of Regulation (EC) No. 1907/2006 and s.m.i. (REACh) and Annex I of Regulation 1272/2008 and s.m.i. (CLP).

12.6 Endocrine disrupting properties

The mixture is not classified for endocrine disruption to the environment due to lack of data.

12.7 Other adverse effects

The gas oil component is not classified as PMT or vPvM. Although some components of the UVCB substance EC 269-822-7 have been classified as Mobile and some as Very Mobile, these components are not classified as Toxic or Very Persistent respectively, therefore based on the available data, no PMT/vPvM constituents are present (Concawe document "*An Evaluation of the Persistence, Bioaccumulation, Mobility and Toxicity of Petroleum Hydrocarbons*" – Revision 3 – 2024).

The other two hazardous components of the mixture: Petroleum gas oil, co-processed (EC: 941-364-9) and Renewable hydrocarbons (diesel type fraction) (EC: 700-571-2) do not meet the classification criteria for PMT or vPvM.

This product may contribute to the formation of ozone in the surface atmosphere.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not discharge on the ground or in sewers, tunnels and waterways.

Dispose wastes and contaminated packaging according to Directive 2008/98/EC and f.a. and official local/national regulations.

European Waste Catalogue code(s) (Decision 2014/955/EU): 13 07 01* – 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.

SECTION 14. TRANSPORT INFORMATION

Regulations applicable to road transport
ADR Agreement, Annexes A and B

Regulations applicable to rail transport
COTIF Convention, Appendix C, RID Regulation

Regulations applicable to inland waterway transport
ADN Agreement, Annex

Regulations applicable to maritime transport
IMDG Code

Regulations applicable to air transport
ICAO Technical Instructions
IATA DGR Manual

14.1 UN number or ID number

1202

14.2 UN proper shipping name

GAS OIL or DIESEL FUEL or HEATING OIL LIGHT

14.3 Transport hazard class(es)

Road transport (ADR):	Class: 3	
	Subsidiary hazards:	-
Railway transport (RID):	Class: 3	
	Subsidiary hazards:	-
Inland waterways transport (ADN):	Class: 3	
	Subsidiary hazards:	N2, F
Sea transport (IMDG):	Class: 3	
	Subsidiary hazards:	-
Air transport (IATA):	Class: 3	
	Subsidiary hazards:	-

14.4 Packing group

III

14.5 Environmental hazards

Road transport (ADR):	Environmentally hazardous
Railway transport (RID):	Environmentally hazardous
Inland waterways transport (ADN):	Environmentally hazardous
Sea transport (IMDG):	Marine Pollutant (MP)
Air transport (IATA):	Environmentally hazardous

14.6 Special precautions for user

Carriage, 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.
Ensure that the transfer of the material under conditions of containment or extraction ventilation.
During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.
Further prescriptions are reported in the applicable regulations.

General additional information

Mark and labeling:	MODEL No. 3 LABEL + ENVIRONMENTALLY HAZARDOUS
(except packaging or carriagew in exemption)	SUBSTANCE MARK

Additional information on raod transport (ADR)

Transport category according to ADR 1.1.3.6:	3
Tunnel restriction code:	(D/E)
Hazard Identification Number (tank):	30
High Consequence Dangerous Goods (HCDG):	NO

Additional information on railway transport (RID)

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

Additional information on internal waterways transport (ADN)

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

Additional information on sea transport (IMDG)

Emergency Schedules	EmS F-E, S-E

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

14.7 Transport in bulk according to IMO instruments

Not applicable (Annex I of MARPOL)

SECTION 15. REGULATORY INFORMATION

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

- Authorisations according to REACH Regulation (Title VII): the product is not subjected.
- Restrictions according to REACH Regulation (Title VIII): Annex XVII Entrie 3, 40, 75

Other UE and National Regulations:

- The product is dangerous under the Seveso Regulation (Dir. 2012/18/UE):
- Annex 1, part 1: Category P5c-Flammable liquids
    - Category E2- Hazardous to the Aquatic Environment in category chronic 2
- Annex 1 part 2: category 34 petroleum products and alternative fuels
- *Directive 98/24/EC and f.a. (chemical agents):* product subject
- *Directive 2004/37/EC and f.a. (Carcinogens, mutagens or reprotoxic substances):* product subject
- Dispose wastes and contaminated packaging according to official regulations.

15.2 Chemical safety assessment

Chemical safety assessment has been carried out for the components:

EC 269-822-7/ CAS 68334-30-5 (fuels, diesel, gasoil)

EC 941-364-9 ((Petroleum gasoil fraction, co-processed with renewable hydrocarbons of plant and/or animal origin):

EC 700-571-2 (Renewable hydrocarbons (diesel type fraction))

SECTION 16. OTHER INFORMATION

List of relevant hazard statements:

H226: Flammable liquid and vapour.

H304: May be fatal if swallowed and enters airways.

H315: Causes skin irritation.

H351: Suspected of causing cancer.

H360FD: May damage fertility and the unborn child

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

H411: Toxic to aquatic life with long lasting effects.

EUH066: Repeated exposure may cause skin dryness or cracking

Advice on any training appropriate for workers:

Properly train all workers that are potentially exposed to this product on the basis of the contents of this safety data sheet.

Note to the CLP classification of mixtures: procedure used

Calculation method

Key literature references and sources for data:

FUELS DIESEL

REACH registration dossier for EC 269-822-7

CSR 2025

Petroleum gasoil fraction, co-processed with renewable hydrocarbons of plant and/or animal origin

REACH registration dossier for EC 941-364-9

CSR 2025

Renewable hydrocarbons (diesel type fraction)

REACH registration dossier for EC 700-571-2

CSR 2023

SDS of the supplied raw materials.

Legend of 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

PMT = Persistent, Mobile and Toxic Substance

SEm: = Emergency Response Procedures for Ships Carrying Dangerous Goods (Ems Guide)

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

vPvM = very Persistent and very Mobile

Note N – The harmonised classification as a carcinogen applies unless the full refining history is known and it can be shown that the substance from which it is produced is not a carcinogen, in which case a classification in accordance with Title II of this Regulation shall be performed also for that hazard class.

Safety Data Sheet in according to Annex II of EC Regulation no. 1907/2006 and subsequent amendments (amended by Reg.878/2020)

Revision Index:

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Revision Date: 20/05/2016
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Addition of new precautionary statement P210 and P273
Deletion of Note H
Section 8 updated
Section 14 updated
Section 15, subsection 15.1 updated
Exposure scenario updated

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Grounds for review: *Se*ction 1 updated
Section 3 updated
Section 8 updated
Section 16
Exposure scenario updated

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Grounds for review: *Se*ction 14 updated

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Revision Number: 06
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Revision Number: 08
Revision Date: *03/04/2026*
Reasons for review Rev07 (20/11/2025): update of sections 2. 4. 5. 6. 7. and 8.

Annex 1

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Exposure scenario for EC 700-571-2 168

Exposure scenarios for EC 269-822-7

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
M-1 01 – Manufacture of Substance	Manufacture	-	-	1. 2. 3. 4. 8a, 8b, 9. 15. 28	1	ESVOC SpERC 1.1.v3
F-4 02 - Formulation & (re)packing of substances and mixtures	Formulation	-	-	1. 2. 3. 4. 5. 8a, 8b, 9. 14. 15. 28	2	ESVOC SpERC 2.2.v3
IW-15 12a - Use in fuel; industrial	Industrial	-	13	1. 2. 8a, 8b, 16. 28	7	ESVOC SpERC 7.12a.v4
PW-16 12b - Use in fuel; professional	Professional	-	13	1. 2. 8a, 8b, 16. 28	9a, 9b	ESVOC SpERC 9.12b.v3
C-17 12c - Use in fuel; consumer	Consumer	-	13	-	9a, 9b	ESVOC SpERC 9.12c.v3

Summary of Exposure scenarios for EC 269-822-7

M1 -01. Manufacture of the substance ..... **Errore. Il segnalibro non è definito.**
F4 – 02. Formulation & (re)packing of substances and mixtures ..... **Errore. Il segnalibro non è definito.**
IW15 – 12a. Use in fuel; Industrial ..... **Errore. Il segnalibro non è definito.**
PW16 – 12b. Use in fuel; Professional ..... **Errore. Il segnalibro non è definito.**
C17 – 12c. Use in fuel; Consumer ..... **Errore. Il segnalibro non è definito.**

M1 -01. Manufacture of the substance

Section 1	
Title	
01 – Manufacture of the substance	
Use descriptor	
Sector(s) of use	
Process categories	1. 2. 3. 4. 8a, 8b, 9. 15. 28
Environmental release categories	1
Specific Environmental Release Category	ESVOC SpERC 1.1.v3
Processes, tasks, activities covered	
Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), 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	
Worker contributing scenario(s): CS1 – General exposures; Open systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9) CS2 – Laboratory activities (PROC15) CS3 – Bulk transfers; Closed systems (PROC 8b) CS4– Bulk transfers; Open systems (PROC 8b) CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28) CS6 – Storage (PROC2. PROC 1)	
Product characteristics	
Physical state of the product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation
Concentration of substance in the product	
For all CS	Covers percentage substance in the product up to 100%
Frequency and duration of use/exposure	
Duration of activity	
For all CS	≤ 8 h/day Covers daily exposures up to 8 hours
Technical and organisation conditions and measures	
CS1 – General exposures; Open systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)	Closed batch process with occasional controlled exposure Occupational Health and Safety Management System: Advanced Handle substance within a closed system Sample via a closed loop or other system to avoid exposure Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS2 – Laboratory activities (PROC15)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) Room ventilation: Basic (up to 3 ACH)
CS3 – Bulk transfers; Closed systems (PROC 8b)	Occupational Health and Safety Management System: Advanced Handle substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS4– Bulk transfers; Open systems (PROC 8b)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)

CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Occupational Health and Safety Management System: Advanced Standard Operating Procedures (SOP) maintenance (industrial) (Drain down and flush system prior to equipment break-in or maintenance.) Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS6 – Storage (PROC2. PROC 1)	Closed continuous process with occasional controlled exposure (Store substance within a closed system) Occupational Health and Safety Management System: Advanced Store substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance.
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)
General measures applicable to all activities	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.
Dermal protection	
For all CS	Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)
Respiratory protection	

For all CS	Not necessary
Face/eye protection	
For all CS	Not necessary
Other conditions affecting workers exposure	
Place of use (Indoor / Outdoor)	
CS1 – General exposures; Open systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9) CS3 – Bulk transfers; Closed systems (PROC 8b) CS4– Bulk transfers; Open systems (PROC 8b) CS6 – Storage(PROC2. PROC 1)	Outdoor
CS2 – Laboratory activities (PROC15) CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Indoor
Operating temperature	
CS1 – General exposures; Open systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)	≤ 25°C
CS2 – Laboratory activities (PROC15) CS4– Bulk transfers; Open systems (PROC 8b) CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28) CS6 – Storage (PROC2. PROC 1)	≤ 20°C (ambient temperature)
CS3 – Bulk transfers; Closed systems (PROC 8b)	≤ 40°C
Other	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
CS2 – Laboratory activities (PROC15)	Put lids (caps) on containers (bottles) immediately after use
CS4– Bulk transfers; Open systems (PROC 8b)	Ensure no splashing occurs during transfer
CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Wear suitable coveralls to prevent exposure to skin Clear spills immediately
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1.0
Regional use tonnage (tonnes/year)	199700000.0
Fraction of Regional tonnage used locally	0.0
Annual site tonnage (tonnes/year)	6675000
Maximum daily site tonnage (kg/day)	22250.0
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	14
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	0.1
Release fraction to wastewater from process (initial release prior to RMM)	0.0
Release fraction to soil from process (initial release prior to RMM)	0.0

Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	100.0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	100.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	0.0
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	22700000
Assumed domestic sewage treatment plant flow (m3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	
During manufacturing no waste of the substance is generated.	

Section 3 Exposure Estimation

3.1. Health

The ART tool has been used to estimate workplace exposures unless otherwise indicated.

CS1 – General exposures; Open systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	7.6 E-3 mg/m³ (ART 1.5) RCR = 1.38 E-3	Final RCR 0.051
	Vapour	0.27 mg/m³ (ART 1.5) RCR = 0.049	
Inhalation, systemic, acute	Aerosol	0.03 mg/m³ (ART 1.5) RCR = 7.09E-6 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	1.08mg/m³ (ART 1.5) RCR = 2.52E-4 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236

Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS2 – Laboratory activities (PROC15)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR < 0.01
	Vapour	4.2E-3 mg/m³ (ART 1.5) RCR = 0	
Inhalation, systemic, acute	Aerosol	0.03 mg/m³ (ART 1.5) RCR = 7.09E-6 **Supportive exposure (not used for RC):** 2 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.017 mg/m³ (ART 1.5) RCR = 3.92E-6 **Supportive exposure (not used for RC):** 14 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.034 mg/kg bw/day (TRA Workers) RCR = 0.012	Final RCR = 0.012
Dermal, local, long term	Dermal	9.92E-3 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	9.92E-3 mg/cm² (TRA Workers)	Qualitative risk

CS3 – Bulk transfers; Closed systems (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.016 mg/m³ (ART 1.5) RCR = 2.91E-3	Final RCR = 0.0422
	Vapour	2.3 mg/m³ (ART 1.5) RCR = 0.419	
Inhalation, systemic, acute	Aerosol	0.064 mg/m³ (ART 1.5) RCR = 1.49E-5 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	9.2 mg/m³ (ART 1.5) RCR = 2.15E-3 **Supportive exposure (not used for RC):** 490 mg/m³ (TRA Workers)	

Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk

CS4– Bulk transfers; Open systems (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.016 mg/m^3 (ART 1.5) RCR = 2.91E-3	Final RCR = 0.0422
	Vapour	2.3 mg/m^3 (ART 1.5) RCR = 0.419	
Inhalation, systemic, acute	Aerosol	0.064 mg/m^3 (ART 1.5) RCR = 1.49E-5 **Supportive exposure (not used for RC):** 70 mg/m^3 (TRA Workers)	Final RCR < 0.01
	Vapour	9.2 mg/m^3 (ART 1.5) RCR = 2.15E-3 **Supportive exposure (not used for RC):** 98 mg/m^3 (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk

CS5 – Equipment cleaning and maintenance (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.8E-4 mg/m^3 (ART 1.5) RCR = 5.1E-5	Final RCR = 0.291
	Vapour	1.6 mg/m^3 (ART 1.5) RCR = 0.291	
Inhalation, systemic, acute	Aerosol	1.12E-3mg/m^3 (ART 1.5) RCR = 2.61E-7 **Supportive exposure (not used for RC):** 200 mg/m^3 (TRA Workers)	Final RCR < 0.01

	Vapour	6.4 mg/m³ (ART 1.5) RCR = 1.49E-3 **Supportive exposure (not used for RC):** 280 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS6 – Storage (PROC2. PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR = 0.401
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 2.8 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk

3.2. Environment

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

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.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Available hazard data do not support the need for a DNEL to be established for other health effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation
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. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (https://www.esig.org/reach-ges/environment/#factsheets).

F4 – 02. Formulation & (re)packing of substances and mixtures

Section 1	
Title	
02 - Formulation & (re)packing of substances and mixtures	
Use descriptor	
Sector(s) of use	
Process categories	1. 2. 3. 4. 5. 8a, 8b, 9. 14. 15. 28
Environmental release categories	2
Specific Environmental Release Category	ESVOC SpERC 2.2v3
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, pelletisation, extrusion, large and small scale packing, sampling, 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	
Worker contributing scenario(s): CS1 - General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9) CS2 – Mixing operations; Open systems (PROC 5) CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 – Drum/batch transfers; Dedicated facility (PROC 8b) CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a) CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14) CS7 – Laboratory activities (PROC15) CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28) CS9 – Storage (PROC2. PROC 1)	
Product characteristics	
Physical state of the product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation
Concentration of substance in the product	
For all CS	Covers percentage substance in the product up to 100%
Frequency and duration of use/exposure	
Duration of activity	
CS1 - General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9) CS2 – Mixing operations; Open systems (PROC 5) CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 – Drum/batch transfers; Dedicated facility (PROC 8b) CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a) CS7 – Laboratory activities (PROC15) CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28) CS9 – Storage (PROC2. PROC 1)	≤ 8 h/day Covers daily exposures up to 8 hours
CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14)	≤ 4 h/day
Technical and organisation conditions and measures	

CS1 - General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)	Closed batch process with occasional controlled exposure Occupational Health and Safety Management System: Advanced Handle substance within a closed system Sample via a closed loop or other system to avoid exposure Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS2 – Mixing operations; Open systems (PROC 5)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH) Glove bag/box: non necessario Personal enclosure: Not necessary Vapour recovery system: Not necessary Downward laminar flow booth: Not necessary Segregation of the source: Not necessary Suppression techniques for solid products: Not necessary Containment: Not necessary
CS3 – Bulk transfers; Dedicated facility (PROC 8b)	Occupational Health and Safety Management System: Advanced Handle substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS4 – Drum/batch transfers; Dedicated facility (PROC 8b)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)	Occupational Health and Safety Management System: Advanced Use drum pumps Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) Room ventilation: Enhanced (5 to 10 ACH)
CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) Room ventilation: Basic (up to 3 ACH)
CS7 – Laboratory activities (PROC15)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) Room ventilation: Basic (up to 3 ACH)
CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Occupational Health and Safety Management System: Advanced Standard Operating Procedures (SOP) maintenance (industrial) (Drain down and flush system prior to equipment break-in or maintenance.) Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS9 – Storage (PROC2. PROC 1)	Occupational Health and Safety Management System: Advanced Closed continuous process with occasional controlled exposure(Store substance within a closed system) Store substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages

	- Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)
General measures applicable to all activities	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.
Dermal protection	
For all CS	Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)
Respiratory protection	
For all CS	Not necessary
Face/eye protection	
For all CS	Not necessary
Other conditions affecting workers exposure	
Place of use (Indoor / Outdoor)	
CS1 - General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9) CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 – Drum/batch transfers; Dedicated facility (PROC 8b) CS9 – Storage (PROC2. PROC 1)	Outdoor
CS2 – Mixing operations; Open systems (PROC 5) CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a) CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14) CS7 – Laboratory activities (PROC15) CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Indoor
Operating temperature	
CS1 - General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)	≤ 25°C (ambient temperature)
CS2 – Mixing operations; Open systems (PROC 5) CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 – Drum/batch transfers; Dedicated facility (PROC 8b)	≤ 20°C (ambient temperature)

CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a) CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14) CS7 – Laboratory activities (PROC15) CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28) CS9 – Storage (PROC2. PROC 1)	
Other	
CS2 – Mixing operations; Open systems (PROC 5)	Distance of the source to buildings: Close to buildings
CS2 – Mixing operations; Open systems (PROC 5)	Distance of workers to the source: < 1m
CS2 – Mixing operations; Open systems (PROC 5)	Open surface area of baths and reservoirs: 1–3 m2
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
CS7 – Laboratory activities (PROC15)	Put lids (caps) on containers (bottles) immediately after use
CS4 – Drum/batch transfers; Dedicated facility (PROC 8b) CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)	Ensure no splashing occurs during transfer
CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28)	Wear suitable coveralls to prevent exposure to skin Clear spills immediately

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1.0
Regional use tonnage (tonnes/year)	227900000
Fraction of Regional tonnage used locally	0.0
Annual site tonnage (tonnes/year)	30000
Maximum daily site tonnage (kg/day)	100
Frequency and duration of use	
Continuous release.	
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)	0.5
Release fraction to wastewater from process (initial release prior to RMM)	0.0
Release fraction to soil from process (initial release prior to RMM)	0.0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	99.2

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	99.2
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	0.0
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	101000
Assumed domestic sewage treatment plant flow (m3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

Section 3 Exposure Estimation

3.1. Health

The ART tool has been used to estimate workplace exposures unless otherwise indicated.

CS 1: General exposures; Closed systems (PROC 4. PROC 1. PROC 2. PROC 3. PROC9)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.045 mg/m³ (ART 1.5) RCR = 8.2 E-3	Final RCR 0.318
	Vapour	1.7 mg/m³ (ART 1.5) RCR = 0.31	
Inhalation, systemic, acute	Aerosol	0.18 mg/m³ (ART 1.5) RCR = 4.2E-5 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	6.8 mg/m³ (ART 1.5) RCR = 1.59E-3 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS2 – Mixing operations; Open systems (PROC 5)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification

Inhalation, systemic, long term	Aerosol	6E-3 mg/m³ (ART 1.5) RCR = 1.09 E-3	Final RCR 0.311
	Vapour	1.7 mg/m³ (ART 1.5) RCR = 0.31	
Inhalation, systemic, acute	Aerosol	0.1024 mg/m³ (ART 1.5) RCR = 5.6E-6 **Supportive exposure (not used for RC):** 100 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	6.8 mg/m³ (ART 1.5) RCR = 1.59E-3 **Supportive exposure (not used for RC):** 140 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	Qualitative risk

CS3 – Bulk transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.047 mg/m³ (ART 1.5) RCR = 8.56 E-3	Final RCR 0.482
	Vapour	2.6 mg/m³ (ART 1.5) RCR = 0.474	
Inhalation, systemic, acute	Aerosol	0.188 mg/m³ (ART 1.5) RCR = 4.38E-5 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	10.4 mg/m³ (ART 1.5) RCR = 2.43E-3 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS4 – Drum/batch transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.012 mg/m³ (ART 1.5) RCR = 2.19E-3	Final RCR 0.401
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0.048 mg/m³ (ART 1.5) RCR = 1.12E-5 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS5 – Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.15 mg/m³ (ART 1.5) RCR = 0.027	Final RCR 0.41
	Vapour	2.1 mg/m³ (ART 1.5) RCR = 0.383	
Inhalation, systemic, acute	Aerosol	0.6 mg/m³ (ART 1.5) RCR = 1.4E-4	Final RCR < 0.01
	Vapour	8.4 mg/m³ (ART 1.5) RCR = 1.96E-3	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS6 – Tabletting, compression, extrusion or pelletisation (PROC 14)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.6 mg/m³ (ART 1.5) RCR = 0.027	Final RCR 0.492
	Vapour	2.1 mg/m³ (ART 1.5) RCR = 0.383	
Inhalation, systemic, acute	Aerosol	4 mg/m³ (ART 1.5) RCR = 9.33E-4	Final RCR < 0.01
	Vapour	14 mg/m³ (ART 1.5) RCR = 3.26E-3	
Dermal, systemic, long term	Dermal	0.343 mg/kg bw/day (TRA Workers) RCR = 0.118	Final RCR = 0.118
Dermal, local, long term	Dermal	0.05 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.05 mg/cm² (TRA Workers)	Qualitative risk

CS7 – Laboratory activities (PROC15)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR < 0.01
	Vapour	4.2E-3 mg/m³ (ART 1.5) RCR = 0	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 2 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.017 mg/m³ (ART 1.5) RCR = 3.92E-6 **Supportive exposure (not used for RC):** 14 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.034 mg/kg bw/day (TRA Workers) RCR = 0.012	Final RCR = 0.012
Dermal, local, long term	Dermal	9.92E-3 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	9.92E-3 mg/cm² (TRA Workers)	Qualitative risk

CS8 – Equipment cleaning and maintenance (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.045 mg/m³ (ART 1.5) RCR = 8.2E-3	Final RCR = 0.318
	Vapour	1.7 mg/m³ (ART 1.5) RCR = 0.31	
Inhalation, systemic, acute	Aerosol	0.18 mg/m³ (ART 1.5) RCR = 4.2E-5 **Supportive exposure (not used for RC):** 200 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	6.8 mg/m³ (ART 1.5) RCR = 1.59E-3 **Supportive exposure (not used for RC):** 280 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS9 – Storage (PROC2. PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR = 0.401
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 2.8 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.47	Final RCR = 0.47
Dermal, local, long term	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk

Dermal, local, acute	Dermal	0.02 mg/cm^2 (TRA Workers)	Qualitative risk

3.2. Environment

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

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.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Available hazard data do not support the need for a DNEL to be established for other health effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation

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. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (https://www.esig.org/reach-ges/environment/#factsheets).

IW15 – 12a. Use in fuel; Industrial

Section 1	
Title	
12a. - Use in fuel; Industrial	
Use descriptor	
Sector(s) of use	
Process categories	1. 2. 8a, 8b, 16. 28
Environmental release categories	7
Specific Environmental Release Category	ESVOC SPERC 7.12a.v4
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additive) 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	
Worker contributing scenario(s): CS1 – General exposures; Closed systems; Use in contained systems(PROC 2. PROC 1) CS2 – Use of fuels; Closed systems (PROC 16) CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 - Drum/batch transfers; Dedicated facility (PROC 8b) CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28) CS6 – Storage (PROC2. PROC 1)	
Product characteristics	
Physical state of the product	
For all CS	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation
Concentration of substance in the product	
For all CS	Covers percentage substance in the product up to 100%
Frequency and duration of use/exposure	
Duration of activity	
For all CS	≤ 8 h/day Covers daily exposures up to 8 hours
Technical and organisation conditions and measures	
CS1 – General exposures; Closed systems; Use in contained systems(PROC 2. PROC 1)	Occupational Health and Safety Management System: Advanced Handle substance within a closed system Sample via a closed loop or other system to avoid exposure Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS2 – Use of fuels; Closed systems (PROC 16)	Occupational Health and Safety Management System: Advanced Handle substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 - Drum/batch transfers; Dedicated facility (PROC 8b)	Occupational Health and Safety Management System: Advanced Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)

CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)	Occupational Health and Safety Management System: Advanced Standard Operating Procedures (SOP) maintenance (industrial) (Drain down and flush system prior to equipment break-in or maintenance.) Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS6 – Storage (PROC2. PROC 1)	Occupational Health and Safety Management System: Advanced Closed continuous process with occasional controlled exposure(Store substance within a closed system) Store substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)
General measures applicable to all activities	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.
Dermal protection	
All CS eccetto quelli indicati sottto	Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)
CS2 – Use of fuels; Closed systems (PROC 16)	Not necessary

Respiratory protection	
For all CS	Not necessary
Face/eye protection	
For all CS	Not necessary
Other conditions affecting workers exposure	
Place of use (Indoor / Outdoor)	
All CS except those listed below	Outdoor
CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)	Indoor
Operating temperature	
All CS except those listed below	≤ 25°C (ambient temperature)
CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)	≤ 20°C (ambient temperature)
Other	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
CS3 – Bulk transfers; Dedicated facility (PROC 8b) CS4 - Drum/batch transfers; Dedicated facility (PROC 8b)	Ensure no splashing occurs during transfer
CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)	Clear spills immediately Wear suitable coveralls to prevent exposure to skin

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1.0
Regional use tonnage (tonnes/year)	33110000
Fraction of Regional tonnage used locally	0.0
Annual site tonnage (tonnes/year)	1500000
Maximum daily site tonnage (kg/day)	5000
Frequency and duration of use	
Continuous release.	
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)	0.1
Release fraction to wastewater from process (initial release prior to RMM)	0.0
Release fraction to soil from process (initial release prior to RMM)	0.0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	

If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	98.3
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	98.3
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	-
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	-
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	-
Assumed domestic sewage treatment plant flow (m3/d)	-
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	

Section 3 Exposure Estimation

3.1. Health

CS1 – General exposures; Closed systems; Use in contained systems(PROC 2. PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	7.6 E-3 mg/m³ (ART 1.5) RCR = 1.38 E-3	Final RCR = 0.051
	Vapour	0.27 mg/m³ (ART 1.5) RCR = 0.049	
Inhalation, systemic, acute	Aerosol	0.03 mg/m³ (ART 1.5) RCR = 7.09E-6 **Supportive exposure (not used for RC):** 2.8 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	1.08mg/m³ (ART 1.5) RCR = 2.52E-4 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.137 mg/kg bw/day (TRA Workers) RCR = 0.047	Final RCR = 0.047
Dermal, local, long term	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk

CS2 – Use of fuels; Closed systems (PROC 16)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.021 mg/m³ (ART 1.5) RCR = 3.83 E-3	Final RCR = 0.133
	Vapour	0.27 mg/m³ (ART 1.5) RCR = 0.129	
Inhalation, systemic, acute	Aerosol	0.084 mg/m³ (ART 1.5) RCR = 1.96E-5 **Supportive exposure (not used for RC):** 28 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	2.84 mg/m³ (ART 1.5) RCR = 6.62E-4 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	Qualitative risk

CS3 – Bulk transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.016 mg/m³ (ART 1.5) RCR = 2.91E-3	Final RCR = 0.422
	Vapour	2.3 mg/m³ (ART 1.5) RCR = 0.419	
Inhalation, systemic, acute	Aerosol	0.064 mg/m³ (ART 1.5) RCR = 1.49E-5 **Supportive exposure (not used for RC):** 70 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	9.2 mg/m³ (ART 1.5) RCR = 2.15E-3 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

Dermal, local, acute	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk

CS4 - Drum/batch transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.016 mg/m^3 (ART 1.5) RCR = 2.91E-3	Final RCR = 0.422
	Vapour	2.3 mg/m^3 (ART 1.5) RCR = 0.419	
Inhalation, systemic, acute	Aerosol	0.064 mg/m^3 (ART 1.5) RCR = 1.49E-5 **Supportive exposure (not used for RC):** 70 mg/m^3 (TRA Workers)	Final RCR < 0.01
	Vapour	9.2 mg/m^3 (ART 1.5) RCR = 2.15E-3 **Supportive exposure (not used for RC):** 98 mg/m^3 (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm^2 (TRA Workers)	Qualitative risk

CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.8E-4 mg/m^3 (ART 1.5) RCR = 5.1E-5	Final RCR = 0.291
	Vapour	1.6 mg/m^3 (ART 1.5) RCR = 0.291	
Inhalation, systemic, acute	Aerosol	1.12E-3 mg/m^3 (ART 1.5) RCR = 2.61E-7 **Supportive exposure (not used for RC):** 200 mg/m^3 (TRA Workers)	Final RCR < 0.01
	Vapour	6.4 mg/m^3 (ART 1.5) RCR = 1.49E-3 **Supportive exposure (not used for RC):** 280 mg/m^3 (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471

Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS6 – Storage (PROC2. PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR = 0.401
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 2.8 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.137mg/kg bw/day (TRA Workers) RCR = 0.047	Final RCR = 0.047
Dermal, local, long term	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk

3.2. Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model,

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.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Available hazard data do not support the need for a DNEL to be established for other health effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation

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. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (https://www.esig.org/reach-ges/environment/#factsheets).

PW16 – 12b. Use in fuel; Professional

Section 1	
Title	
12b. - Use in fuel; Professional	
Use descriptor	
Sector(s) of use	
Process categories	1. 2. 8a, 8b, 16. 28
Environmental release categories	9a, 9b
Specific Environmental Release Category	ESVOC SPERC 9.12b.v3
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additive) 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	
Worker contributing scenario(s): CS1 – Bulk transfers; Dedicated facility (PROC 8b) CS2 - Drum/batch transfers; Dedicated facility (PROC 8b) CS3 – Refuelling (PROC 8b, PROC 2) CS4 – Use of fuels; Closed systems (PROC 16) CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28) CS6 – Storage (PROC2. PROC 1)	
Product characteristics	
Physical state of the product	
For all CS	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation
Concentration of substance in the product	
For all CS	Covers percentage substance in the product up to 100%
Frequency and duration of use/exposure	
Duration of activity	
For all CS	≤ 8 h/day Covers daily exposures up to 8 hours
Technical and organisation conditions and measures	
CS1 – Bulk transfers; Dedicated facility (PROC 8b)	Occupational Health and Safety Management System: Basic Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS2 - Drum/batch transfers; Dedicated facility (PROC 8b)	Occupational Health and Safety Management System: Basic Local exhaust ventilation: Yes, specifically designed LEV such as receiving hoods (assumed effectiveness >= 80-90%) Room ventilation: Basic (up to 3 ACH) Use drum pumps (Effectiveness Inhalation: 90%, Dermal: 0%)
CS3 – Refuelling (PROC 8b, PROC 2)	Occupational Health and Safety Management System: Basic Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS4 – Use of fuels; Closed systems (PROC 16)	Occupational Health and Safety Management System: Basic Handle substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)

CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)	Occupational Health and Safety Management System: Basic Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
CS6 – Storage (PROC2. PROC 1)	Occupational Health and Safety Management System: Basic Closed continuous process with occasional controlled exposure(Store substance within a closed system) Store substance within a closed system Local exhaust ventilation: No Room ventilation: Basic (up to 3 ACH)
Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)
General measures applicable to all activities	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.
Dermal protection	
All CS except those listed below	Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)
CS3 – Refuelling (PROC 8b, PROC 2) CS4 – Use of fuels; Closed systems (PROC 16)	Not necessary
Respiratory protection	

For all CS	Not necessary
Face/eye protection	
For all CS	Not necessary
Other conditions affecting workers exposure	
Place of use (Indoor / Outdoor)	
All CS except those listed below	Outdoor
Operating temperature	
All CS except those listed below	≤ 25°C (ambient temperature)
CS6 – Storage (PROC2. PROC 1)	≤ 20°C (ambient temperature)
Other	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
CS1 – Bulk transfers; Dedicated facility (PROC 8b) CS2 - Drum/batch transfers; Dedicated facility (PROC 8b) CS3 – Refuelling (PROC 8b, PROC 2)	Ensure no splashing occurs during transfer

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	4291000
Fraction of Regional tonnage used locally	0.0
Annual site tonnage (tonnes/year)	2145.835
Maximum daily site tonnage (kg/day)	5.9
Frequency and duration of use	
Continuous release.	
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)	0.5
Release fraction to wastewater from process (initial release prior to RMM)	0.0
Release fraction to soil from process (initial release prior to RMM)	0.0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	0.0

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95.4
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	7080.0
Assumed domestic sewage treatment plant flow (m3/d)	2000.0
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	

Section 3 Exposure Estimation

3.1. Health

CS1 – Bulk transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.047mg/m³ (ART 1.5) RCR = 8.56E-3	Final RCR = 0.446
	Vapour	2.4 mg/m³ (ART 1.5) RCR = 0.437 **Supportive exposure (not used for RC):** 6 mg/m³ (dato misurato: Report Concawe N°	
Inhalation, systemic, acute	Aerosol	0.188 mg/m³ (ART 1.5) RCR = 4.38E-5 **Supportive exposure (not used for RC):** 140 mg/m³ (TRA Workers)	Final RCR = 0.017
	Vapour	74 mg/m³ (dato misurato: Report Concawe N° 1/06) RCR = 0.017 **Supportive exposure (not used for RC):** 196 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS2 - Drum/batch transfers; Dedicated facility (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.012 mg/m³ (ART 1.5) RCR = 2.19E-3	Final RCR = 0.403
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0.048 mg/m³ (ART 1.5) RCR = 1.12E-5 **Supportive exposure (not used for RC):** 140 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 196 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS3 – Refuelling (PROC 8b, PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.082 mg/m³ (ART 1.5) RCR = 0.015	Final RCR = 0.015
	Vapour	2 mg/m³ (ART 1.5) RCR = 0.364	
Inhalation, systemic, acute	Aerosol	0.328 mg/m³ (ART 1.5) RCR = 7.65E-5	Final RCR < 0.01
	Vapour	8 mg/m³ (ART 1.5) RCR = 1.87E-3 **Supportive exposure (not used for RC):** 196 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.8 mg/kg bw/day (Dato misurato: Report Concawe 14/14) RCR = 0.275 **Supportive exposure (not used for RC):**	Final RCR = 0.471
Dermal, local, long term	Dermal	1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	1 mg/cm² (TRA Workers)	Qualitative risk

CS4 – Use of fuels; Closed systems (PROC 16)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR = 0.177
	Vapour	0.97 mg/m³ (ART 1.5) RCR = 0.177 **Supportive exposure (not used for RC):** 0.35 mg/m³ (dato misurato: Report Concawe N° 1/06)	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 140 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	11 mg/m³ (dato misurato: Report Concawe N° 1/06) RCR = 2.57E-3 **Supportive exposure (not used for RC):** 19.6 mg/m³ (TRA Workers) 3.88 mg/m³ (ART 1.5)	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	Qualitative risk

CS5 – Equipment cleaning and maintenance(PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.05 mg/m³ (ART 1.5) RCR = 9.11E-3	Final RCR = 0.301
	Vapour	1.6 mg/m³ (ART 1.5) RCR = 0.291	
Inhalation, systemic, acute	Aerosol	0.2 mg/m³ (ART 1.5) RCR = 4.66E-5 **Supportive exposure (not used for RC):** 140 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	6.4 mg/m³ (ART 1.5) RCR = 1.49E-3 **Supportive exposure (not used for RC):** 490 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471

Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	Qualitative risk

CS6 – Storage (PROC2. PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0 mg/m³ (ART 1.5) RCR = 0	Final RCR = 0.401
	Vapour	2.2 mg/m³ (ART 1.5) RCR = 0.401	
Inhalation, systemic, acute	Aerosol	0 mg/m³ (ART 1.5) RCR = 0 **Supportive exposure (not used for RC):** 14 mg/m³ (TRA Workers)	Final RCR < 0.01
	Vapour	8.8 mg/m³ (ART 1.5) RCR = 2.05E-3 **Supportive exposure (not used for RC):** 98 mg/m³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.137mg/kg bw/day (TRA Workers) RCR = 0.047	Final RCR = 0.047
Dermal, local, long term	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk
Dermal, local, acute	Dermal	0.02 mg/cm² (TRA Workers)	Qualitative risk

3.2. Environment

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

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.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Available hazard data do not support the need for a DNEL to be established for other health effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation

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. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (https://www.esig.org/reach-ges/environment/#factsheets).

C17 – 12c. Use in fuel; Consumer

Section 1	
Title	
12b. - Use in fuel; Consumer	
Use descriptor	
Sector(s) of use	
Product Category	13
Environmental release categories	9a, 9b
Specific Environmental Release Category	ESVOC SPERC 9.12c.v3
Processes, tasks, activities covered	
Covers consumer uses in liquid fuels	
Assessment Method	
See Section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of consumer exposure	
Worker contributing scenario(s): Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13) Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	
Product characteristics	
For all CS	Exposure via dermal route: yes Exposure via inhalation route: yes Spray: NO Exposure via oral route: not relevant
For all CS	Covers percentage substance in the product up to 100%
Amount, Frequency and duration of use/exposure	
Amount of product used per application	
Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)	<= 4.4E4 g/event
Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	<= 750 g/event
Exposure time per event	
Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)	0.05 h/event
Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	0.033 h/event
Frequency of use over a year	
Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)	Frequent (52 times/year (once/week))
Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	Frequent (26 times/year)
Frequency of use over a day	
For all CS	1 event per day
Information and behavioral advice for consumers	
Place of use:	
Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)	Outdoor
Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	Indoor
Adult/child assumed	

For all CS	Adult
Other conditions affecting consumers exposure	
Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)	Dermal transfer factor: 5E-3 Body parts potentially exposed: Palm of one hand Inhalation transfer factor: 2E-3
Cons CS2 – Fuels; Liquid; Garden equipment (PC13)	Dermal transfer factor: 1E-3 Body parts potentially exposed: Inside hands / one hand / palm of hands Inhalation transfer factor: 0.03

Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	14410000
Fraction of Regional tonnage used locally	0.0
Annual site tonnage (tonnes/year)	7205.1
Maximum daily site tonnage (kg/day)	19.7
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional use only)	0.0
Release fraction to wastewater from wide dispersive use	0.0
Release fraction to soil from wide dispersive use (regional use only)	0.0
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95.4
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	23800
Assumed domestic sewage treatment plant flow (m3/d)	2000.0
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
Section 3 Exposure Estimation	
3.1. Health	

Cons CS1 – Fuels; Liquid; Automotive refuelling (Diesel) (PC 13)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.699 mg/m³ (TRA Consumers) RCR = 0.603 **Supportive exposure (not used for RC):** 0.26 mg/m³ (dato misurato: Report Concawe N° 1/06)	Final RCR = 0.603
Inhalation, systemic, acute	Vapour	257.3 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.1	Final RCR = 0.1
Dermal, systemic, long term	Dermal	0.175 mg/kg bw/day (TRA Consumers) RCR = 0.14	Final RCR = 0.14
Oral, systemic, long term	Dermal	0 mg/kg bw/day (TRA Consumers) RCR = 0	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.14

Cons CS2 – Fuels; Liquid; Garden equipment (PC13)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.657 mg/m³ (TRA Consumers) RCR = 0.567	Final RCR = 0.567
Inhalation, systemic, acute	Vapour	2.244 mg/m³ (ECETOC TRA Consumers3.1) RCR = 8.72E-4	Final RCR < 0.01
Dermal, systemic, long term	Dermal	0.071 mg/kg bw/day (TRA Consumers) RCR = 0.057	Final RCR = 0.057
Oral, systemic, long term	Dermal	0 mg/kg bw/day (TRA Consumers) RCR = 0	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.057

3.2. Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model,

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.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Available hazard data do not support the need for a DNEL to be established for other health effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation

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

Exposure Scenarios for EC 941-364-9

identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
M1 01 – Manufacture of Substance	Manufacture	-	-	1, 2, 3, 4, 8a, 8b, 9, 15, 28	1	ESVOC SPERC 1.1.v3
F4 02- Formulation & (re)packing of substances and mixtures (classified)	Formulation	-	-	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15, 28	2	ESVOC SPERC 2.2.v3
IW-15 12a - Use as a fuel; industrial	Industrial	8, 9	13	1, 2, 8a, 8b, 16, 28	7	ESVOC SPERC 7.12a.v4
PW-16 12b-- Use as a fuel; professional	Professional	-	13	1, 2, 8a, 8b, 16, 28	9a, 9b	ESVOC SPERC 9.12b.v3
C-17 12c- Use as a fuel; consumer	Consumer	-	13	13	9a, 9b	ESVOC SPERC 9.12c.v3

Summary of Exposure scenarios for EC 941-364-9

M1.01 – Manufacture of Substance 77
F4. 02- Formulation & (re)packing of substances and mixtures (classified) 101
IW-15.12a - Use as a fuel; industrial 129
PW-16.12b-- Use as a fuel; professional 142
C-17.12c- Use as a fuel; consumer 160

M1.01 – Manufacture of Substance

Environment contributing scenario(s):		
	Manufacture of substances	ERC 1
Worker contributing scenario(s):		
CS 1	General exposures (closed systems)	PROC 1
CS 2	General exposures (closed systems)	PROC 2
CS 3	General exposures (closed systems)	PROC 3
CS 4	General exposures; Open systems	PROC 4
CS 5	Process sampling	PROC 9
CS 6	Laboratory activities	PROC 15
CS 7	Bulk transfers; Closed systems	PROC 8b
CS 8	Bulk transfers; Open systems	PROC 8b
CS 9	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 10	Storage	PROC 2, PROC1

Further description of the use:

Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities.

Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance.
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)

General measures applicable to all activities	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.

1.1. Control of environmental exposure

Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1,0
Regional use tonnage (tonnes/year)	5614000,0
Fraction of Regional tonnage used locally	0,7
Annual site tonnage (tonnes/year)	3900000,0
Maximum daily site tonnage (kg/day)	13000,0
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	100
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	0.1
Release fraction to wastewater from process (initial release prior to RMM)	0.0
Release fraction to soil from process (initial release prior to RMM)	0.0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90.0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	98.0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	98.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	0.0
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	14200000.0

Assumed domestic sewage treatment plant flow (m3/d)	2000.0
Conditions and measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	
During manufacturing no waste of the substance is generated.	

1.2.Worker CS 1: General exposures (closed systems) (PROC 1)

1.2.1.Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8).	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 800.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 5.07E-4 Supportive exposure (not used for RC): 1 mg/m³ (Measured data: Concawe Report No 1/06)	RCR < 0.01
Inhalation, systemic, acute	Vapour >10.000 Pa	0.139 mg/m³ (TRA Workers) RCR = 3.23E-5	RCR < 0.01
Combined routes, systemic, long-term			RCR < 0.01
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (800°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour >10.000 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Production operator
Duration: 480 minutes
No detailed job description is provided in the report. The exposure value has been added to PROC1 and PROC2 General Exposures (Closed Systems), which reflects the conditions at refineries best.
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Risk characterisation

Qualitative risk characterisation:

Qualitative risks management measures are laid out above (General measures).

1.3.Worker CS 2: General exposures (closed systems) (PROC 2)

1.3.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8).	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 800.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour >10.000 Pa	60.66 mg/m³ (TRA Workers) RCR = 0.888 Supportive exposure (not used for RC): 1 mg/m³ (Measured data: Concawe Report No 1/06)	RCR = 0.888
Inhalation, systemic, acute	Vapour >10.000 Pa	242.6 mg/m³ (TRA Workers) RCR = 0.057	RCR = 0.057
Combined routes, systemic, long-term			RCR = 0.888
Combined routes, systemic, acute			RCR = 0.057

Remarks on exposure dataset obtained with ECETOC TRA
The vapour pressure at operating temperature (800°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:
Concawe Report No 1/06 for Vapour >10.000 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Production operator
Duration: 480 minutes
No detailed job description is provided in the report. The exposure value has been added to PROC1 and PROC2 General Exposures (Closed Systems), which reflects the conditions at refineries best.
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Risk characterisation

Qualitative risk characterisation:
Qualitative risks management measures are laid out above (General measures).

1.4.Worker CS 3: General exposures (closed systems) (PROC 3)

1.4.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8).	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 800.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour >10.000 Pa	17.33 mg/m³ (TRA Workers) RCR = 0.254	RCR = 0.254
Inhalation, systemic, acute	Vapour >10.000 Pa	9.33 mg/m³ (TRA Workers) RCR = 0.016	RCR = 0.016
Combined routes, systemic, long-term			RCR = 0.254
Combined routes, systemic, acute			RCR = 0.016

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (800°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.5. Worker CS 4: General exposures; Open systems (PROC 4)

1.5.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.203
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 6 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 0.028	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 5.07E-4	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.013
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	7.69 mg/m³ (TRA Workers) RCR = 1.79E-3	
	Vapour >10.000 Pa	0.139 mg/m³ (TRA Workers) RCR = 3.23E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.675
Combined routes, systemic, acute			RCR = 0.013

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Waste water treatment plant operator (exposure is most likely from various hydrocarbon stream of the refinery. The C number in the range of gas oils have been considered)
Duration: 480 minutes
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.6.Worker CS 5: Process sampling (PROC 9)

1.6.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0

	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.246
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 6 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.01E-3	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.016
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.277 mg/m³ (TRA Workers) RCR = 6.47E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.718
Combined routes, systemic, acute			RCR = 0.016

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 3
Inhalation exposure, short term concentration: Number of measured data points: 3
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator – sampling
Typical duration: 45 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.7. Worker CS 6: Laboratory activities (PROC 15)

1.7.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
• No other specific measures identified	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Put lids (caps) on containers (bottles) immediately after use	

1.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.373 mg/m³ (TRA Workers) RCR = 5.46E-3	RCR = 0.14
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 7.9 mg/m³ (Measured data: Concawe Report No 1/06) 9 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	0.961 mg/m³ (TRA Workers) RCR = 0.01	
	Vapour >10.000 Pa	0.017 mg/m³ (TRA Workers) RCR = 2.54E-4	
Inhalation, systemic, acute	Aerosol	1.492 mg/m³ (TRA Workers) RCR = 3.48E-4	RCR <0,01
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	3.845 mg/m³ (TRA Workers) RCR = 8.97E-4	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.62E-5	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.257
Combined routes, systemic, acute			RCR <0,01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Refinery laboratory worker
Typical duration: 100 minutes
38 mg/m3 (excluding acetone (laboratory solvent))
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Refinery laboratory worker
Typical duration: 480 minutes
9 mg/m3 (excluding acetone (laboratory solvent))
Maximum value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.8.Worker CS 7: Bulk transfers ; Closed systems (PROC 8b)

1.8.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0

	Method
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.8.2.Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 0.75 mg/m³ (Measured data: Concawe Report No 1/06) 18 mg/m³ (Measured data: Concaw Report No 1/06)	RCR = 0.156
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 24 mg/m³ (Measured data: Concawe Report No 1/06)	RCR < 0.01
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.627
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Inhalation exposure, short term concentration: Number of measured data points: 1
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Jetty crew
Typical duration: 120 minutes
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 4
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator
Duration: 480 minutes
Highest value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns reasonable well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.9.Worker CS 8: Bulk transfers; Open systems (PROC 8b)

1.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <=20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

1.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.746 mg/m³ (TRA Workers) RCR = 0.011	RCR = 0.167
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 2.63 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Aerosol	2.983 mg/m³ (TRA Workers) RCR = 6.96E-4	RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 84 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.638
Combined routes, systemic, acute			RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:

Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 3
Inhalation exposure, short term concentration: Number of measured data points: 3
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Rail car loading
Typical duration: 45 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only.
The median value is 6mg/m3 and shows that the reported value is an overestimation of actual exposure.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns reasonable well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.10.Worker CS 9: Equipment cleaning and maintenance (PROC 8a, PROC 28)

1.10.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0

	Method
Standard Operating Procedures (SOP) maintenance (industrial) [Effectiveness Inhalation: 90%, Dermal: 0%] Drain down and flush system prior to equipment break-in or maintenance. Inhalation explanation: Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016. Dermal explanation: Expect dermal exposure is substantially reduced when lines and equipment are properly drained and flushed according to Standard Operating Procedures (SOP). Specific exposure reduction is per assessor professional judgment	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Wear suitable coveralls to prevent exposure to skin	
• Clear spills immediately	

1.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers) RCR = 0.241 Supportive exposure (not used for RC): 1.25 mg/m³ (Measured data: Concawe Report No. 1/06)	RCR = 0.312
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	65.77 mg/m³ (TRA Workers) RCR = 0.015 Supportive exposure (not used for RC): 40 mg/m³ (Measured data: Concawe Report No. 1/06)	RCR = 0,02
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.783
Combined routes, systemic, acute			RCR < 0.02

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 5
Inhalation exposure, short term concentration: Number of measured data points: 5
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator – filter changing
Typical duration: 30 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only. Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

1.11. Worker CS 10: Storage (PROC 2)

1.11.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• Store substance within a closed system	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <=20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

1.11.2.Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 10 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.502
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

F4. 02- Formulation & (re)packing of substances and mixtures (classified)

Environment contributing scenario(s):		
	Formulation	ERC 2
Worker contributing scenario(s):		
CS 1	General exposures (closed systems)	PROC 2, PROC 1, PROC 3
CS 2	General exposures (open systems)	PROC 4
CS 3	Batch process; Elevated temperature; Use in contained systems	PROC 3
CS 4	Process sampling	PROC 9
CS 5	Laboratory activities	PROC 15
CS 6	Bulk transfers; Dedicated facility	PROC 8b
CS 7	Mixing operations (open systems)	PROC 5
CS 8	Manual; Transfer from/pouring from containers; Non-dedicated facility	PROC 8a
CS 9	Drum/batch transfers; Dedicated facility	PROC 8b
CS 10	Tabletting, compression, extrusion or pelletisation	PROC 14
CS 11	Drum and small package filling	PROC 9
CS 12	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 13	Storage	PROC 2, PROC 1

Further description of the use:

Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Conditions and measures related to personal protection, hygiene and health evaluation	
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)
General measures applicable to all activities	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.

2.1 Control of environmental exposure

Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1,0
Regional use tonnage (tonnes/year)	5534000,0
Fraction of Regional tonnage used locally	0,0
Annual site tonnage (tonnes/year)	30000,0
Maximum daily site tonnage (kg/day)	100,0
Frequency and duration of use	
Continuous release.	
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)	0,5
Release fraction to wastewater from process (initial release prior to RMM)	0,0
Release fraction to soil from process (initial release prior to RMM)	0,0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90,0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	96,4

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	96,4
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	0.0
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	114000,0
Assumed domestic sewage treatment plant flow (m3/d)	2000,0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

2.2. Worker CS 1: General exposures (closed systems) (PROC 2, PROC 1, PROC 3)

2.2.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8).	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <=20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 11 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024 Supportive exposure (not used for RC): 1 mg/m³ (Measured data: Concawe Report No 1/06)	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.502
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Production operator
Duration: 480 minutes
No detailed job description is provided in the report. The exposure value has been added to PROC1 and PROC2. General Exposures (Closed Systems), which reflects the conditions at refineries best. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.3. Worker CS 2: General exposures; Open systems (PROC 4)

2.3.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 12. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.203
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 6 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 0.028	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 5.07E-4	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.013
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	7.69 mg/m³ (TRA Workers) RCR = 1.79E-3	
	Vapour >10.000 Pa	0.139 mg/m³ (TRA Workers) RCR = 3.23E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.675
Combined routes, systemic, acute			RCR = 0.013

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Waste water treatment plant operator (exposure is most likely from various hydrocarbon stream of the refinery. The C number in the range of gas oils have been considered)
Duration: 480 minutes
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.4. Worker CS 3: Batch process; Elevated temperature; Use in contained systems (PROC 3)

2.4.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *Formulate in enclosed or ventilated mixing vessels.*	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 60 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 13- Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.876 mg/m³ (TRA Workers) RCR = 0.013	RCR = 0.022
	Vapour 500-10.000 Pa	0.606 mg/m³ (TRA Workers) RCR = 8.87E-3	
	Vapour >10.000 Pa	0.029 mg/m³ (TRA Workers) RCR = 4.31E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	3.503 mg/m³ (TRA Workers) RCR = 8.17E-4	RCR < 0.01
	Vapour 500-10.000 Pa	2.426 mg/m³ (TRA Workers) RCR = 5.66E-4	
	Vapour >10.000 Pa	0.118 mg/m³ (TRA Workers) RCR = 2.75E-5	
Combined routes, systemic, long-term			RCR = 0.022
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.5. Worker CS 4: Process sampling (PROC 9)

2.5.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 14- Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.246
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 1.03 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.01E-3	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.016
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 33 mg/m³ (Measured data: Concawe Report No 1/06)	

	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.277 mg/m³ (TRA Workers) RCR = 6.47E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.718
Combined routes, systemic, acute			RCR = 0.016

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 3
Inhalation exposure, short term concentration: Number of measured data points: 3
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator – sampling
Typical duration: 45 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.6. Worker CS 5: Laboratory activities (PROC 15)

2.6.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 15 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.373 mg/m³ (TRA Workers) RCR = 5.46E-3	RCR = 0.14
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 7.9 mg/m³ (Measured data: Concawe Report No 1/06) 9 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	0.961 mg/m³ (TRA Workers) RCR = 0.014	
	Vapour >10.000 Pa	0.017 mg/m³ (TRA Workers) RCR = 2.54E-4	
Inhalation, systemic, acute	Aerosol	1.492 mg/m³ (TRA Workers) RCR = 3.48E-4	RCR < 0.01
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	3.845 mg/m³ (TRA Workers) RCR = 8.97E-4	
	Vapour >10.000 Pa	10.069 mg/m³ (TRA Workers) RCR = 1.62E-5	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.257
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 1
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Refinery laboratory worker
Typical duration: 100 minutes
38 mg/m3 (excluding acetone (laboratory solvent))
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Refinery laboratory worker
Typical duration: 480 minutes
9 mg/m3 (excluding acetone (laboratory solvent))
Maximum value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.7. Worker CS 6: Bulk transfers; Dedicated facility (PROC 8b)

2.7.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *Formulate in enclosed or ventilated mixing vessels.*	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0

	Method
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 16 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 0.75 mg/m³ (Measured data: Concawe Report No 1/06) 18 mg/m³ (Measured data: Concawe Report No 1/06)	RCR = 0.156
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 24 mg/m³ (Measured data: Concawe Report No 1/06)	RCR < 0.01
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.627
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 1
Inhalation exposure, short term concentration: Number of measured data points: 1
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Jetty crew
Typical duration: 120 minutes
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 4
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator
Duration: 480 minutes
Highest value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns reasonable well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterization

Qualitative risks management measures are laid out above (General measures).

2.8. Worker CS 7: Mixing operations; Open systems (PROC 5)

2.8.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *Provide extract ventilation to points where emissions occur*. Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016. This supports ESIG standard phrase Provide extract ventilation to points where emissions occur. E54*	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 17 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.373 mg/m³ (TRA Workers) RCR = 5.46E-3	RCR = 0.025
	Vapour 10-500 Pa	0.822 mg/m³ (TRA Workers) RCR = 0.012	
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Aerosol	1.492 mg/m³ (TRA Workers) RCR = 3.48E-4	RCR < 0.01
	Vapour 10-500 Pa	3.288 mg/m³ (TRA Workers) RCR = 7.67E-4	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal		
Dermal, local, acute	Dermal		
Combined routes, systemic, long-term		0.2 mg/cm² (TRA Workers)	RCR = 0.496
Combined routes, systemic, acute		0.2 mg/cm² (TRA Workers)	RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.9. Worker CS 8: Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)

2.9.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *LEV represents exposure reduction effeciency of drum pumps*	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Use drum pumps [E53] [Effectiveness Inhalation: 90%, Dermal: 0%] *Use drum pumps [E53]* Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016. This supports ESIG standard phrase E53.* Dermal explanation: *Expect dermal exposure is substantially reduced when drum pumps are used. Specific exposure reduction is per assessor professional judgment.*	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

2.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table- 18 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.373 mg/m³ (TRA Workers) RCR = 5.46E-3	RCR = 0.037
	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Aerosol	1.492 mg/m³ (TRA Workers) RCR = 3.48E-4	RCR <0.01
	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.508
Combined routes, systemic, acute			RCR <0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.10. Worker CS 9: Drum/batch transfers; Dedicated facility (PROC 8b)

2.10.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C *Ambient temperature.*	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 19 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.746 mg/m³ (TRA Workers) RCR = 0.011	RCR = 0.167
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Aerosol	2.983 mg/m³ (TRA Workers) RCR = 6.96E-4	RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.638
Combined routes, systemic, acute			RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.11. Worker CS 10: Tabletting, compression, extrusion or pelletisation (PROC 14)

2.11.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: NO [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: es (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 20 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	RCR = 0.192
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	RCR = 0.012
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	
Dermal, systemic, long term	Dermal	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	RCR = 0.236
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.428
Combined routes, systemic, acute			RCR = 0.012

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.12. Worker CS 11: Drum and small package filling (PROC 9)

2.12.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0

	Method
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.12.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 21- Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.246
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.01E-3	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.016
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.277 mg/m³ (TRA Workers) RCR = 6.47E-5	
Dermal, systemic, long term	Dermal	1.372 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.718
Combined routes, systemic, acute			RCR = 0.016

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

2.13. Worker CS 12: Equipment cleaning and maintenance (PROC 8a, PROC 28)

2.13.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Standard Operating Procedures (SOP) maintenance (industrial) [Effectiveness Inhalation: 90%, Dermal: 0%] *Drain down and flush system prior to equipment break-in or maintenance.* Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016.* Dermal explanation: *Expect dermal exposure is substantially reduced when lines and equipment are properly drained and flushed according to Standard Operating Procedures (SOP). Specific exposure reduction is per assessor professional judgment*.	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Wear suitable coveralls to prevent exposure to skin	

	Method
• Clear spills immediately	

2.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 22 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers) RCR = 0.241 Supportive exposure (not used for RC): 1.25 mg/m³ (Measured data: Concawe Report No. 1/06)	RCR = 0.312
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	65.77 mg/m³ (TRA Workers) RCR = 0.015 Supportive exposure (not used for RC): 40 mg/m³ (Measured data: Concawe Report No. 1/06)	RCR = 0.02
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.783
Combined routes, systemic, acute			RCR = 0.02

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No. 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 5
Inhalation exposure, short term concentration: Number of measured data points: 5
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Tank farm operator – filter changing
Typical duration: 30 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only. Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterization

Qualitative risks management measures are laid out above (General measures).

2.14. Worker CS 13: Storage (PROC 2, PROC 1)

2.14.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *Formulate in enclosed or ventilated mixing vessels.*	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

2.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 23 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.502
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterization

Qualitative risks management measures are laid out above (General measures).

IW-15.12a - Use as a fuel; industrial

Environment contributing scenario(s):		
	Industrial use of substances in closed systems	ERC 7
Worker contributing scenario(s):		
CS 1	Bulk transfers; Dedicated facility	PROC 8b
CS 2	Drum/batch transfers; Dedicated facility	PROC 8b
CS 3	General exposures (closed systems)	PROC 2, PROC 1
CS 4	Use of fuels (closed systems)	PROC 16
CS 5	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 6	Storage	PROC 2

Further description of the use:

Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)

Conditions and measures related to personal protection, hygiene and health evaluation	
General measures applicable to all activities	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.

4. Control of environmental exposure

Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	1,0
Regional use tonnage (tonnes/year)	2235000,0
Fraction of Regional tonnage used locally	0,7
Annual site tonnage (tonnes/year)	1500000,0
Maximum daily site tonnage (kg/day)	5000,0
Frequency and duration of use	
Continuous release.	
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)	0,1
Release fraction to wastewater from process (initial release prior to RMM)	0,0
Release fraction to soil from process (initial release prior to RMM)	0,0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90,0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	92,0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	92,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	0,0
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	0,9

Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5390000,0
Assumed domestic sewage treatment plant flow (m3/d)	2000,0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

4.1. Worker CS 1: Bulk transfers; Dedicated facility (PROC 8b)

4.1.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Ensure no splashing occurs during transfer	

4.2.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

Table 24 - Local releases to the environment

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.746 mg/m³ (TRA Workers) RCR = 0.011	RCR = 0.167
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Aerosol	2.983 mg/m³ (TRA Workers) RCR = 6.96E-4	RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.638
Combined routes, systemic, acute			RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

4.2. Worker CS 2: Drum/batch transfers; Dedicated facility (PROC 8b)

4.2.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

4.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 25 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.746 mg/m³ (TRA Workers) RCR = 0.011	RCR = 0.167
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	
	Vapour 500-10.000 Pa	2.403 mg/m³ (TRA Workers) RCR = 0.035	
	Vapour >10.000 Pa	0.052 mg/m³ (TRA Workers) RCR = 7.61E-4	
Inhalation, systemic, acute	Aerosol	2.983 mg/m³ (TRA Workers) RCR = 6.96E-4	RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000 Pa	9.612 mg/m³ (TRA Workers) RCR = 2.24E-3	
	Vapour >10.000 Pa	0.208 mg/m³ (TRA Workers) RCR = 4.85E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.638
Combined routes, systemic, acute			RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

4.3.Worker CS 3: General exposures (closed systems) (PROC 2, PROC 1)

4.3.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%].	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8).	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

4.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 26 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, systemic, long term	Dermal	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.502
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterization

Qualitative risks management measures are laid out above (General measures).

4.4. Worker CS 4: Use of fuels; Closed systems (PROC 16)

4.4.1.Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%].	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0

	Method
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

4.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 27 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.148
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterization

Qualitative risks management measures are laid out above (General measures).

4.5. Worker CS 5: Equipment cleaning and maintenance (PROC 8a, PROC 28)

4.5.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%].	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Standard Operating Procedures (SOP) maintenance (industrial) [Effectiveness Inhalation: 90%, Dermal: 0%] *Drain down and flush system prior to equipment break-in or maintenance.* Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016*. Dermal explanation: Expect dermal exposure is substantially reduced when lines and equipment are properly drained and flushed according to Standard Operating Procedures (SOP). Specific exposure reduction is per assessor professional judgment.	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal:90%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Wear suitable coveralls to prevent exposure to skin	
• Clear spills immediately	

4.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 28 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers) RCR = 0.241	RCR = 0.312
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	65.77 mg/m³ (TRA Workers) RCR = 0.015	RCR = 0,02
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.783
Combined routes, systemic, acute			RCR < 0.02

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

4.6. Worker CS 6: Storage (PROC 2, PROC 1)

4.6.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• Store substance within a closed system	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <=20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

4.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 29 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.502
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

PW-16.12b-- Use as a fuel; professional

Environment contributing scenario(s):			**SPERC**
	Widespread use by professional workers - Use in fuel; Professional	**ERC 9b**, ERC 9a	ESVOC SPERC 9.12b.v3
Worker contributing scenario(s):			
CS 1	Bulk transfers; Dedicated facility	PROC 8b	
CS 2	Drum/batch transfers; Dedicated facility	PROC 8b	
CS 3	Refuelling	PROC 8b	
CS 4	General exposures (closed systems)	PROC 2, PROC 1	
CS 5	Use of fuels; (closed systems)	PROC 16	
CS 6	Equipment cleaning and maintenance	PROC 8a, PROC 28	
CS 7	Storage	PROC 2, PROC 1	

Further description of the use:

Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

Conditions and measures related to personal protection, hygiene and health evaluation	
Good basic standard of occupational hygiene	Assumes a good basic standard of occupational hygiene is implemented. Good occupational hygiene practice is considered by Concawe to constitute measures that are routinely encountered and applied to meet the requirements of relevant workplace legislation such as regulations supporting the EU Framework Directive, in addition to specific RMM identified in the ES. These may include, but are not limited to: - Risk assessment of local workplace activities - Procedures supporting safe handling and maintenance of controls - Education and training of workers in understanding the hazards and control measures relevant to their activities - Provision of general ventilation - Good housekeeping and prompt clearance of spillages - Appropriate selection, testing and maintenance of equipment used to control exposure, e.g. Personal Protective Equipment (PPE), Local Exhaust Ventilation (LEV) - Draining of equipment prior to maintenance; retention of drained material in sealed storage pending disposal or recycling - Regular supply and laundering of work clothing; provision of washing and changing facilities; eating and smoking only in designated areas separate from the workplace
General Measures (skin irritants)	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 any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General measures (aspiration)	Do not ingest. If swallowed then seek immediate medical assistance. .
General measures (flammability)	Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line velocity during pumping to avoid generation of electrostatic discharge. Ground/bond container and receiving equipment. Use non-sparking tools. Comply with relevant EU/national regulations. Review SDS for additional advice (section 7 and/or 8)

Conditions and measures related to personal protection, hygiene and health evaluation	
General measures applicable to all activities	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.

5 Control of environmental exposure

Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	122600,0
Fraction of Regional tonnage used locally	0,0
Annual site tonnage (tonnes/year)	61,3
Maximum daily site tonnage (kg/day)	0,2
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	365,0
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)	0,5
Release fraction to wastewater from process (initial release prior to RMM)	0,0
Release fraction to soil from process (initial release prior to RMM)	0,0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil.	
Risk from environmental exposure is driven by freshwater sediment	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required .	
Treat air emission to provide a typical removal efficiency of (%)	90,0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	0,0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,0

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	1,0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	14200,0
Assumed domestic sewage treatment plant flow (m3/d)	2000,0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations	

5.1. Worker CS 1: Bulk transfers; Dedicated facility (PROC 8b)

5.1.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

5.1.2. Releases

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 30. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.367
	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers) RCR = 0.241 Supportive exposure (not used for RC): 2.3 mg/m³ (Measured data: Concawe Report No 1/06) 7 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.013
	Vapour 10-500 Pa	65.77 mg/m³ (TRA Workers) RCR = 0.015 Supportive exposure (not used for RC): 74 mg/m³ (Measured data: Concawe Report No 1/06) 113 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.838
Combined routes, systemic, acute			RCR = 0.023

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 27
Inhalation exposure, short term concentration: Number of measured data points: 27
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Loading (unspecified)
Typical duration: 20 minutes
Top loading
Typical duration: 15 minutes
Bottom loading
Typical duration: 20 minutes
Maximum value, instead of 90th percentile, due to small number of measurements. Vapor measurements only. Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Measured values aligns very well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 6
Inhalation exposure, short term concentration: Number of measured data points: 6
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Gantry operator (used for long-term exposure)
Duration: 480 minutes
Top loading (used for short-term exposure)
Typical duration: 20 minutes
Median value instead of highest value, as it was reported that during both highest measurements, measurement errors have been observed and no other values were provided in the report.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities.
Measured values aligns very well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.2. Worker CS 2: rum/batch transfers; Dedicated facility (PROC 8b)

5.2.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.*	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%] *LEV exposure reduction efficiency represents the exposure reduction efficiency of using drum pumps.*	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Use drum pumps [E53] [Effectiveness Inhalation: 90%, Dermal: 0%] *Use drum pumps [E53]* Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016. This supports ESIG standard phrase E53.* Dermal explanation: *Expect dermal exposure is substantially reduced when drum pumps are used. Specific exposure reduction is per assessor professional judgment*.	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: *Yes (Chemically resistant gloves conforming to EN374 with basic employee training) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]*	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

5.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 31 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.746 mg/m³ (TRA Workers) RCR = 0.011	RCR = 0.042
	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	
	Vapour >10.000 Pa	8.67E-3 mg/m³ (TRA Workers) RCR = 1.27E-4	
Inhalation, systemic, acute	Aerosol	2.983 mg/m³ (TRA Workers) RCR = 6.96E-4	RCR < 0.01
	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 4.48E-4	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 8.08E-6	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.513
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.3. Worker CS 3: Refuelling (PROC 8b)

5.3.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) As described in ECETOC TR114. exposure to aerosol can be estimated using the medium dustiness band of the ECETOC TRA. For a detailed explanation see section 9.0.4.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

5.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 32- Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.729 mg/m³ (TRA Workers) RCR = 0.055	RCR = 0.367
	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers) RCR = 0.241 Supportive exposure (not used for RC): 0.35 mg/m³ (Measured data: Concawe Report No 1/06) 21.5 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	4.806 mg/m³ (TRA Workers) RCR = 0.07	
	Vapour >10.000 Pa	0.087 mg/m³ (TRA Workers) RCR = 1.27E-3	
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	RCR = 0.023
	Vapour 10-500 Pa	65.77 mg/m³ (TRA Workers) RCR = 0.015 Supportive exposure (not used for RC): 11 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	19.22 mg/m³ (TRA Workers) RCR = 4.48E-3	
	Vapour >10.000 Pa	0.347 mg/m³ (TRA Workers) RCR = 8.08E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.838
Combined routes, systemic, acute			RCR = 0.023

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.

The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:
Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 9
Inhalation exposure, short term concentration: Number of measured data points: 9
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Refuelling (heavy goods vehicle)
Typical duration: 15 minutes
90th percentile. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Identity of the substance used: gas oils
Inhalation exposure, long term concentration: Number of measured data points: 114
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Area near diesel pumps
Duration: 240 minutes
95th percentile. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.4. Worker CS 4: General exposures; Closed systems (PROC 2, PROC 1)

5.4.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid.	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Handle substance within a closed system	
• Sample via a closed loop or other system to avoid exposure (E8)	

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <=20 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

5.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 33 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 1.4 mg/m³ (Measured data: Concawe Report No 1/06) 6 mg/m³ (Measured data: Concaw Report No 1/06) 6 mg/m³ (Measured data: Concaw Report No 1/06) 0.83 mg/m³ (Measured data: Concaw Report No 1/06)	RCR = 0.149
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 0.028	
	Vapour >10.000 Pa	0.017 mg/m³ (TRA Workers) RCR = 2.54E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 44 mg/m³ (Measured data: Concawe Report No 1/06) 26.7 mg/m³ (Measured data: Concawe Report No 1/06)	RCR < 0.01
	Vapour 500-10.000 Pa	7.69 mg/m³ (TRA Workers) RCR = 1.79E-3	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.62E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.619
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Inhalation exposure, long term concentration: Number of measured data points: 12
Inhalation exposure, short term concentration: Number of measured data points: 12
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Deliveries
Typical duration: 20 minutes
90th percentile. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 8
Explanation: according to Table 2 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Road tanker operations
Typical duration: Full shift
90th percentile. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 13
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Drivers (Full cycle of loading and deliveries)
Duration: Full shift
Highest value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 1
Inhalation exposure, short term concentration: Number of measured data points: 1
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Deliveries
Duration: 4 minutes
Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.5. Worker CS 5: Use of fuels; Closed systems (PROC 16)

5.5.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0

	Method
• Covers use at ambient temperatures (unless stated differently)	

5.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 34 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.644 mg/m³ (TRA Workers) RCR = 0.024	RCR = 0.038
	Vapour 500-10.000 Pa	0.961 mg/m³ (TRA Workers) RCR = 0.014	
	Vapour >10.000 Pa	0.017 mg/m³ (TRA Workers) RCR = 2.54E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	RCR < 0.01
	Vapour 500-10.000 Pa	3.845 mg/m³ (TRA Workers) RCR = 8.97E-4	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.62E-5	
Dermal, systemic, long term	Dermal	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.155
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.6. Worker CS 6: quipment cleaning and maintenance (PROC 8a,PROC 28)

5.6.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 80%, Dermal: 0%] *Added to consider exposure reduction efficiency of drain and flush system prior break-in Exceptionally added to show safe use for cleaning and maintenance. To avoid over-application of RMMs, aerosol exposure was exceptionally assessed as well*.	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Standard Operating Procedures (SOP) maintenance (professional) [Effectiveness Inhalation: 80%, Dermal: 0%] *Drain down and flush system prior to equipment break-in or maintenance.* Inhalation explanation: *Based on results from Fraunhofer experimental study report Verifying the Effectiveness of Solvent RMMs 15/6/2016.* Dermal explanation: *Expect dermal exposure is substantially reduced when lines and equipment are properly drained and flushed according to Standard Operating Procedures (SOP). Specific exposure reduction is per assessor professional judgment*.	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Wear suitable coveralls to prevent exposure to skin	
• Clear spills immediately	

5.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 35 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.492 mg/m³ (TRA Workers) RCR = 0.022	RCR = 0.171
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12 Supportive exposure (not used for RC): 12.2 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 0.028	
	Vapour >10.000 Pa	0.035 mg/m³ (TRA Workers) RCR = 5.07E-4	
Inhalation, systemic, acute	Aerosol	5.966 mg/m³ (TRA Workers) RCR = 1.39E-3	RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3 Supportive exposure (not used for RC): 390 mg/m³ (Measured data: Concawe Report No 1/06)	
	Vapour 500-10.000 Pa	7.69 mg/m³ (TRA Workers) RCR = 1.79E-3	
	Vapour >10.000 Pa	0.139 mg/m³ (TRA Workers) RCR = 3.23E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.1 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.1 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.642
Combined routes, systemic, acute			RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 10 Pa for Aerosol.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 2
Inhalation exposure, short term concentration: Number of measured data points: 2
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Domestic heating oil tank cleaning
Typical duration: 30 minutes
Highest value. Vapor measurements only.
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities). Chesar tool does not allow to report measured data based on vapor assessments entities. Full-shift measured values aligns well with the ECETOC TRA predictions (if all vapor pressure bands are added up), which further supports the approach of splitting up the vapor pressure bands for the ECETOC TRA assessments. Short-term exposure may significantly exceed ECETOC TRA predictions, but are still significantly below the DNEL.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

5.7. Worker CS 7: Storage (PROC 2, PROC 1)

5.7.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently)	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently)	
Technical and organisational conditions and measures	
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Store substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0

	Method
• Operating temperature: <= 20.0 °C	TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently)	

5.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 36 Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	RCR = 0.149
	Vapour 500-10.000 Pa	1.922 mg/m³ (TRA Workers) RCR = 0.028	
	Vapour >10.000 Pa	0.017 mg/m³ (TRA Workers) RCR = 2.54E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	RCR < 0.01
	Vapour 500-10.000 Pa	7.69 mg/m³ (TRA Workers) RCR = 1.79E-3	
	Vapour >10.000 Pa	0.069 mg/m³ (TRA Workers) RCR = 1.62E-5	
Dermal, systemic, long term	Dermal	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	RCR = 0.471
Dermal, local, long term	Dermal	0.2 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.2 mg/cm² (TRA Workers)	
Combined routes, systemic, long-term			RCR = 0.619
Combined routes, systemic, acute			RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Dermal.
The vapour pressure at operating temperature (20°C) used for the calculation is 250 Pa for Vapour 10-500 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 5E3 Pa for Vapour 500-10.000 Pa.
The vapour pressure at operating temperature (20°C) used for the calculation is 1E4 Pa for Vapour >10.000 Pa.

Risk characterisation

Qualitative risks management measures are laid out above (General measures).

C-17.12c- Use as a fuel; consumer

Consumer contributing scenario(s):			SCED
CS 1	Fuels; Liquid; Automotive refuelling; (; Diesel;)	PC 13	Concawe_SCED_13_3_a
CS 2	Fuels; Liquid; Garden equipment	PC 13	Concawe_SCED_13_4_a
CS 3	Fuels; Liquid; Home space heater	PC 13	Concawe_SCED_13_5_a

Further description of the use:

Covers consumer uses in liquid fuels.

6.1. Cons CS 1: Fuels; Liquid; Automotive refuelling; (; Diesel;) (PC 13)

6.1.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_3_a Fuels, Liquid, Automotive refuelling (diesel)

Version date: December 2017

Product (article) characteristics	
• Exposure via inhalation route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Exposure via dermal route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Exposure via oral route: Oral exposure is considered to be not relevant *The SCED already addresses inhalation and dermal exposure routes assuming 100% systemic absorption. Oral exposure (e.g. from hand-to-mouth behaviour) is only likely to arise from incidental consumer actions. The potential contribution of oral exposure to systemic dose is therefore expected to be minimal when seen in the context of the other exposure routes.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Spray: No	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Amount used (or contained in articles), frequency and duration of use/exposure	
• Amount of product used per application: <= 44000 g/event *Based on 50 L fuel dispensed and density of 880 g/L. Value is consistent with reported refuelling amounts: 90th percentile of 53 L and average of 30 L.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Exposure time per event: = 0.05 h/event *Consistent with reported refuelling time ranging from 0.3-3.5 min, with an average of 1 min.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a year: Frequent *52 times/year - once/week; consistent with the 90th percentile of 5 times per month (0.17) and average of 3.1 times per month (0.1); corresponds to "frequent" Use Freq band in ECETOC TRA v3.1*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a day: = 1.0 events per day *Unchanged from ECETOC TRA default value*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Information and behavioral advice for consumers	
• Adult/child assumed: Adult	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)

• Place of use: Indoor/Outdoor	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Other conditions affecting consumers exposure	
• Body parts potentially exposed: Palm of one hand	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Inhalation transfer factor: = 0.002 *Refuelling via contained nozzle. Leakage on nozzle insertion and withdrawal is expected to be very low. As diesel fuel has a higher boiling point and let much lower vapour pressure than gasoline, emissions are expected to be much less significant than those for gasoline (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org).*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Dermal transfer factor: = 0.005 *This value is greater (more conservative) than the <0.001% of material handled that has been measured as being transferred onto the skin when refuelling cars with diesel (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org). Rationale for skin contact area: only one hand holds the fuel nozzle when refuelling*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1

6.1.2. Releases

1.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 1 - Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.536 mg/m³ (TRA Consumers) RCR = 0.027 Supportive exposure (not used for RC): 0.26 mg/m³ (Measured data: Concawe Report No 1/06)	RCR = 0.027
Inhalation, systemic, acute	Vapour 10-500 Pa	257.3 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.1	RCR = 0.1
Dermal, systemic, long term	Dermal	0.175 mg/kg bw/day (TRA Consumers) RCR = 0.14	RCR = 0.14
Oral, systemic, long term	Dermal	0 mg/kg bw/day (TRA Consumers) RCR = 0	RCR < 0.01
Combined routes, systemic, long-term			RCR = 0.166
Combined routes, systemic, acute			RCR = 0.1

Remarks on exposure dataset obtained with ECETOC TRA

Explanation for Vapour 10-500 Pa: Exposure modifying factor for 3 minutes calculated based on a 24 hour time-weighted average.

Remarks on exposure data from external estimation tools:

ECETOC TRA Consumers 3.1 for Vapour 10-500 Pa:
Explanation: since the assessed task is shorter than 15 minutes, the default TRA exposure prediction was used as conservative assumption

Remarks on measured exposure:

Concawe Report No 1/06 for Vapour 10-500 Pa:
Inhalation exposure, long term concentration: Number of measured data points: 114
Explanation: according to Table 1 of the Concawe Report No 1/06 Human exposure information for EU substance risk assessment of gas oils
Area near diesel pumps
Duration: 240 minutes
95th percentile. Vapor measurements only. It is assumed that during 40% of that time car were actually refueled, which is a worst-case assumption. This leads to a consumer exposure of 107.5 mg/m3 during the 3.5 minutes the complete refueling actions takes.
24 hour TWA: 107.5 mg/m3 * 3.5 minutes / 1440 minutes = 0.26 mg/m3
Exposure estimates represents all vapor pressure bands (i.e. all vapor assessments entities).
Measured values aligns well with the ECETOC TRA predictions, which further supports the approach of consolidating up the vapor pressure bands for the consumer exposure assessment using the ECETOC TRA assessments.

Risk characterisation

Qualitative risk characterisation:
General measures (skin irritation):
Dermal exposure during handling of consumer fuels is low and according to the Concawe SCEDs significantly less than 0.1% of the handled quantities are transferred to the skin. Exposure durations are very low and will typically not exceed one minute of dermal contact. The re-fuelling equipment is in general designed to minimise exposure (e.g. nozzle, vapour recovery systems etc). Additionally, disposable gloves are usually provided at petrol stations.
The risk due to skin irritation can thus be considered controlled.

Additional remarks on risk characterisation:
General measures (aspiration):
Applicable if classified as H304, refer to section 3 of the CSR.
Do not ingest. If swallowed then seek immediate medical assistance.
The risk due to aspiration can thus be considered controlled.

General measures (flammability):
Applicable if classified as H224 or H225 or H226, refer to section 3 of the CSR.
Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area or outdoors to prevent formation of explosive atmosphere. Use non-sparking tools.
The risk due to flammability can thus be considered controlled

6.2. Cons CS 2: Fuels; Liquid; Garden equipment (PC 13)

6.2.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_4_a Fuels, Liquids, Garden equipment refuelling

Version date: December 2017

Product (article) characteristics	
• Exposure via inhalation route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Exposure via dermal route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Exposure via oral route: Oral exposure is considered to be not relevant *The SCED already addresses inhalation and dermal exposure routes assuming 100% systemic absorption. Oral exposure (e.g. from hand-to-mouth behaviour) is only likely to arise from incidental consumer actions. The potential contribution of oral exposure to systemic dose is therefore expected to be minimal when seen in the context of the other exposure routes.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Spray: No	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Amount used (or contained in articles), frequency and duration of use/exposure	
• Amount of product used per application: <= 750.0 g/event *Based on tank size of 1 L and substance density of 750 g/L*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Exposure time per event: =0.033 h/event *Estimated 2 min: time taken to refuel a smaller size tank should be significantly less than for the auto-refuelling exposure time of 3 min.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a year: Frequent *6 times/year - Once/two weeks: refuelling of garden machinery activity occurs mostly during spring and summer; reported frequency for (vehicle) refuelling activity throughout the year was once/week, that corresponds to once/two weeks per year for garden equipment; corresponds to "occasional" Use Freq band in ECETOC TRA v3.11*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a day: = 1.0 events per day *Unchanged from ECETOC TRA default value*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Information and behavioral advice for consumers	
• Adult/child assumed: Adult	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Place of use: Indoor	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Other conditions affecting consumers exposure	
• Body parts potentially exposed: Inside hands / one hand / palm of hands	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Inhalation transfer factor: = 0.002 *0.03* *Estimated loss of <0.03 product used via spillage or evaporation (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org)*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1

• Dermal transfer factor: = 0.001 *Estimated value for gasoline. This value is greater (more conservative) than the <0.001% of material handled that has been measured as being transferred onto the skin when refuelling cars (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org). Rationale for skin contact area: only one hand holds the fuel nozzle when re-fuelling. Total area exposed less than for one hand.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1

6.2.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 2. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.504 mg/m³ (TRA Consumers) RCR = 0.025	RCR = 0.025
Inhalation, systemic, acute	Vapour 10-500 Pa	362.9 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.141	RCR = 0.141
Dermal, systemic, long term	Dermal	0.071 mg/kg bw/day (TRA Consumers) RCR = 0.057	RCR = 0.057
Oral, systemic, long term	Dermal	0 mg/kg bw/day (TRA Consumers) RCR = 0	RCR < 0.01
Combined routes, systemic, long-term			RCR = 0.082
Combined routes, systemic, acute			RCR = 0.141

Remarks on exposure data from external estimation tools:

Explanation for Vapour 10-500 Pa: Exposure modifying factor for 2 minutes calculated based on a 24 hour time-weighted average.

Remarks on exposure dataset obtained with ECETOC TRA

ECETOC TRA Consumers 3.1 for Vapour 10-500 Pa:

Explanation: since the assessed task is shorter than 15 minutes, the default TRA exposure prediction was used as

Risk characterisation

Qualitative risk characterisation:
General measures (skin irritation):
Dermal exposure during handling of consumer fuels is low and according to the Concawe SCEDs significantly less than 0.1% of the handled quantities are transferred to the skin. Exposure durations are very low and will typically not exceed one minute of dermal contact. The re-fuelling equipment is in general designed to minimize exposure (e.g. nozzle, vapour recovery systems etc). Additionally, disposable gloves are usually provided at petrol stations.
The risk due to skin irritation can thus be considered controlled.

Additional remarks on risk characterisation:
General measures (aspiration):
Applicable if classified as H304, refer to section 3 of the CSR.
Do not ingest. If swallowed then seek immediate medical assistance.
The risk due to aspiration can thus be considered controlled.

General measures (flammability):
Applicable if classified as H224 or H225 or H226, refer to section 3 of the CSR.
Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area or outdoors to prevent formation of explosive atmosphere. Use non-sparking tools. The risk due to flammability can thus be considered controlled.

6.3. Cons CS 3: Fuels; Liquid; Home space heater (PC 13)

6.3.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_5_a Fuels, Liquid, Home space heater

Version date: December 2017

Product (article) characteristics	
• Exposure via inhalation route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Exposure via dermal route: Yes	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Exposure via oral route: Oral exposure is considered to be not relevant *The SCED already addresses inhalation and dermal exposure routes assuming 100% systemic absorption. Oral exposure (e.g. from hand-to-mouth behaviour) is only likely to arise from incidental consumer actions. The potential contribution of oral exposure to systemic dose is therefore expected to be minimal when seen in the context of the other exposure routes.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Spray: No	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Amount used (or contained in articles), frequency and duration of use/exposure	
• Amount of product used per application: <= 750.0 g/event *Based on 4L and a density of 830 g/L (tank size of a home space heater is about 5L and the heater with a full tank of the fuel can last for 12-15hr.*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Exposure time per event: =0.033 h/event *Estimated 2 min as it should take significantly less time to refuel a smaller size tank than auto-refuelling (3 min).*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a year: Frequent *180 times/year - Daily use during heating season (6 months); corresponds to "frequent" Use Freq band in ECETOC TRA v3.1*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Frequency of use over a day: = 1.0 events per day *Unchanged from ECETOC TRA default value*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1

Information and behavioral advice for consumers	
• Adult/child assumed: Adult	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Place of use: Indoor	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
Other conditions affecting consumers exposure	
• Body parts potentially exposed: Palm of one hand	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)
• Inhalation transfer factor: = 0.02 *It is reasonable to anticipate that only a low amount (c. 5 mL) is likely to be routinely spilled during pouring in a residence and this equates to a comparative evaporative loss of <0.02 based on equivalent gasoline values for scooters (for scooter refuelling, the emission loss is calculated to be ~0.001 for refuelling spillage and 0.002 for vapour displacement emission based on the scooter tank volume of 5 L) (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org).*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1
• Dermal transfer factor: = 0.001 *Estimated value. This value is greater (more conservative) than the <0.001% of material handled that has been measured as being transferred onto the skin when refuelling cars (further justification in Concawe Handbook "SCEDs and Supporting Explanation" at www.concawe.org). Rationale for skin contact area: palm of only one hand expected to hold the fuel container when refueling*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1

6.2.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 2. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.488 mg/m³ (TRA Consumers) RCR = 0.074	RCR = 0.074
Inhalation, systemic, acute	Vapour 10-500 Pa	1.07E3 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.416	RCR = 0.416
Dermal, systemic, long term	Dermal	0.035 mg/kg bw/day (TRA Consumers) RCR = 0.028	RCR = 0.028
Oral, systemic, long term	Dermal	0 mg/kg bw/day (TRA Consumers) RCR = 0	RCR < 0.01
Combined routes, systemic, long-term			RCR = 0.102
Combined routes, systemic, acute			RCR = 0.416

Remarks on exposure data from external estimation tools:

Explanation for Vapour 10-500 Pa: Exposure modifying factor for 2 minutes calculated based on a 24 hour time-weighted average.

Remarks on exposure dataset obtained with ECETOC TRA

ECETOC TRA Consumers 3.1 for Vapour 10-500 Pa:

Explanation: since the assessed task is shorter than 15 minutes, the default TRA exposure prediction was used as

Risk characterisation

Qualitative risk characterisation:

General measures (skin irritation):

Dermal exposure during handling of consumer fuels is low and according to the Concawe SCEDs significantly less than 0.1% of the handled quantities are transferred to the skin. Exposure durations are very low and will typically not exceed one minute of dermal contact. The re-fuelling equipment is in general designed to minimize exposure (e.g. nozzle, vapour recovery systems etc). Additionally, disposable gloves are usually provided at petrol stations.
The risk due to skin irritation can thus be considered controlled.
Additional remarks on risk characterisation:

General measures (aspiration):

Applicable if classified as H304, refer to section 3 of the CSR.
Do not ingest. If swallowed then seek immediate medical assistance.
The risk due to aspiration can thus be considered controlled.

General measures (flammability):

Applicable if classified as H224 or H225 or H226, refer to section 3 of the CSR.
Use in contained systems. Avoid ignition sources – No Smoking. Handle in well ventilated area or outdoors to prevent formation of explosive atmosphere. Use non-sparking tools.
The risk due to flammability can thus be considered controlled.

Exposure scenario for EC 700-571-2

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
IW-7. - Use in fuel; industrial	Industrial	-	-	1, 2, 8a, 8b, 16, 28	7	ESVOC SpERC 7.12a.v3
PW-6. - Use in fuel; professional	Professional	-	-	1, 2, 8a, 8b, 16, 28	9a, 9b	ESVOC SpERC 9.12b.v3
C-4. - Use in fuel; consumer	Consumer	-	13	n. a.	9a, 9b	ESVOC SpERC 9.12c.v3

Summary of Exposure scenarios for EC 941-364-9

IW-7.Use in fuel, Industrial 170
PW-6. - Use in fuel; professional 170
C-4. – Use in fuel; Consumer 187

IW-7.Use in fuel, Industrial

Product category used: PC 13: Fuels

Environment contributing scenario(s):			**SPERC**
CS 1	Use in fuel	**7**	ESVOC SPERC 7.12a.v3
Worker contributing scenario(s):			**SWED**
CS 2	Bulk transfers; Dedicated facility	PROC 8b	
CS 3	Drum/batch transfers; Dedicated facility	PROC 8b	
CS 4	General exposures (closed systems)	PROC 1	
CS 5	General exposures (closed systems); With sample collection	PROC 2	
CS 6	Use of fuels; Closed systems	PROC 16	
CS 7	Equipment maintenance	**PROC 8a**, PROC 28	
CS 8	Storage	PROC 1	
CS 9	Storage	PROC 2	

Further description of the use:

Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste [GES12_P].

1.1. Env CS 1: Use in fuel (ERC 9b, ERC 9a)

1.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use amount at site: <= 5E3 tonnes/day *Amount of substance use per day: 5,000,000 kg/day*
• Percentage of EU tonnage used at regional scale: = 100 %
• Percentage of Regional tonnage used at local scale: = 100 %
• Annual use amount at site: <= 1E4 tonnes/year *Number of emission days per year: 300 (default value)*
Technical and organisational conditions and measures
• RMM limiting release to air: no obligatory RMMs
• RMM limiting release to water: Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) is required. *Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) is required*.
Conditions and measures related to biological sewage treatment plant
• Discharge rate of STP: >= 2E3 m3/day *Assumed domestic sewage treatment plant flow*
• Biological STP: Site specific [Effectiveness Water: 94.63%] *Biological wastewater treatment (WWT) may involve the use of both industrial and municipal WWT facilities. The prevalence of each type of facility was assessed in a survey of WWT technologies at 81 European chemical facilities that included both large integrated facilities and smaller dedicated stand-alone sites (EC, 2016). The operations at these facilities included the production and formulation of a wide range of chemicals and solvents for use in a wide range of downstream applications. The survey results indicated that a majority (i.e. 89%) of the chemical facilities used a dedicated industrial wastewater treatment facility; a much smaller percentage utilized a municipal treatment plant capable of handling both industrial and domestic wastewater. Despite the limited reliance on municipal treatment facilities, their usage is conservatively assumed to exist as a normal operating condition during the production, formulation, and downstream use of solvents*
• Application of the STP sludge on agricultural soil: No

Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: Other *Residual raw materials and are in some cases recycled and fed back into the process reactor to improve efficiencies. In other cases, residues and by-products are used as raw materials for other downstream applications (EEA, 2016). Wastewater generated during cleaning and maintenance operations is directed to a waste water treatment plant for biological degradation. Atmospheric release of waste vapour may be ameliorated using wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. All unrecovered waste is handled as an industrial waste that can be incinerated.*
Other conditions affecting environmental exposure
• Place of use: Indoor/Outdoor
• Water contact during use: Yes

1.1.2. Releases

The releases have been estimated on the basis of SPERC ESVOC SPERC 7.12a.v3: Use as a fuel (industrial): solvent-borne
Modification date: 21/04/2020

Description of activities/processes covered by the SPERC
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.
Product/substance domain:
Substance types / functions / properties included or excluded
Applicable to petroleum substances and petrochemicals.
Additional specification of product types covered: Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.

Sub-SPERC: ESVOC 7.12a.b.v3: VP < 1000
The local releases to the environment are reported in the following table.

Table 1. Local releases to the environment

Release	Explanations
Water	**Release factor:** 1E-3% **Local release rate:** 50 kg/day
Air	**Release factor:** 0.6% **Local release rate:** 3E4 kg/day
Non agricultural soil	**Release factor:** 0% **Local release rate:** - kg/day

Releases to waste: Release factor to external waste: 0%

1.1.3. Exposure and risks for the environment and man via the environment

No exposure datasets are defined for this environmental contributing scenario.

Risk characterisation

Qualitative risk characterisation (Fresh water, Sediment (freshwater), Marine water, Sediment (marine water), Sewage Treatment Plant, Agricultural soil):
See Annex 4 for complete PETRORISK modelling for the environmental compartment.

1.2. Worker CS 2: Bulk transfers; Dedicated facility (PROC 8b)

1.2.1 Conditions of use for Workers applicable to the Contribution Scenarios

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 2. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	41.63 mg/m³ (TRA Workers)	RCR = 0.283
Dermal, systemic, long term	1.371 mg/kg bw/day (TRA Workers)	RCR = 0.033
Combined routes, systemic, long-term		RCR = 0.316

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation: 0%

1.3.0Worker CS 3: Drum/batch transfers; Dedicated facility (PROC 8b)

1.3.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 3. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	41.63 mg/m³ (TRA Workers)	RCR = 0.283
Dermal, systemic, long term	1.371 mg/kg bw/day (TRA Workers)	RCR = 0.033
Combined routes, systemic, long-term		RCR = 0.316

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

1.4.0 Worker CS 4: General exposures (closed systems) (PROC 1)

1.4.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 4. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.083 mg/m³ (TRA Workers)	RCR <0.01
Dermal, systemic, long term	3.4E-3 mg/kg bw/day (TRA Workers)	RCR <0.01
Combined routes, systemic, long-term		RCR <0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation: 0%

1.5.0 Worker CS 5: General exposures (closed systems); With sample collection (PROC 2)

1.5.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 5. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	8.327 mg/m³ (TRA Workers)	RCR =0.057
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.06

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

1.6.0 Worker CS 6: Use of fuels; Closed systems (PROC 16)

11.6.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

11.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 6. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	8.327 mg/m³ (TRA Workers)	RCR = 0.057
Dermal, systemic, long term	0.034 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.057

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

1.7.0 Worker CS 7: Equipment cleaning and maintenance (PROC 8a, PROC 28)

1.7.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 7. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	8.327 mg/m³ (TRA Workers)	RCR = 0.057
Dermal, systemic, long term	1.371 mg/kg bw/day (TRA Workers)	RCR = 0.033
Combined routes, systemic, long-term		RCR = 0.089

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation: 90 %

1.8.0 Worker CS 8: Storage (PROC 1)

1.8.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 8. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.083 mg/m³ (TRA Workers)	RCR < 0.01
Dermal, systemic, long term	3.4E-3 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

1.9.0 Worker CS 9: Storage (PROC 2)

1.9.1. Conditions of use

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Room ventilation: Good (3 to 5 ACH)	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: Indoor	TRA Workers 3.0

1.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	8.327 mg/m³ (TRA Workers)	RCR = 0.057
Dermal, systemic, long term	0.137 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.06

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

PW-6. - Use in fuel; professional

Product category used: PC 13: Fuels

Environment contributing scenario(s):			**SPERC**
CS 1	Use in fuel	**ERC 9b**, ERC 9a	ESVOC SPERC 9.12b.v3
Worker contributing scenario(s):			**SWED**
CS 2	Bulk transfers; Dedicated facility	PROC 8b	
CS 3	Drum/batch transfers; Dedicated facility	PROC 8b	
CS 4	Refuelling	PROC 8b	
CS 5	General exposures (closed systems)	PROC 1	
CS 6	General exposures (closed systems)	PROC 2	
CS 7	Use of fuels; Closed systems	PROC 16	
CS 8	Equipment maintenance	**PROC 8a**, PROC 28	
CS 9	Storage	PROC 1	
CS 10	Storage	PROC 2	

Further description of the use:

Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste [GES12_P].

11.1. Env CS 1: Use in fuel (ERC 9b, ERC 9a)

11.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Percentage of EU tonnage used at regional scale: = 10 %
• Percentage of Regional tonnage used at local scale: = 0.05 %
• Daily local widespread use amount: <= 0.041 tonnes/day *Amount of substance use per day: Supplied by registrant* *Fraction of Regional tonnage used locally: 0.05% (default value) / Number of emission days per year: 365 (default)*
Technical and organisational conditions and measures
• RMM limiting release to air: no obligatory RMMs
• RMM limiting release to water: The release to water is modified after biological treatment at a standard municipal sewage treatment plant (STP) with an effluent flow rate of 2,000 m3 /day
• RMM limiting release to soil: No obligatory RMMs
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 94.63%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: Other *Unused and spent products and solutions should be appropriately labelled and stored for eventual recovery or disposal as hazardous waste. A suitable unbreakable and closable container should be used when storing and shipping hazardous materials. The containers must be solvent compatible, leakproof, and free of any defects. Contaminated debris such as disposable paper towels, brushes, rollers, masks, transfer vessels, and wipes that may contain small amounts of solvent residue need to be handled as hazardous waste and properly disposed of in a manner that is consistent with local, regional, and national regulations. Direct disposal of waste into a municipal sewer system needs to conform with all applicable laws and regulations. A spill plan needs to be available that outlines the steps to be taken to minimize any potential health and environmental threats.* *EPA (2001). Managing Your Hazardous Waste: A Guide for Small Businesses. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Washington, DC. https://www.epa.gov/sites/production/files/2014-12/documents/k01005.pdf.*
Other conditions affecting environmental exposure
• Place of use: Indoor/Outdoor

• Water contact during use: Yes

11.1.2. Releases

The releases have been estimated on the basis of SPERC ESVOC SPERC 9.12b.v3: Use as a fuel (professional): solvent-borne
Applicable to petroleum substances and petrochemicals.
Additional specification of product types covered: Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.
Inclusion of sub-SPERCs:
2 ERCs -9a and 9b- covered by same sub-SPERC
Sub-SPERC: ESVOC 9.12b.v3: .
The local releases to the environment are reported in the following table.

Table 163. Local releases to the environment

Release	Explanations
Water	**Release factor:** 1E-4% **Local release rate:** 4.11E-5 kg/day
Air	**Release factor:** 0.5% **Local release rate:** - kg/day
Non agricultural soil	**Release factor:** 0.025% **Local release rate:** - kg/day

Releases to waste: Release factor to external waste: 2 %
The waste factor has been taken from a life cycle assessment of gasoline production and use in passenger cars (Morales, 2015). The evaluation revealed that 2.1 ml of hazardous waste was incinerated per km driven. The stated fuel mileage of 150 ml/km yields a waste release factor of 1.4%, which was rounded upward to 2%.

11.1.3. Exposure and risks for the environment and man via the environment

No exposure datasets are defined for this environmental contributing scenario.

Risk characterisation

Qualitative risk characterisation (Fresh water, Sediment (freshwater), Marine water, Sediment (marine water), Sewage Treatment Plant, Agricultural soil):
See Annex 4 for complete PETRORISK modelling for the environmental compartment.

11.2. Conditions of use for Workers applicable to the Contribution Scenarios

	Method
Product (article) characteristics	
Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Process Conditions: • Closed process without likelihood of exposure • Continuous closed process with occasional controlled exposure Batch closed process with occasional controlled exposure	
Conditions and measures related to personal protection, hygiene and health evaluation	
Face/eye protection: No	
Local exhaust ventilation • No Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	

	Method
Dermal protection: Yes (effectiveness >= 80%)	TRA Workers 3.0
Respiratory protection: No	TRA Workers 3.0
Other conditions affecting workers exposure	
Operating temperature: <= 25 °C *Assumes use at not more than 25°C above ambient temperature.*	TRA Workers 3.0
Place of use: • Outdoor • Indoor	TRA Workers 3.0

11.2.0 Worker CS 2: Bulk transfers; Dedicated facility (PROC 8b)

11.2.1.Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: -
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Outdoor

11.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 164. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	83.27 mg/m³ (TRA Workers)	RCR = 0.566
Dermal, systemic, long term	2.742 mg/kg bw/day (TRA Workers)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.632

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation

11.3.0Worker CS 3: Drum/batch transfers; Dedicated facility (PROC 8b)

11.3.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: -
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 165. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	83.27 mg/m³ (TRA Workers)	RCR = 0.566
Dermal, systemic, long term	2.742 mg/kg bw/day (TRA Workers)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.632

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

11.4.0 Worker CS 4: Refuelling (PROC 8b)

11.4.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: -
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.166. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	83.27 mg/m³ (TRA Workers)	RCR = 0.566
Dermal, systemic, long term	2.742 mg/kg bw/day (TRA Workers)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.632

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation

11.5.0 Worker CS 5: General exposures (closed systems) (PROC 1)

11.5.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: Closed process without likelihood of exposure
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 167. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.083 mg/m³ (TRA Workers)	RCR < 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

11.6.0 Worker CS 6: General exposures (closed systems) (PROC 2)

11.6.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: Closed continuous process with occasional controlled exposure
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 168. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	41.63 mg/m³ (TRA Workers)	RCR = 0.283
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.29

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

11.7.0 Worker CS 7: Use of fuels; Closed systems (PROC 16)

11.7.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: -
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 169. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	8.327 mg/m³ (TRA Workers)	RCR = 0.057
Dermal, systemic, long term	0.068 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.058

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

11.8.0 Worker CS 8: Equipment maintenance (PROC 8a, PROC 28)

11.8.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: -
Local exhaust ventilation: Yes, specifically designed LEV such as receiving hoods (assumed effectiveness >= 80-90%)

Other conditions affecting workers exposure

Place of use: Indoor

11.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 170. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	41.63 mg/m³ (TRA Workers)	RCR = 0.283
Dermal, systemic, long term	2.742 mg/kg bw/day (TRA Workers)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.349

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 80 %

11.9.0 Worker CS 9: Storage (PROC 1)

11.9.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: Closed process without likelihood of exposure
Store substance within a closed system.
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 171. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.083 mg/m³ (TRA Workers)	RCR < 0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR < 0.01

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

11.10.0 Worker CS 10: Storage (PROC 2)

11.10.1. Conditions of use

General conditions in table 11.2

Technical and organisational conditions and measures

Process conditions: Closed continuous process with occasional controlled exposure
Store substance within a closed system.
Local exhaust ventilation: no

Other conditions affecting workers exposure

Place of use: Indoor

11.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 172. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	41.63 mg/m³ (TRA Workers)	RCR = 0.283
Dermal, systemic, long term	0.274 mg/kg bw/day (TRA Workers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.29

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (25°C) used for the calculation is 87.1 Pa.
Local exhaust ventilation effectiveness used by TRA: inhalation 0 %

C-4. – Use in fuel; Consumer

Environment contributing scenario(s):			**SPERC**
CS 1	Use in fuel	**ERC 9b**, ERC 9a	ESVOC SPERC 9.12c.v3
Consumer contributing scenario(s):			**SCED**
CS 2	Fuels: Liquid - subcategories added: Automotive Refuelling	PC 13	
CS 3	Fuels: Liquid - subcategories added: Scooter Refuelling	PC 13	
CS 4	Fuels: Liquid - subcategories added: Garden Equipment - Use	PC 13	
CS 5	Fuels: Liquid (subcategories added): Garden Equipment - Refueling	PC 13	
CS 6	Fuels: Liquid (subcategories added): Home space heater fuel	PC 13	
CS 7	Fuels: Liquid - subcategories added: Lamp oil	PC 13	

18.1. Env CS 1: Use in fuel (ERC 9b, ERC 9a)

18.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Percentage of EU tonnage used at regional scale: = 10 %
• Percentage of Regional tonnage used at local scale: = 0.05 %
• Daily local widespread use amount: <= 1.37E-7 tonnes/day *Amount of substance use per day: Supplied by registrant* *Fraction of Regional tonnage used locally: 0.05% (default value) / Number of emission days per year: 365 (default)*
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: Other *Although household hazardous waste (HHW) represents a small portion of the total domestic waste produced by consumers, it needs to be separated from normal trash and amassed for special handling. Many regional municipalities have established voluntary procedures for the identification, collection, and disposal of HHW in a safe and efficient manner. Once amassed, the HHW can be transported to collection sites where it is reused, recycled, or incinerated. The handling and disposal of hazardous waste needs to conform with established practices and local/regional regulations in order to minimize environmental release and the potential for ecological harm.*
Other conditions affecting environmental exposure
• Biological STP: Standard [Effectiveness Water: 94.63%]
• Place of use: Indoor/Outdoor
• Water contact during use: Yes
• RMM limiting release to air: no obligatory RMMs
• RMM limiting release to soil: No obligatory RMMs
• RMM limiting release to water: The release to water is modified after biological treatment at a standard municipal sewage treatment plant (STP) with an effluent flow rate of 2,000 m3 /day *By default, the release to water is modified after biological treatment at a standard municipal sewage treatment plant (STP) with an effluent flow rate of 2,000 m3 /day.*

18.1.2.Releases

The releases have been estimated on the basis of SPERC ESVOC SPERC 9.12c.v3
Applicable to petroleum substances and petrochemicals.
Additional specification of product types covered: Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.
Inclusion of sub-SPERCs
Yes (2 ERCs -9a and 9b- covered by same sub-SPERC)
Sub-SPERC: ESVOC 9.12c.c.v3: VP < 500 Pa
The local releases to the environment are reported in the following table.

Table 257. Local releases to the environment

Release	Explanations
Water	**Release factor:** 2E-5% **Local release rate:** 2.74E-11 kg/day
Air	**Release factor:** 0.01% **Local release rate:** - kg/day
Non agricultural soil	**Release factor:** 5E-3% **Local release rate:** - kg/day

Releases to waste: **Release factor to external waste:** 0 %

18.1.3.Exposure and risks for the environment and man via the environment

No exposure datasets are defined for this environmental contributing scenario.

Risk characterisation

Qualitative risk characterisation (Fresh water, Sediment (freshwater), Marine water, Sediment (marine water), Sewage Treatment Plant, Agricultural soil):
See Annex 4 for complete PETRORISK modelling for the environmental compartment.

18.2. Conditions of use for professional workers applicable to the Contribution Scenarios

	Method
Information and behavioral advice for consumers	
Air Exchange Rate • 2.5 l/hr *TRAv.1 default* • 1.5 l/hr *RIVM general fact sheet* • 0.6 l/hr *RIVM general fact sheet*	
Room volume: • 100 m^3 *Stoffenmanager volume used for outdoors* • 34 m^3 *RIVM general fact sheet* • 20 m^3 TRA default	
Other conditions affecting consumers exposure	
• Use Dilution Factor: = 1 *TRA default*	
• Amount of product swallowed: = 0 mg *TRA default*	
Skin Contact Surface Area: • 210 cm^2 *est. as palm of one hand* • 420 cm^2 *Est. half of each hand* • *no dermal contact*	

18.2.0 Cons CS 2: Fuels: Liquid - subcategories added: Automotive Refuelling (PC 13)

18.2.1.Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 2.5 l/hr *TRAv.1 default*
Room volume: 100 m^3 *Stoffenmanager volume used for outdoors*
Other conditions affecting consumers exposure
Skin Contact Surface Area: 210 cm^2 *est. as palm of one hand*

18.2.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 258. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.734 mg/m³ (EGRET 2.0) **Supportive exposure (not used for RC):** 333.3 mg/m³ (TRA Consumers)	RCR < 0.01
Dermal, systemic, long term	13.51 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** (TRA Consumers)	RCR = 0.751
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.758

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 0.05 h/event
(*3mins, 97th percentile-Vainiotalo et al. 1999*)
• Exposure via dermal route: Yes
• Place of use: Outdoor
(*outdoor*)
• Inhalation transfer factor: = 2E-3
(*expect low % loss during refueling due to evaporation /spill*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 3.75E4 g/event
(*est. fuel tank size 50 L converted using gasoline density of 750 kg/m3*)
• Percentage (w/w) of substance in mixture/article: <= 50 %
(*increased above TRA default*)
• Exposure via inhalation route: Yes
• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Dermal transfer factor: = 1 (*TRA default*)
• Frequency of use over a year: Frequent (*est. as 1 per week*)
• Body parts potentially exposed

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2

18.3.0 Cons CS 3: Fuels: Liquid - subcategories added: Scooter Refuelling (PC 13)

18.3.1. Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 2.5 l/hr *TRAv.1 default*
Room volume: 100 m³ *Stoffenmanager volume used for outdoors*
Other conditions affecting consumers exposure
Skin Contact Surface Area: 210 cm² *est. as palm of one hand*

18.3.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 259. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.495 mg/m³ (EGRET 2.0) **Supportive exposure (not used for RC):** 346.4 mg/m³ (TRA Consumers)	RCR < 0.01
Dermal, systemic, long term	13.51 mg/kg bw/day (EGRET 2.0)	RCR = 0.751

Route of exposure and type of effects	Exposure concentration	Risk quantification
	Supportive exposure (not used for RC): (TRA Consumers)	
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.756

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 0.033 h/event
(*2mins, Est. as shorter than vehicle*)
• Exposure via dermal route: Yes
• Place of use: Outdoor
(*outdoor*)
• Inhalation transfer factor: = 0.02
(*expect low % loss during refueling but more than for automotive*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 3.75E3 g/event
(*est. fuel tank size 5 L converted using gasoline density of 750 kg/m3*)
• Percentage (w/w) of substance in mixture/article: <= 50 %
(*increased above TRA default*)
• Exposure via inhalation route: Yes
• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Dermal transfer factor: = 1 (*TRA default*)
• Frequency of use over a year: Frequent (*est. as 1 per week*)
• Body parts potentially exposed

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2

18.4.0 Cons CS 4: Fuels: Liquid - subcategories added: Garden Equipment - Use (PC 13)

18.4.1. Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 2.5 l/hr *TRAv.1 default*
Room volume: 100 m^3 *Stoffenmanager volume used for outdoors*
Other conditions affecting consumers exposure
Skin Contact Surface Area: no dermal contact

18.4.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 260. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	2.483 mg/m^3 (EGRET 2.0) **Supportive exposure (not used for RC):** 25 mg/m^3 (TRA Consumers)	RCR = 0.026
Dermal, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):**	RCR < 0.01

Route of exposure and type of effects	Exposure concentration	Risk quantification
	0 mg/kg bw/day (TRA Consumers)	
Combined routes, systemic, long-term		RCR = 0.026

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 2 h/event (*Est. 2 hours per day*)
• Exposure via dermal route: Dermal exposure assumed to be negligible
• Place of use: Outdoor (*outdoor*)
• Inhalation transfer factor: = 0.02
(*expect low % loss during equipment use*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 750 g/event
(*1 L: Conv from L to g based upon density for mogas = 750 kg/m3.*)
• Percentage (w/w) of substance in mixture/article: <= 100 %
(*increased above TRA default*)
• Exposure via inhalation route: Yes
• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Frequency of use over a year: Infrequent (*est. as 1 per two weeks*)

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2

18.5.0 Cons CS 5: Fuels: Liquid (subcategories added): Garden Equipment - Refueling (PC 13)

18.5.1. Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 1.5 l/hr RIVM general fact sheet
Room volume: 34 m^3 RIVM general fact sheet
Other conditions affecting consumers exposure
Skin Contact Surface Area: 420 cm^2 Est. half of each hand

18.5.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 261. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.162 mg/m^3 (EGRET 2.0) **Supportive exposure (not used for RC):** 1.11E3 mg/m^3 (TRA Consumers)	RCR < 0.01
Dermal, systemic, long term	10.80 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** (TRA Consumers)	RCR = 0.6
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.602

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 0.03 h/event
(*Est. 2mins*)
• Exposure via dermal route: Yes

• Place of use: Indoor (*garage*)
• Inhalation transfer factor: = 0.03
(*expect low % loss but may be more from pouring than using filling station equipment*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 750 g/event
(*1 L: Conv from L to g based upon density for mogas = 750 kg/m3.*)
• Percentage (w/w) of substance in mixture/article: <= 100 % (*increased above TRA default*)
• Exposure via inhalation route: Yes
• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Dermal transfer factor: = 1 (*TRA default*)
• Frequency of use over a year: Infrequent (*est. as 1 per two weeks*)
• Body parts potentially exposed

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2

18.6.0 Cons CS 6: Fuels: Liquid (subcategories added): Home space heater fuel (PC 13)

18.6.1. Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 0.6 l/hr RIVM general fact sheet
Room volume: 20 m^3 TRA default
Other conditions affecting consumers exposure
Skin Contact Surface Area: 210 cm^2 est. as palm of one hand

18.6.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 262. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.116 mg/m^3 (EGRET 2.0) **Supportive exposure (not used for RC):** 92.09 mg/m^3 (TRA Consumers)	RCR < 0.01
Dermal, systemic, long term	13.51 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** (TRA Consumers)	RCR = 0.751
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.752

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 0.03 h/event (*Est. 2mins*)
• Exposure via dermal route: Yes
• Place of use: Indoor (*indoor, typical*)
• Inhalation transfer factor: = 1.25E-3
(*expect low amount (5 ml max) spilled during pouring in residence*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 3E3 g/event
(*4 L: Conv from L to g based upon density for mogas = 750 kg/m3.*)
• Percentage (w/w) of substance in mixture/article: <= 50 %
(*increased above TRA default*)
• Exposure via inhalation route: Yes

• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Dermal transfer factor: = 1 (*TRA default*)
•equency of use over a year: Frequent (*est. as daily*)
• Body parts potentially exposed

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2

18.7.0 Cons CS 7: Fuels: Liquid - subcategories added: Lamp oil (PC 13)

18.7.1. Conditions of use

General conditions in table 18.2

Information and behavioral advice for consumers

Air Exchange Rate: 0.6 l/hr RIVM general fact sheet
Room volume: 20 m^3 TRA default
Other conditions affecting consumers exposure

Skin Contact Surface Area: 210 cm^2 est. as palm of one hand

18.7.2. Exposure and risks for consumers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 263. Exposure concentrations and risks for consumers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.067 mg/m^3 (EGRET 2.0) **Supportive exposure (not used for RC):** 124.0 mg/m^3 (TRA Consumers)	RCR < 0.01
Dermal, systemic, long term	13.51 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** (TRA Consumers)	RCR = 0.751
Oral, systemic, long term	0 mg/kg bw/day (EGRET 2.0) **Supportive exposure (not used for RC):** 0 mg/kg bw/day (TRA Consumers)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.751

Remarks on exposure dataset obtained with ECETOC TRA

Additional conditions of use related to the exposure estimate:

• Exposure time per event: = 0.013 h/event (*Est. 0.75 min*)
• Exposure via dermal route: Yes
• Place of use: Indoor (*indoor, typical*)
• Inhalation transfer factor: = 0.05
(*expect low loss but % increased because lower use volume*)
• Frequency of use over a day: = 1 events per day
• Amount of product used per application: <= 100 g/event
(*0.13L: Conv from L to g based upon density for mogas = 750 kg/m3.*)
• Percentage (w/w) of substance in mixture/article: <= 50 %
(*increased above TRA default*)
• Exposure via inhalation route: Yes
• Adult/child assumed: Adult
• Spray: No
• Exposure via oral route: Oral exposure is considered to be not relevant
• Dermal transfer factor: = 1 (*TRA default*)

• Frequency of use over a year: Frequent (*est. as 1 per week*)
• Body parts potentially exposed

Remarks on exposure data from external estimation tools:

EGRET 2.0:
Explanation:
Exposure Estimations were conducted based on EGRET ver2
T ver2