Safety Data Sheet

[In accordance with the criteria of Regulation No 1907/2006 (REACH) as amended]

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

1.1 Product identifier

Trade name: **MARINE GAS OIL (MGO:DMA)**
UFI number: 0200-U0CW-6003-Q3HG

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

Relevant identified uses: diesel fuel for shipping purposes.
Uses advised against: not determined.

1.3 Details of the supplier of the safety data sheet

Supplier: **UNIMOT PALIWA Sp. z o.o.**
Address: ul. Świerklańska 2 a
47-120 Zawadzkie
Telephone number: +48 (77) 461 65 48
E-mail address for a competent person responsible for sds: biuro@thetaconsulting.pl

1.4 Emergency telephone number

112

Section 2: Hazards identification

2.1 Classification of the substance or mixture

Flam. Liq. 3 H226	Flammable liquid and vapour.
Asp. Tox. 1 H304	May be fatal if swallowed and enters airways.
Skin Irrit. 2 H315	Causes skin irritation.
Acute Tox. 4 H332	Harmful if inhaled.
Carc. 2 H351	Suspected of causing cancer.
STOT RE 2 H373	May cause damage to organs through prolonged or repeated exposure.
Aquatic Chronic 2 H411	Toxic to aquatic life with long lasting effects.

2.2 Label elements

Hazard pictograms and signal words

DANGER

Substances which influenced classification

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

Precautionary statements

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.

P273	Avoid release to the environment.
P280	Wear protective gloves.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P331	Do NOT induce vomiting.

2.3 Other hazards

Components of this mixture meet criteria for PBT or vPvB in accordance with Annex XIII of REACH Regulation. The product does not contain substances included in the list established in accordance with Article 59(1) for having endocrine disrupting properties, or substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 (3) or Commission Regulation (EU) 2018/605 at a concentration equal to or greater than 0.1% by weight.

Section 3: Composition/information on ingredients

3.2 Mixtures

Fuels, diesel

Concentration range:	90-100%
CAS number:	68334-30-5
EC number:	269-822-7
Index number:	649-224-00-6
REACH number:	01-2119484664-27-0286
KCLP classification:	Flam. Liq. 3 H226, Asp. Tox. 1 H304, Skin Irrit. 2 H315, Acute Tox. 4 H332; Carc. 2 H351, STOT RE 2 H373, Aquatic Chronic 2 H411

Full text of each relevant H phrases is given in section 16 of SDS.

Section 4: First aid measures

4.1 Description of first aid measures

Skin contact: remove contaminated clothing, immediately wash skin with plenty of water. If there was no irritation, it is advisable to use soap. Do not solvents. If irritation occurs, consult a doctor.

Eye contact: consult a doctor if disturbing symptoms appear. Protect non- irritated eye, remove contact lenses. Rinse the irritated eye thoroughly with water for 10-15 minutes. Avoid strong stream of water - the risk of cornea damage.

Ingestion: do not induce vomiting. Rinse mouth with water. Do not give milk, fats or alcohol to drink. Never give anything by mouth to an unconscious person. Call a doctor immediately and show container or label.

Inhalation: consult a doctor immediately. Remove victim to fresh air, keep warm and at rest. Symptoms may be delayed.

4.2 Most important symptoms and effects, both acute and delayed

Eye contact: high concentrations of vapors or direct contact with the liquid may cause irritation of the mucous membranes of the eyes, burning, tearing, redness.

Skin contact: has a degreasing effect; direct, prolonged contact with the liquid may cause drying, cracking, irritation and inflammation of the skin. With prolonged contact with the product, the product may be absorbed through the skin.

Ingestion: stomach pain, nausea. Due to its low viscosity, the product may penetrate directly into the lungs after swallowing or vomiting and cause serious lung damage (aspiration pneumonia).

Inhalation: causes headaches and dizziness, irritation of the respiratory mucous membranes, nausea, vomiting; at higher vapor concentrations, breathing disorders, impaired coordination of movements, states of excitement, disorientation, drowsiness, loss of consciousness.

4.3 Indication of any immediate medical attention and special treatment needed

Doctor makes a decision regarding further medical treatment after thoroughly examination of the injured.

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Section 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: CO_2 extinguishers, foam extinguishers, powder extinguishers with ABC/BC putting powder, water spray. Fight small fires with a powder or snow extinguisher; extinguish large fires with fire-fighting foam or dispersed water jets; use remote sprinkler devices or fight fire from behind protective covers - risk of explosion.
Unsuitable extinguishing media: water jet – risk of the propagation of the flame.

5.2 Special hazards arising from the substance or mixture

During the combustion, toxic gases may be generated, such as carbon monoxide, organic vapors, etc. Avoid inhalation of combustion products that may pose a health risk.

5.3 Advice for firefighters

The protective measures typical in case of fire. Do not stay in the danger zone without adequate fire-resistant clothing and chemical-contained breathing apparatus with independent air circulation. Flammable product. Fire or an increase of heating pressure in the tank create a risk of explosion. The affected area should be isolated and any action dangerous for human health or life should be avoided. Product vapors are heavier than air and accumulate in the lower parts of the premises. Formation of explosive mixtures with air is highly probable - if such a danger occurs, order an immediate evacuation. Containers exposed to fire should be cooled from a safe distance with water spray jet. Do not allow extinguishing water entering drains, surface water and groundwater .

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Limit the access for the outsiders into the breakdown area, until the suitable cleaning operations are completed. In case of large spills, isolate the affected area. Explosive area. Product vapors are heavier than air and accumulate in the lower parts of rooms. There is a high probability of creating an explosive mixture with air - in the event of such a danger, order immediate evacuation. Avoid direct contact with releasing product. Avoid breathing vapors. Use personal protective equipment. Provide adequate ventilation. Remove the source of ignition (extinguish open fire, announce a ban on smoking and the use of sparking tools), protect tanks against heating, dilute vapors with a dispersed stream of water.

6.2 Environmental precautions

In case of release of large amounts of the mixture, it is necessary to take appropriate steps to prevent it from spreading into the environment. Do not let the product to get to the sewage system. Notify relevant emergency services.

6.3 Methods and material for containment and cleaning up

Large spill: isolate the place of liquid accumulation, pump away the collected liquid.
Small spill: collect with incombustible materials which absorb liquids (for example: sand, soil, universal firming agents, silica, vermiculite, etc.) and place in labeled containers. Treat the collected material as waste. Clean and ventilate the affected area.

6.4 Reference to other sections

Appropriate conduct with waste product – see section 13. Personal protective equipment – see section 8.

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Section 7: Handling and storage

7.1 Precautions for safe handling

Handle in accordance with good occupational hygiene and safety practices. Avoid contact with eyes and skin. Before the break and after work wash your hands. Unused containers should be tightly closed. Ensure adequate ventilation in the premises where the product is used. Do not inhale the vapors. Do not allow to create the fumes in the concentrations higher than combustion limits. Eliminate sources of ignition - do not use open flames, no smoking, no sparking. Do not heat the product above the flash point.

7.2 Conditions for safe storage, including any incompatibilities

Keep in certified, properly labeled, closed, steel containers in a cool, well ventilated warehouse. Keep on a hard impermeable surface made of materials resistant to hydrocarbons. Tanks should be filled up to 90% of their volume. Store in rooms equipped with ventilation. Keep containers away from heat sources, open flames and direct sunlight. Smoking, eating, using open fire and tools creating sparks is not allowed. Keep away from oxidizing agents. Work related to cleaning, inspection and maintenance of the internal structure of storage tanks should be carried out by a qualified team. Storage installations should be designed so that in the event of a leak or spill, there is no contamination of water and soil.

7.3 Specific end use(s)

No information about other uses than those mentioned in subsection 1.2.

Section 8: Exposure controls/personal protection

8.1 Control parameters

Components of the product do not have occupational exposure limit values established on the Community level. Legal basis: Commission Directive 2006/15/EC, 2000/39/EC, 2009/161/EC, 2017/164/EU, 2019/1831/EU.

Please check any national occupational exposure limit values in your country.

Fuels, diesel (CAS 68334-30-5)

DNEL values

Workers	
Route of exposure	respiratory system
Potential health effects	acute toxicity - systemic efect
DNEL	4 300 mg/m^3/15 min
Route of exposure	skin
Potential health effects	chronić acute – local effect
DNEL	2,9 mg/kg/8h
Route of exposure	respiratory system
Potential health effects	chronic toxicity – systemic effect
DNEL	68 aerosol mg/m^3/8h
Consumer	
Route of exposure	respiratory system
Potential health effects	acute toxicity - systemic efect
DNEL	2 600 mg/m^3/15 min
Route of exposure	skin
Potential health effects	chronić acute – local effect
DNEL	1,3 mg/kg/24

Route of exposure	respiratory system
Potential health effects	chronic toxicity – systemic effect
DNEL	20 aerosol mg/m^3/8h

Recommended control procedures

Procedures concerning the control over the dangerous components concentrations in the air and control over the air quality in the workplace – if they are available and justified for the position – in accordance with the European Standards, with the conditions within the exposure place and a proper test methodology adapted to the working conditions.

8.2 Exposure controls

Appropriate engineering controls

Work in accordance good occupational hygiene and safety practices. During operation, do not eat, drink or smoke. Avoid contact with skin and eyes. Avoid breathing vapors or aerosols. Ensure good local and general ventilation at work stations – to ensure the maintenance of concentrations of hazardous components in the atmosphere below the exposure limit values. In case of spilling the substance on worker, showers and eye safety washers should be installed near the working place.

Individual protection measures, such as personal protective equipment

The necessity to use and selection of appropriate personal protective equipment should take into account the type of risk posed by the product, conditions at the workplace and the manner of handling the product. The personal protective equipment used must meet the requirements of Regulation (EU) 2016/425 and the relevant standards. The employer is obliged to provide protection measures appropriate to the activities performed and meeting all quality requirements, including their maintenance and cleaning. Any contaminated or damaged PPE must be replaced immediately**.**

Hand protection

Use gloves resistant to chemicals (EN 374). In case of short-term exposure wear the protective gloves with protection level 2 or higher (breakthrough time > 30 min). In case of long-term exposure wear the protective gloves with protection level 6 (breakthrough time > 480 min).

When using protective gloves during work with chemical products, it should be noted that the efficacy levels and corresponding breakthrough times do not indicate actual times of protection at a particular workplace, because the protection can be affected by many factors, e.g. temperature, other substances etc. If there are any signs of degradation, damage or change in appearance (colour, flexibility, shape), it is recommended to replace the gloves with a new pair. Please follow the manufacturer's instructions, not only in terms of gloves' usage, but also in terms of their cleaning, maintenance and storage. It is also important to know how to take off the gloves in order to avoid hands contamination.

Body protection

Depending on the task performed, protective clothing in accordance with the EN ISO 13688 standard appropriate to the potential threat should be worn. In case of long-term contact with the product, use protective clothing made of coated or impregnated fabrics

Eye/face protection

Wear protective goggles (EN 166) in case of danger of eye contamination.

Respiratory protection

In case of insufficient ventilation and exposure to inhalation of product mists or vapors, wear a half-mask/mask with a type A filter.

Thermal hazards

Not applicable.

Environmental exposure controls

Prevent direct runoff into drains / surface waters. Do not contaminate surface waters and drainage ditches, chemicals or used packaging. Any spills, particularly into surface water, should be reported to the appropriate authorities in accordance with national and local regulations.

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Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	liquid
Colour	yellow-brown
Odour	characteristic for organic solvents
Melting point/freezing point	>= -40 <= 6 °C
Boiling point or initial boiling point and boiling range	>= 142 <= 462 °C (EN ISO 3405)
Flammability	flammable liquid and vapour.
Lower and upper explosion limit	not determined
Flash point	min. 56°C (EN ISO 2719)
Auto-ignition temperature	not determined
Decomposition temperature	not determined
pH	not determined
Kinematic viscosity (40°C)	>= 1.5mm^2/s (EN ISO 3104)
Solubility	does not dissolve in water, dissolves in organic solvents
Partition coefficient n-octanol/water (log value)	not applicable (mixtures)
Vapour pressure (40°C)	0.4 kPa
Density and/or relative density	>= 0.8 <= 0.91 g/cm^3 (EN ISO 12185)
Relative vapour density	heavier than air
Particle characteristics	not determined

9.2. Other information

No additional data.

Section 10: Stability and reactivity

10.1 Reactivity

Under normal conditions it does not react dangerously with other substances. The product may soften some plastics.

10.2 Chemical stability

The product is stable under normal conditions.

10.3 Possibility of hazardous reactions

May form explosive mixtures with air.

10.4 Conditions to avoid

Avoid heat sources, elevated temperature, open flames, direct sunlight.

10.5 Incompatible materials

Strong oxidants.

10.6 Hazardous decomposition products

Unknown.

Section 11: Toxicological information

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

Information concerning acute and/or delayed effects of exposure was specified on the base of classification of the product and/or toxicology testing and the manufacturer's knowledge and experience.

Toxicity of components

Fuels, Diesla (CAS 68334-30-5)

Acute toxicity (rat, oral) LD_{50}:	21,1 mg/l (OECD 401, API 1980a)
Acute toxicity (rat, oral) LD_{50}:	> 5 000 mg/l (OECD 401, ARCO 1987b)
Acute toxicity (rat, inhalaation) LD_{50}:	3,6 mg/l (OECD 403, ARCO 1988a)
Acute toxicity (rat, inhalation) LD_{50}:	> 1,7 mg/l (OECD 403, ARCO 1993c)
Acute toxicity (rabbit, skin) LD_{50}:	> 5 ml/kg (OECD 434, API 1980b)
Acute toxicity (rabbit, skin) LD_{50}:	> 1 800 mg/kg (OECD 434, ARCO 1993d)

Toxicity of mixture

Acute toxicity

Harmful if inhaled.

Skin corrosion/ irritation

Causes skin irritation.

Serious eye damage/ irritation

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

Respiratory or skin sensitisation

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

Germ cell mutagenicity

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

Carcinogenicity

Suspected of causing cancer: route of exposure skin.

Reproductive toxicity

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

STOT- single exposure

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

STOT- repeated exposure

May cause damage to organs: blood, thymus, liver through prolonged or repeated exposure.

Aspiration hazard

May be fatal if swallowed and enters airways.

Information on likely routes of exposure

Routes of exposure: eye contact, skin contact, ingestion, inhalation. For more information – see subsection 4.2.

Symptoms related to the physical, chemical and toxicological characteristics

None known other than those listed in sections 2,4 and 11.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

There are no known other than those indicated above.

Effects of mutual influence

They are not known.

11.2 Information on other hazards

Endocrine disrupting properties

The product does not contain substances included in the list established in accordance with Article 59(1) for having endocrine disrupting properties, or substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 (3) or Commission Regulation (EU) 2018/605 at a concentration equal to or greater than 0,1% by weight.

Other information

No data.

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Section 12: Ecological information

12.1 Toxicity

Toxic to aquatic life with long lasting effects.

Fuels, diesel (CAS 68334-30-5)

Acute toxicity for microorganisms	EL_{50}: > 1000 mg/l/40h *Tetrahymena pyryformis*
Chronic toxicity for microorganisms NOEL:	> 3,217 mg/l/40h *Tetrahymena pyryformis*
Acute toxicity for fish LL_{50}:	180 mg/l/48h/ *Oncorhynchus mykiss (OECD 203)*
Chronic toxicity foe fish NOEL:	0,083 mg/l/14d/ *Oncorhynchus mykiss (OECD 203)*
Acute toxicity for daphnia EL_{50}:	210 mg/l/48h/ *Daphnia magna (OECD 202)*
Chronic toxicity for daphnia NOEL:	46 mg/l/48h/ *Daphnia magna (OECD 202)*
Acute toxicity for algae EbL_{50}:	25 mg/l/72 h/*Pseudokirchnerella subcapitata (OECD 201)*
Acute toxicity for aalgae EbL_{50}:	3 mg/l/72 h/*Pseudokirchnerella subcapitata (OECD 201)*

12.2 Persistence and degradability

Mixture is biodegradable.

Fuels, diesel (CAS 68334-30-5)

The substance dissolves in water by approximately 60% within 28 days (OECD 301f, Anon, 2003).

12.3 Bioaccumulative potential

Bioaccumulation is not expected.

12.4 Mobility in soil

Insoluble in water, it floats on the surface. Product is mobile in soil.

12.5 Results of PBT and vPvB assessment

Components of this mixture meet criteria for PBT or vPvB in accordance with Annex XIII of REACH Regulation.

12.6 Endocrine disrupting properties

The product does not contain substances included in the list established in accordance with Article 59(1) for having endocrine disrupting properties, or substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 (3) or Commission Regulation (EU) 2018/605 at a concentration equal to or greater than 0,1% by weight.

12.6 Other adverse effects

The mixture is not classified as hazardous to the ozone layer.

Section 13: Disposal considerations

13.1 Waste treatment methods

Disposal methods for the product: dispose in accordance with applicable regulations. Do not introduce into drains. Residues store in sealed, steel containers. Wastes classify as hazardous waste. Do not dispose of with municipal waste. Assign the waste code individually to the place where the waste was generated.

Disposal methods for used packing: reuse/recycle/eliminate empty containers in accordance with the local legislation. Only completely emptied packaging can be recycled. Do not mix with other waste. The classification for this waste meets the requirements for the hazardous waste. Empty, uncleaned packaging may contain product residues (liquid, vapor) and may pose a fire/explosion hazard. Uncleaned packaging/tanks must not be cut, drilled, ground, welded or performed in their vicinity.

Legal basis: Directive 2008/98/EC as amended, 94/62/EC as amended.

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Section 14: Transport information

14.1 UN number or ID number

UN 1202

14.2 UN proper shipping name

DIESEL FUEL

14.3 Transport hazard class(es)

3

14.4 Packing group

III

14.5 Environmental hazards

The mixture is hazardous for the environment in accordance with the criteria included in transport regulations and in accordance with the criteria covered by the UN Model Regulations includes symbol 5.2.1.8.3 ADR and the entry in the shipping document compliant with 5.4.1.1.18.

14.6 Special precautions for user

When handling the load, wear personal protective equipment in accordance with section 8.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable.

Section 15: Regulatory information

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

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC as amended.

Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (Text with EEA relevance) as amended.

Commission Regulation (EU) No 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (Text with EEA relevance).

Commission Regulation (EU) No 2020/878 of 18 June 2020 amending Annex II to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives as amended.

European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste as amended.

Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC (Text with EEA relevance).

Commission Directive 2000/39/EC of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Commission Directive 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC.

Commission Directive 2009/161/EU of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC.

Commission Directive 2017/164/EU of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC, and amending Commission Directives 91/322/EEC, 2000/39/EC and 2009/161/EU.
Commission Directive 2019/1831/EU of 24 October 2019 establishing a fifth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC and amending Commission Directive 2000/39/EC.

15.2 Chemical safety assessment

A safety assessment has been performed for the components of this mixture. selected exposure scenarios in the annex to this sheet.

Section 16: Other information

Full text of indicated H phrases mentioned in section 3

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

Clarification of aberrations and acronyms

PBT	Persistent, Bioaccumulative and Toxic substance
vPvB	very Persistent, very Bioaccumulative substance
Flam. Liq. 3	Flammable liquid cat. 3
Asp. Tox. 1	Aspiration hazard cat. 1
Skin Irrit. 2	Skin irritation cat. 2
Acute Tox. 4	Acute toxicity cat. 4
Carc. 2	Carcinogenicity cat. 2
STOT RE 2	Specific target organ toxicity — repeated exposure cat. 2
Aquatic Chronic 2	Hazardous to the aquatic environment cat. 2

Trainings

Before commencing working with the product, the user should learn the Health & Safety regulations, regarding handling chemicals, and in particular, undergo a proper workplace training. Persons related to the transportation of the dangerous goods in compliance with the ADR Agreement should be properly trained within the scope of performed tasks (general training, on-the-job training and training related to the safety issues).

Other data

Safety Data Sheet made by: THETA Consulting Sp. z o.o.

The information above is based on a current available data concerning the product, but also on the experience and knowledge in this field of the producer. They are neither a quality description of the product nor a guarantee of particular features. They are to be treated as aid to safety in transport, storage and usage of the product. That does not free the user from the responsibility of improper usage of the information above and also of improper compliance with the law norms in the field.

9.7. Exposure scenario 7: Use at industrial sites - Use in fuel; Industrial

Market sector: Use in fuel
Product category used: PC 13: Fuels

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, 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.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C

9.7.1.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *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 to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line*	

	Method
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.	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

9.7.1.2. Exposure and risks for workers

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

Table 9.76. 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	Final 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	Final RCR = 0.011
	Vapour 10-500 Pa	32.88 mg/m³ (TRA Workers) RCR = 7.67E-3	
	Vapour 500-10.000	9.612 mg/m³ (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Pa	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	Final 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			Final RCR = 0.638
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C

9.7.2.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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*	

	Method
any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.	
• General measures (aspiration) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

9.7.2.2. Exposure and risks for workers

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

Table 9.77. 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	Final RCR = 0.167
	Vapour 10-500 Pa	8.221 mg/m³ (TRA Workers) RCR = 0.12	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	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	Final 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	Final 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			Final RCR = 0.638
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

9.7.3. Worker CS 3: General exposures; Closed systems (PROC 2, PROC 1)

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only PROC 2 and PROC 1 (similar activities within the exposure scenario) have been assessed within one contributing scenario. The (highest) exposure predictions of PROC 2 have been used in the exposure and risk assessment and PROC 1 has been mapped as an additional PROC relevant for the contributing activity.

9.7.3.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0

	Method
	TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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,*	

	Method
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) *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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.7.3.2. Exposure and risks for workers

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

Table 9.78. Exposure concentrations and risks for workers

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

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	Final 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	Final 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	Final 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			Final RCR = 0.502
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only

9.7.4.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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)	

	Method
It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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)	

	Method
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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.7.4.2. Exposure and risks for workers

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

Table 9.79. 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	Final 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	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers) RCR = 1.53E-3	Final 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 = 0.117	Final 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			Final RCR = 0.148
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only
Cleaning and maintenance activities have been assessed within one contributing scenario. Since the ECETOC TRA currently does not provide exposure predictions for the associated PROC28, PROC8a exposure predictions have been used and PROC28 has been mapped as an additional PROC relevant for the contributing activity.

9.7.5.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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*	

	Method
- 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) *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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
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	

9.7.5.2. Exposure and risks for workers

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

Table 9.80. Exposure concentrations and risks for workers

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

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	Final 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	Final 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	Final 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			Final RCR = 0.783
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only
PROC 2 and PROC 1 (similar activities within the exposure scenario) have been assessed within one contributing scenario. The (highest) exposure predictions of PROC 2 have been used in the exposure and risk assessment and PROC 1 has been mapped as an additional PROC relevant for the contributing activity.

9.7.6.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0

	Method
• Liquid, vapour pressure < 0.5kPa at STP, with potential for aerosol generation	
• Covers percentage substance in the product up to 100% (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Store substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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*	

	Method
facilities; eating and smoking only in designated areas separate from the workplace	
• General Measures (skin irritants) *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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.7.6.2. Exposure and risks for workers

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

Table 9.81. 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	Final RCR = 0.031
	Vapour 500-10.000 Pa	0.481 mg/m³ (TRA Workers) RCR = 7.03E-3	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	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	Final 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	Final 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			Final RCR = 0.502
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

9.8. Exposure scenario 8: Widespread use by professional workers - Use in fuel; Professional

Market sector: Use in fuel
Product category used: PC 13: Fuels

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.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C

9.8.1.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *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 to prevent formation of explosive atmosphere.*	

	Method
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.	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

9.8.1.2. Exposure and risks for workers

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

Table 9.82. 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	Final 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	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Aerosol	14.92 mg/m³ (TRA Workers) RCR = 3.48E-3	Final RCR = 0.023
	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	Final 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			Final RCR = 0.838
Combined routes, systemic, acute			Final 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:
Identity of the substance used: gas oils
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:
Identity of the substance used: gas oils
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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C

9.8.2.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness	TRA Workers 3.0

	Method
Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *General measures (flammability): applicable if classified as H224 or H225 or H226,*	

	Method
refer to section 3 of the CSR; 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.	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

9.8.2.2. Exposure and risks for workers

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

Table 9.83. 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	Final 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	Final RCR < 0.01
	Vapour 10-500 Pa	6.577 mg/m³ (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		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	Final 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			Final RCR = 0.513
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C

9.8.3.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *General Measures (skin irritants): Avoid direct skin contact with product. Identify*	

	Method
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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Ensure no splashing occurs during transfer	

9.8.3.2. Exposure and risks for workers

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

Table 9.84. 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	Final RCR = 0.367
	Vapour 10-500 Pa	16.44 mg/m³ (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		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	Final 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	Final 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			Final RCR = 0.838
Combined routes, systemic, acute			Final 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:
Identity of the substance used: gas oils
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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only
PROC 2 and PROC 1 (similar activities within the exposure scenario) have been assessed within one contributing scenario. The (highest) exposure predictions of PROC 2 have been used in the exposure and risk assessment and PROC 1 has been mapped as an additional PROC relevant for the contributing activity.

9.8.4.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *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 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*	

	Method
EU/national regulations. Review SDS for additional advice.	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.8.4.2. Exposure and risks for workers

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

Table 9.85. 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: Concawe Report No 1/06) 6 mg/m³ (Measured data: Concawe Report No 1/06) 0.83 mg/m³ (Measured data: Concawe Report No 1/06)	Final 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	Final RCR < 0.01

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		Report No 1/06)	
	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	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final 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			Final RCR = 0.62
Combined routes, systemic, acute			Final 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: 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:
Identity of the substance used: gas oils
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:
Identity of the substance used: gas oils
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:
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 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only

9.8.5.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	

	Method
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Handle substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *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 to prevent formation of explosive atmosphere. Use equipment and protective systems approved for flammable substances. Restrict line*	

	Method
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.	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.8.5.2. Exposure and risks for workers

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

Table 9.86. 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	Final 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	Final 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	Final RCR = 0.117
Dermal, local, long term	Dermal	0.099 mg/cm² (TRA Workers)	
Dermal, local, acute	Dermal	0.099 mg/cm² (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Combined routes, systemic, long-term			Final RCR = 0.155
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

9.8.6. Worker CS 6: Equipment cleaning and maintenance (PROC 8a, PROC 28)

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C
Cleaning and maintenance activities have been assessed within one contributing scenario. Since the ECETOC TRA currently does not provide exposure predictions for the associated PROC28, PROC8a exposure predictions have been used and PROC28 has been mapped as an additional PROC relevant for the contributing activity.

9.8.6.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	

	Method
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *General Measures (skin irritants): Avoid direct skin contact with product. Identify*	

	Method
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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	
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	

9.8.6.2. Exposure and risks for workers

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

Table 9.87. 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	Final RCR = 0.171

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	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	Final 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	Final 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			Final RCR = 0.642
Combined routes, systemic, acute			Final RCR = 0.011

Remarks on exposure dataset obtained with ECETOC TRA

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 1E4 Pa for Vapour >10.000 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 250 Pa for Dermal.

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: 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_vapour only PROC 2 and PROC 1 (similar activities within the exposure scenario) have been assessed within one contributing scenario. The (highest) exposure predictions of PROC 2 have been used in the exposure and risk assessment and PROC 1 has been mapped as an additional PROC relevant for the contributing activity.

9.8.7.1. Conditions of use

	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 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) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may cover concentrations less than 100%.*	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers daily exposures up to 8 hours (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be shorter than 8 hours.*	
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Store substance within a closed system	
Conditions and measures related to personal protection, hygiene and health evaluation	

	Method
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• 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) *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) *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.*	
• General measures (flammability) *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 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.*	
• General measures applicable to all activities *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. G25*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0

	Method
	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Operating temperature: <= 20.0 °C	TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0 TRA Workers 3.0
• Covers use at ambient temperatures (unless stated differently) *It is required to map this condition of use against each contributing scenario for the exposure scenario for communication. The specific contributing scenario may be carried out above ambient temperature.*	

9.8.7.2. Exposure and risks for workers

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

Table 9.88. 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	Final 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	Final 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	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final 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			Final RCR = 0.62
Combined routes, systemic, acute			Final 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 risk characterisation:
Qualitative risks management measures are laid out above (General measures). More details are available in section 9.0.4.

9.9. Exposure scenario 9: Consumer use - Use in fuel; Consumer

Market sector: Use in fuel

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.

Explanation on the approach taken for the ES:

Uses listed in IUCLID are determined by manufacturers based on specific permutations of their substance and followed down the supply chain from manufacture; to cover all potential manufacturing cases there are multiple uses listed for Consumer Fuel Use in IUCLID. However, regardless of its starting permutation, consumers are potentially exposed only to fuel meeting the standards of Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels. Therefore only one Exposure Scenario is required for Consumer Fuel Use and this covers all IUCLID use permutations and tonnages.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_consumers

9.9.1.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_3_a Fuels, Liquid, Automotive refuelling (diesel)
Version date: December 2017

Products/activities covered by the SCED

: Filling motor vehicle outdoors with a full tank of fuel every week

Applicability of the SCED

: Determinant values refer to gasoil (diesel) as the fuel

Source of SCED

: http://www.concawe.org

	Method
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*	TRA Consumers 3.1 (R15) TRA Consumers 3.1 (R15)

	Method
other exposure routes.	
• 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: 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	TRA Consumers 3.1

	Method
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.	(R15) TRA Consumers 3.1 (R15)

9.9.1.2. Exposure and risks for consumers

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

Table 9.89. 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	0.536 mg/m³ (TRA Consumers) RCR = 0.027 **Supportive exposure (not used for RC):** 0.26 mg/m³ (Measured data: Concawe Report No 1/06)	Final RCR = 0.027
Inhalation, systemic, acute	Vapour 10-500 Pa	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 = 0.167
Combined routes, systemic, acute			Final 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:
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. 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.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_consumers

9.9.2.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_4_a Fuels, Liquids, Garden equipment refuelling
Version date: December 2017

Products/activities covered by the SCED

: Filling lawn mower outdoors with a full tank of fuel once per week during spring and summer (6 months)

Applicability of the SCED

: SCED data refers to gasoline

Source of SCED

: http://www.concawe.org

	Method
Product (article) characteristics	
• Exposure via inhalation route: Yes	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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)

	Method
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• Frequency of use over a year: Frequent *26 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 v3.1*	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• Frequency of use over a day: = 1.0 events per day *Unchanged from ECETOC TRA default value*	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
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)
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: = 0.03 *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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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)

9.9.2.2. Exposure and risks for consumers

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

Table 9.90. 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	Final RCR = 0.025
Inhalation, systemic, acute	Vapour 10-500 Pa	362.9 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.141	Final RCR = 0.141
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 = 0.082
Combined routes, systemic, acute			Final RCR = 0.141

Remarks on exposure dataset obtained with ECETOC TRA

Explanation for Vapour 10-500 Pa: Exposure modifying factor for 2 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

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.

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

Assessment entity group used for the assessment of this contributing scenario: VHGO @ 20°C_consumers

9.9.3.1. Conditions of use

The contributing scenario is based on SCED: Concawe_SCED_13_5_a Fuels, Liquid, Home space heater
Version date: December 2017

Products/activities covered by the SCED

: Filling space heater indoors with fuel every day during heating season

Applicability of the SCED

: Determinant values refer to kerosene as the fuel

Source of SCED

: http://www.concawe.org

	Method
Product (article) characteristics	
• Exposure via inhalation route: Yes	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
Amount used (or contained in articles), frequency and duration of use/exposure	
• Amount of product used per application: <= 3320 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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• Frequency of use over a day: = 1.0 events per day *Unchanged from ECETOC TRA default value*	TRA Consumers 3.1 (R15) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)

	Method
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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
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) ECETOC TRA Consumers 3.1 TRA Consumers 3.1 (R15)
• 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)

9.9.3.2. Exposure and risks for consumers

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

Table 9.91. 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	Final RCR = 0.074
Inhalation, systemic, acute	Vapour 10-500 Pa	1.07E3 mg/m³ (ECETOC TRA Consumers 3.1) RCR = 0.416	Final RCR = 0.416
Dermal, systemic, long term	Dermal	0.035 mg/kg bw/day (TRA Consumers) RCR = 0.028	Final RCR = 0.028
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 = 0.102
Combined routes, systemic, acute			Final RCR = 0.416

Remarks on exposure dataset obtained with ECETOC TRA

Explanation for Vapour 10-500 Pa: Exposure modifying factor for 2 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

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.
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The risk due to flammability can thus be considered controlled.