

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

1.1. Product identifier

Product form	: Substance
Trade name	: Aviation Kerosene
EC index no	: 649-422-00-2
EC no	: 265-149-8
CAS No.	: 64742-47-8
REACH registration No.	: 01-2119484819-18-0014
Product code	: 641, SDS # PbR0116
Synonyms	: QAV-1 / Jet Fuel / Jet A1
Product group	: Trade product

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

1.2.1. Relevant identified uses

Use of the substance/preparation	: Manufacture of substances Intermediate Formulation [mixing] of preparations and/or re-packaging Coatings Building and construction work. Road work Cleaning additive Metal working fluids Agrochemicals Lubricant Functional fluids Release agent. explosive Binding agent Fuels
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1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Petrobras International Braspetro B.V. – PIB BV
Prins Bernhardplein 200, 1097 – JB Amsterdam
The Netherlands

All communications shall be addressed exclusively to the following address:

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4th Floor, 20 North Audley Street
London W1K 6WL – United Kingdom
Fax number: +44(0) 20 7355 8750
E-mail: reach@petrobras.com.br

1.4. Emergency telephone number

Emergency number	: For Chemical Emergency, Spill, Leak, Fire, Exposure or Accident Call CHEMTREC Day or Night Within USA and Canada: 1-800-424-9300 Outside USA and Canada (collect calls accepted): 1-703-527-3887
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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 3	H226
Asp. Tox. 1	H304
Skin Irrit. 2	H315
STOT SE 3	H336
Aquatic Chronic 2	H411

Full text of H-phrases: see section 16.

Classification according to Directive 67/548/EEC or 1999/45/EC

R10
Xn; R65
Xi; R38
N; R51/53

Full text of R-phrases: see section 16.

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according to Regulation (EC) No. 453/2010

Adverse physicochemical, human health and environmental effects

Inhalation may affect the nervous system causing headache, possibly dizziness, nausea, weakness, loss of coordination and unconsciousness.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

H226 - Flammable liquid and vapour
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H336 - May cause drowsiness or dizziness
H411 - Toxic to aquatic life with long lasting effects

Precautionary statements (CLP) :

P102 - Keep out of reach of children
P210 - Keep away from open flames, sparks. - No smoking.
P280 - Wear eye protection, face protection, protective clothing, protective gloves.
P301+P310 - If swallowed, immediately call a doctor.
P331 - Do NOT induce vomiting
P501 - Dispose of contents/container to hazardous or special waste collection point.

2.3. Other hazards

This substance/mixture does not meet the PBT criteria of REACH, annex XIII.

This substance/mixture does not meet the vPvB criteria of REACH, annex XIII.

other hazards which do not result in classification

: Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode.

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type :

UVCB

Name :

Distillates (petroleum), hydrotreated light

CAS No. :

64742-47-8

EC no :

265-149-8

EC index no :

649-422-00-2

Name	Product identifier	%	Classification according to Directive 67/548/EEC
Distillates (petroleum), hydrotreated light	(CAS No.) 64742-47-8 (EC no) 265-149-8 (EC index no) 649-422-00-2	100	R10 Xn; R65 Xi; R38 N; R51/53
Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Distillates (petroleum), hydrotreated light	(CAS No.) 64742-47-8 (EC no) 265-149-8 (EC index no) 649-422-00-2	100	Flam. Liq. 3, H226 Asp. Tox. 1, H304 Skin Irrit. 2, H315 STOT SE 3, H336 Aquatic Chronic 2, H411

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

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. In case of breathing difficulties administer oxygen. If medical advice is needed, have product container or label at hand.
- First-aid measures after skin contact : Rinse thoroughly with plenty of water for at least 20 minutes and take medical advice. Take off immediately all contaminated clothing, including underwear and shoes. Wash thoroughly (shower or bath).
- First-aid measures after eye contact : In case of contact with eyes, rinse immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart. Subsequently consult an ophthalmologist.
- First-aid measures after ingestion : Do not induce vomiting. If swallowed, rinse mouth with water (only if the person is conscious). Caution if victim vomits: Risk of aspiration!. Seek immediate medical advice.

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

Symptoms/injuries	: May have a narcotic effect at high concentrations.
Symptoms/injuries after inhalation	: Dizziness, headaches, nausea. Impaired consciousness. Irritant effect on the respiratory tract.
Symptoms/injuries after skin contact	: Slightly irritating to skin. Prolonged/repetitive skin contact may cause skin defatting or dermatitis.
Symptoms/injuries after eye contact	: Slightly irritating to eyes.
Symptoms/injuries after ingestion	: May cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Risk of aspiration pneumonia.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:	: Carbon dioxide (CO ₂). Foam. Water fog.
Unsuitable extinguishing media	: Water spray. Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard	: Flammable liquid. Keep away from sources of ignition - No smoking. Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode.
Reactivity	: Hazardous combustion products. Carbon dioxide (CO ₂). Carbon monoxide. Nitrogen oxides (NO _x).

5.3. Advice for firefighters

Firefighting instructions	: Cool tanks/drums with water spray/remove them into safety.
Protective equipment for firefighters	: In case of fire: Wear self-contained breathing apparatus. Refer to section 8.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Emergency cooling must be provided for in case of fire. Remove product from area of fire. Eliminate all ignition sources if safe to do so.
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6.1.1. For non-emergency personnel

Protective equipment	: Wear suitable protective clothing, gloves and eye/face protection. Refer to section 8.
Emergency procedures	: Stop leak if safe to do so. Remove all sources of ignition.

6.1.2. For emergency responders

Protective equipment	: Wear suitable protective clothing, gloves and eye/face protection. In case of fire: Wear self-contained breathing apparatus. Refer to section 8.
Emergency procedures	: Evacuate unnecessary personnel. Remove all sources of ignition. Stop leak if safe to do so. Eliminate leaks immediately.

6.2. Environmental precautions

Avoid release to the environment. Prevent spreading over great surfaces (e.g. by damming or installing oil booms). Stop leak if safe to do so.

6.3. Methods and material for containment and cleaning up

For containment	: Stop leak if safe to do so. Eliminate leaks immediately.
Methods for cleaning up	: Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents). Collect in closed containers for disposal. Do not empty into drains or the aquatic environment.

6.4. Reference to other sections

Refer to sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	: Handle in accordance with good industrial hygiene and safety procedures. Ground/bond container and receiving equipment. Use only non-sparking tools.
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7.2. Conditions for safe storage, including any incompatibilities

Technical measures:	: Provide adequate ventilation. Floors should be impenetrable, resistant to liquids and easy to clean. The floor should be leak tight, jointless and not absorbent.
Incompatible materials	: Oxidizing agents.
Storage area	: Store in dry, cool, well-ventilated area. Keep away from open flames, hot surfaces and sources of ignition. Ensure the grounding of containers, apparatus, pumps and suction equipment.

7.3. Specific end use(s)

No data available.

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Distillates (petroleum), hydrotreated light (64742-47-8)		
Belgium	Limit value (mg/m ³)	200 mg/m ³
Italy - Portugal - USA ACGIH	ACGIH TWA (mg/m ³)	200 mg/m ³
Finland	HTP-arvo (8h) (mg/m ³)	500 mg/m ³
Norway	Gjennomsnittsverdier (AN) (mg/m ³)	275 mg/m ³
Norway	Gjennomsnittsverdier (AN) (ppm)	40 ppm
Sweden	nivågränsvärde (NVG) (mg/m ³)	350 mg/m ³
Sweden	kortidsvärde (KTV) (mg/m ³)	500 mg/m ³

Aviation Kerosene (64742-47-8)

DNEL/DMEL (General population)

Long-term - systemic effects, oral 19 mg/kg bodyweight/day

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof ventilating equipment.

Personal protective equipment : Gloves. Protective goggles. Protective clothing.



Hand protection : Protective gloves made of rubber or PVC.

Eye protection : Wear eye protection/face protection.

Skin and body protection : Wear long sleeves.

Respiratory protection : Work in well ventilated zones or use proper respiratory protection. Wear appropriate breathing apparatus if air renewal not sufficient to maintain dust/vapour under TLV. In case of fire: Wear self-contained breathing apparatus.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: clear.
Colour	: No data available
Odour	: Solvent. unpleasant odour.
Odour threshold	: 1 ppm
pH	: No data available
Melting point	: -55 °C
Solidification point	: No data available
Boiling point	: 150 - 300 °C
Flash point	: 40 °C Closed cup.
Relative evaporation rate (butylacetate=1)	: No data available
Flammability (solid, gas)	: No data available
Explosive limits	: 0.7 - 5 vol %
Vapour pressure	: No data available
Relative vapour density at 20 °C	: 4.5
Relative density	: 0.804 g/cm ³
Solubility	: Water: < 5 g/l
Log Pow	: 3.3 - 6
Log Kow	: No data available
Self ignition temperature	: 238 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: 4.1 cSt @ -20 °C
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidising properties	: No data available

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9.2. Other information

Minimum ignition energy : 238 °C

SECTION 10: Stability and reactivity

10.1. Reactivity

Hazardous combustion products. Carbon dioxide (CO₂). Carbon monoxide. Nitrogen oxides (NO_x).

10.2. Chemical stability

Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

10.5. Incompatible materials

Oxidizing agents.

10.6. Hazardous decomposition products

No data available.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Distillates (petroleum), hydrotreated light (64742-47-8)	
LD50 oral rat	> 5000 mg/kg
LD50 dermal rabbit	> 2000 mg/kg
LC50 inhalation rat (mg/l)	> 5.28 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation : Not classified
Not irritating

Respiratory or skin sensitisation : Not classified
Not sensitizing

Germ cell mutagenicity : Not classified
Negative

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : May cause drowsiness or dizziness.

Specific target organ toxicity (repeated exposure) : Not classified

Distillates (petroleum), hydrotreated light (64742-47-8)	
NOAEL (oral,rat,90 days)	750 mg/kg bodyweight/day
NOAEL (dermal,rat/rabbit,90 days)	> 400 mg/kg bodyweight/day
NOAEL (inhalation,rat,vapour,90 days)	> 1 mg/l/6h/day

Aspiration hazard : May be fatal if swallowed and enters airways.

Potential Adverse human health effects and symptoms : Inhalation may affect the nervous system causing headache, possibly dizziness, nausea, weakness, loss of coordination and unconsciousness. Repeated exposure may cause skin dryness or cracking. Risk of aspiration pneumonia.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Slightly volatile.

Distillates (petroleum), hydrotreated light (64742-47-8)	
LC50 fishes	> 2 mg/l (96 hours)
EC50 Daphnia	> 1.4 mg/l (48 hours)
NOEC (acute)	> 0.3 mg/l Daphnia (48 hours)
NOEC (chronic)	> 0.48 mg/l Daphnia (21 days)
ErC50 (algae)	> 1 mg/l (72 hours)
ErC50 (other aquatic plants)	> 5 mg/l (96 hours)

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12.2. Persistence and degradability

Aviation Kerosene (64742-47-8)

Persistence and degradability

This product is expected to have a low potential to degrade and thus is expected to persist in the environment.

12.3. Bioaccumulative potential

Aviation Kerosene (64742-47-8)

Log Pow

3.3 - 6

12.4. Mobility in soil

Aviation Kerosene (64742-47-8)

Ecology - soil

Do not allow to enter into soil/subsoil. If product enters soil, it will be mobile and may contaminate groundwater.

12.5. Results of PBT and vPvB assessment

Aviation Kerosene (64742-47-8)

This substance/mixture does not meet the PBT criteria of REACH, annex XIII.

This substance/mixture does not meet the vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects

Other adverse effects : No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Consult the local waste disposal expert about waste disposal. Dispose of this material and its container to hazardous or special waste collection point.

Waste disposal recommendations : Do not empty into drains or the aquatic environment. Collect in closed containers for disposal.

SECTION 14: Transport information

In accordance with ADR / RID / ADN / IMDG / ICAO / IATA

14.1. UN number

UN-No. : 1863

14.2. UN proper shipping name

Proper shipping name : FUEL, AVIATION, TURBINE ENGINE

Transport document description : UN 1863 FUEL, AVIATION, TURBINE ENGINE, 3, III, (D/E)

14.3. Transport hazard class(es)

Class (UN) : 3

Hazard labels (UN) : 3



14.4. Packing group

Packing group (UN) : III

14.5. Environmental hazards

Marine pollutant :



Other information : No supplementary information available.

14.6. Special precautions for user

Special transport precautions : No data available.

14.6.1. Overland transport

Hazard identification number (Kemler No.) : 30

Classification code : F1

Orange plates :



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Tunnel restriction code : D/E
Limited quantities (ADR) : LQ07
Excepted quantities (ADR) : E1

14.6.2. Transport by sea

No additional information available

14.6.3. Air transport

No additional information available

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

IBC code : No data available.

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

Contains no REACH candidate substance

15.1.2. National regulations

No additional information available

15.2. Chemical safety assessment

CSA has been established. Exposure scenario is attached.

SECTION 16: Other information

Sources of Key data : PETROBRAS. MSDS.

Abbreviations and acronyms : ASTM - American Society for Testing and Materials . CLP - Classification, Labelling and Packaging. CSR - Chemical Safety Report. EC - European Community. EEC - European Economic Community. GHS - Globally Harmonised System. REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals. SDS - Safety Data Sheet.

Full text of R-, H- and EUH-phrases:

Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Asp. Tox. 1	Aspiration hazard Category 1
Flam. Liq. 3	flammable liquids Category 3
Skin Irrit. 2	skin corrosion/irritation Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H226	Flammable liquid and vapour
H304	May be fatal if swallowed and enters airways
H315	Causes skin irritation
H336	May cause drowsiness or dizziness
H411	Toxic to aquatic life with long lasting effects
R10	Flammable.
R38	Irritating to skin.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R65	Harmful: may cause lung damage if swallowed.

SDS EU (REACH Annex II)

The information presented in this Safety Data Sheet is based on current knowledge and is believed to be complete and accurate. It describes the product for the purposes of health, safety and environment requirements only and shall, therefore, be used only as a guide. The data refers to a specific product and may not be valid for combined uses with other products. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. Petrobras shall not be responsible for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices.

Exposure Scenarios for: Aviation Kerosene

Trade Name : Aviation Kerosene
 SDS Reference : PbR0116

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Summary of parameters used for assessing safe use:

DNEL: Consumer - oral (long term): 19 mg/kg/24h

Acronyms:

CSA	:	Chemical safety assessment
DNEL	:	Derived no effect level
DU	:	Downstream user
ERC	:	Environmental release category
ES	:	Exposure scenario
PC	:	Product category
PEC	:	Predicted environmental concentration
PNEC	:	Predicted no effect concentration
PPE	:	Personal protection equipment
PROC	:	Process category
RCR	:	Risk characterisation ratio
STP	:	Sewage treatment plant
SU	:	Sector of use
WWTP	:	Wastewater treatment plant

Exposure Scenario (ES1):

Manufacture of Aviation Kerosene – Industrial

9.1.1. Exposure scenario addressing uses carried out by workers	
Manufacture of Aviation Kerosene – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>SU8 : Manufacture of bulk, large scale chemicals (including petroleum products)</p> <p>SU9 : Manufacture of fine chemicals</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC15 : Use as laboratory reagent</p> <p>ERC1 : Manufacture of substances</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p>
Specific environmental release category	ESVOC SpERC 1.1.v1
9.1.2. Operational conditions and risk management measures	
9.1.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	2,000,000 kg/day
Annually at point sources	600,000 t/year (maximum in worst case)
Annually total	5,400,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	300
Environment factors not influenced by risk management	

Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.01
Release fraction to waste water from process before RMMs	0.0003
Release fraction to soil from process before RMMs	0.0001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 90%.
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of ≥ 97.7%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 56.1%.
Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. Onsite wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	97.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	2,000,000
Assumed domestic sewage treatment plant flow (m ³ /d)	10,000
Conditions and measures related to treatment of waste	
During manufacturing no waste of the substance is generated to treat or recover.	
9.1.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Operation is carried out at elevated temperature (>20° above ambient temperature).	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2)	

<p>Ensure material transfers are under containment or extract ventilation (PROC 3 & 8b)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p>														
<p>Technical conditions and measures to control dispersion from source towards the worker</p>														
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 8b)</p> <p>Handle within a fume cupboard or under extract ventilation (PROC 15)</p>														
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p>														
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Avoid splashing (PROC 8b)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)</p> <p>Clear lines prior to decoupling (PROC 4 & 8b)</p> <p>Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 15)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>														
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p>														
<p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely</p>														
<p>9.1.3. Exposure information and reference to its source</p>														
<p>9.1.3.1. Prediction of environmental exposure resulting from the conditions described above</p>														
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>														
<table border="1"> <thead> <tr> <th>Environmental exposure</th> <th>In STP/ untreated wastewater (mg/l)</th> <th>In local freshwater (mg/l)</th> <th>In local soil (mg/kg dw)</th> <th>In local marine water (mg/l)</th> <th>In sediment freshwater (mg/kg dw)</th> <th>In sediment marine water (mg/kg dw)</th> </tr> </thead> <tbody> <tr> <td>PEC</td> <td>0.066</td> <td>0.0066</td> <td>0.0074</td> <td>0.00066</td> <td>0.12</td> <td>0.000066</td> </tr> </tbody> </table>	Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)	PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)								
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066								
<p>9.1.3.2. Prediction of workers exposure resulting from the conditions described above</p>														
<p>Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.</p> <p>Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.</p>														

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 – 10	0
PROC 2	10	0
PROC 3	25	0
PROC 4	20	0
PROC 8a	10	0
PROC 8b	5	0
PROC 15	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.250	n.a.	0 – 0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 8a	0.250	n.a.	0.250
PROC 8b	0.125	n.a.	0.125
PROC 15	0.250	n.a.	0.250

9.1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.1.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES2):

Use of Aviation Kerosene as intermediate – Industrial

9.2.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as Intermediate - Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>SU8 : Manufacture of bulk, large scale chemicals (including petroleum products)</p> <p>SU9 : Manufacture of fine chemicals</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC15 : Use as laboratory reagent</p> <p>ERC6a : Industrial use resulting in manufacture of another substance (use of intermediates)</p>
Specific environmental release category	ESVOC SpERC 6.1a.v1
9.2.2. Operational conditions and risk management measures	
9.2.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	50,000 kg/day
Annually at point sources	15,000 t/year (maximum in worst case)
Annually total	180,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	300
Environment factors not influenced by risk management	

Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.001
Release fraction to waste water from process before RMMs	0.0003
Release fraction to soil from process before RMMs	0.001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 80%.
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of ≥81.4%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of 0%.
Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. If discharging to domestic STP, no onsite wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	180,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to treatment of waste	
The substance is consumed during use and no waste of the substance is generated.	
9.2.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Operation is carried out at elevated temperature (>20° above ambient temperature).	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2)	

Ensure material transfers are under containment or extract ventilation (PROC 3& 8b)
Ensure dedicated sample points are provided (PROC 1 & 2)
Avoid dip sampling (PROC 1 & 2)

Technical conditions and measures to control dispersion from source towards the worker

No specific measure identified.
The following measures are recommended:
Provide extract ventilation to points where emissions occur (PROC 4)
Handle within a fume cupboard or under extract ventilation (PROC 15)

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measure identified.
The following measures are recommended:
Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Clean up contamination/spills as soon as they occur (all PROCs)
Wash off skin contamination immediately (all PROCs)
Avoid splashing (PROC 8b)
Drain down systems prior to equipment break-in or maintenance (PROC 8a)
Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)
Clear lines prior to decoupling (PROC 4 & 8b)
Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 15)
Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)

Conditions and measures related to personal protection, hygiene and health evaluation

1. PPE: Wear gloves (Type EN374) if regular skin contact likely

9.2.3. Exposure information and reference to its source

9.2.3.1. Prediction of environmental exposure resulting from the conditions described above

Substance is a complex UVCB. Predominantly hydrophobic.
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterization ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier – see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.2.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 – 10	0
PROC 2	10	0
PROC 3	25	0
PROC 4	20	0
PROC 8a	10	0
PROC 8b	5	0
PROC 15	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.250	n.a.	0 – 0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 8a	0.250	n.a.	0.250
PROC 8b	0.125	n.a.	0.125
PROC 15	0.250	n.a.	0.250

9.2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.2.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES3):

Distribution of Aviation Kerosene – Industrial

9.3.1. Exposure scenario addressing uses carried out by workers	
Distribution of Aviation Kerosene – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC15 : Use as laboratory reagent</p> <p>ERC1 : Manufacture of substances</p> <p>ERC2 : Formulation of preparations</p> <p>ERC3 : Formulation in materials</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p> <p>ERC5 : Industrial use resulting in inclusion into or onto a matrix</p> <p>ERC6a : Industrial use resulting in manufacture of another substance (use of intermediates)</p> <p>ERC6b : Industrial use of reactive processing aids</p> <p>ERC6c : Industrial use of monomers for manufacture of thermo-plastics</p> <p>ERC6d : Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers</p> <p>ERC7 : Industrial use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 1.1b.v1
9.3.2. Operational conditions and risk management measures	

9.3.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	36,000 kg/day
Annually at point sources	11,000 t/year (maximum in worst case)
Annually total	5,400,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	300
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.001
Release fraction to waste water from process before RMMs	0.00001
Release fraction to soil from process before RMMs	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 90%.
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥0%.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	2,600,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to treatment of waste	
External treatment, disposal, recovery and recycling should comply with application local and/or national regulations.	
9.3.2.2. Control of worker exposure	
Frequency and duration of use/exposure	

Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 1, 2 & 3)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 3)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 8b)</p> <p>Fill containers/cans at dedicated fill points supplies with local extract ventilation (PROC 9)</p>	
Technical conditions and measures to control dispersion from source towards the worker	
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 4)</p> <p>Handle within a fume cupboard or under extract ventilation (PROC 15)</p>	
Organisational measures to prevent /limit releases, dispersion and exposure	
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Avoid splashing (PROC 8b)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)</p> <p>Clear lines prior to decoupling (PROC 4 & 8b)</p> <p>Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 15)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
1. PPE: Wear gloves (Type EN374) if regular skin contact likely	
9.3.3. Exposure information and reference to its source	
9.3.3.1. Prediction of environmental exposure resulting from the conditions described above	
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p>	
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the	

resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.3.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ectoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 – 10	0
PROC 2	10	0
PROC 3	25	0
PROC 4	20	0
PROC 8a	10	0
PROC 8b	5	0
PROC 9	5	0
PROC 15	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.250	n.a.	0 – 0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 8a	0.250	n.a.	0.250
PROC 8b	0.125	n.a.	0.125
PROC 9	0.125	n.a.	0.125
PROC 15	0.250	n.a.	0.250

9.3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.3.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES4):

Formulation & (Re)packing of Aviation Kerosene – Industrial

9.4.1. Exposure scenario addressing uses carried out by workers	
Formulation & (Re)packing of Aviation Kerosene - Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>SU10 : Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC14 : Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC15 : Use as laboratory reagent</p> <p>ERC2 : Formulation of preparations</p>
Specific environmental release category	ESVOC SpERC 2.2.v1
9.4.2. Operational conditions and risk management measures	
9.4.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP

Amounts used	
Daily at point sources	100,000 kg/day
Annually at point sources	30,000 t/year (maximum in worst case)
Annually total	5,200,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	300
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.01
Release fraction to waste water from process before RMMs	0.0002
Release fraction to soil from process before RMMs	0.0001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of >0%.
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of ≥86%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of 0%.
Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from wastewater. If discharging to domestic STP, no onsite wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	260,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to treatment of waste	
External treatment, disposal, recovery and recycling waste should comply with applicable regulations.	
9.4.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	

Other given operational conditions affecting workers exposure
Assumes use at not more than 20° above ambient temperature, unless stated differently.
Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 3 & 8b) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2) Fill containers/cans at dedicated fill points supplies with local extract ventilation (PROC 9) Use drum pumps or carefully pour from container (PROC 8a & 8b)
Technical conditions and measures to control dispersion from source towards the worker
No specific measure identified. The following measures are recommended: Provide extract ventilation to points where emissions occur (PROC 4, 5, 8a, 8b & 14) Handle within a fume cupboard or under extract ventilation (PROC 15)
Organisational measures to prevent /limit releases, dispersion and exposure
No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Avoid splashing (PROC 8b) Drain down systems prior to equipment break-in or maintenance (PROC 8a) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a) Clear lines prior to decoupling (PROC 4 & 8b) Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 15) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)
Conditions and measures related to personal protection, hygiene and health evaluation
1. PPE: Wear gloves (Type EN374) if regular skin contact likely
9.4.3. Exposure information and reference to its source
9.4.3.1. Prediction of environmental exposure resulting from the conditions described above
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.4.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 – 10	0
PROC 2	10	0
PROC 3	25	0
PROC 4	20	0
PROC 5	5	0
PROC 8a	5 – 10	0
PROC 8b	1.50 – 5	0
PROC 9	5	0
PROC 14	5	0
PROC 15	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.250	n.a.	0 – 0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 5	0.125	n.a.	0.125
PROC 8a	0.125 – 0.250	n.a.	0.125 – 0.250
PROC 8b	0.038 - 0.125	n.a.	0.038 - 0.125
PROC 9	0.125	n.a.	0.125
PROC 14	0.125	n.a.	0.125
PROC 15	0.250	n.a.	0.250

9.4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.4.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES5):

Use of Aviation Kerosene in coatings – Industrial

9.5.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in coatings - Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC7 : Industrial spraying</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC15 : Use as laboratory reagent</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p>
Specific environmental release category	ESVOC SpERC 4.3a.v1
9.5.2. Operational conditions and risk management measures	
9.5.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	49,000 kg/day
Annually at point sources	980 t/year (maximum in worst case)
Annually total	980 t/year total market

Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.98
Release fraction to waste water from process before RMMs	0.0007
Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 90%.
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of ≥91.8%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. If discharging to domestic STP, no onsite wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	75,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to treatment of waste	
External treatment, disposal, recovery and recycling waste should comply with applicable regulations.	
9.5.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 5, 8a, 8b, 10, 13 & 15) <4 hours/day (PROC 7)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	

<p>Technical conditions and measures at process level (source) to prevent release</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 1 & 2)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 2)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Transfer materials directly to mixing vessels (PROC 3)</p> <p>Ensure materials transfers are under containment or extract ventilation (PROC 8b)</p>
<p>Technical conditions and measures to control dispersion from source towards the worker</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 5, 8a, 10 & 13)</p> <p>Provide a good standard of general ventilation (PROC 3 & 4)</p> <p>Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 7)</p> <p>Avoid carrying out operation for more than 4 hours (PROC 7)</p> <p>Avoid manual contact with wet work pieces (PROC 5 & 13)</p> <p>Apply ventilation or undertake in ventilated enclosure (PROC 7)</p> <p>Automate activity where possible (PROC 7)</p> <p>Handle within a fume cupboard or under extract ventilation (PROC 15)</p>
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)</p> <p>Clear lines prior to decoupling (PROC 8b)</p> <p>Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 15)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely</p> <p>2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 7)</p>
<p>9.5.3. Exposure information and reference to its source</p>
<p>9.5.3.1. Prediction of environmental exposure resulting from the conditions described above</p> <p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5statistical extrapolation method and the target lipid model using</p>

representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.5.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 – 10	0
PROC 2	5 - 10	0
PROC 3	25	0
PROC 4	20	0
PROC 5	5	0
PROC 7	12.50 – 38.25	0
PROC 8a	5 – 10	0
PROC 8b	1.50	0
PROC 10	5	0
PROC 13	5	0
PROC 15	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.250	n.a.	0 – 0.250
PROC 2	0.125 – 0.250	n.a.	0.125 – 0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 5	0.125	n.a.	0.125
PROC 7	0.313 – 0.956	n.a.	0.313 – 0.956
PROC 8a	0.125 – 0.250	n.a.	0.125 – 0.250
PROC 8b	0.038	n.a.	0.038
PROC 10	0.125	n.a.	0.125
PROC 13	0.125	n.a.	0.125
PROC 15	0.250	n.a.	0.250

9.5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.5.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES6):

Use of Aviation Kerosene in coatings – Professional

9.6.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in coatings - Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC15 : Use as laboratory reagent</p> <p>PROC19 : Hand-mixing with intimate contact and only PPE available</p> <p>ERC8a : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.3b.v1
9.6.2. Operational conditions and risk management measures	
9.6.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	0.28 kg/day

Annually at point sources	0.10 t/year (maximum in worst case)
Annually total	210 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.98
Release fraction to waste water from process before RMMs	0.01
Release fraction to soil from process before RMMs	0.01
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	36
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to treatment of waste	
External treatment, disposal, recovery and recycling waste should comply with applicable local and/or national regulations.	
9.6.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 5, 8a, 8b, 10, 13, 15 & 19) < 1 hour/day (PROC 11)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	

Assumes use at not more than 20° above ambient temperature, unless stated differently.
Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 1, 2 & 3)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 2 & 4)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Use drum pumps (PROC 8a & 8b)</p>
Technical conditions and measures to control dispersion from source towards the worker
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 8b)</p> <p>Provide a good standard of general ventilation (PROC 3 & 15)</p> <p>Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 5, 8a, 10, 13 & 19)</p> <p>Avoid carrying out operations for more than 1 hour (PROC 11)</p> <p>Ensure operatives are trained to minimise exposures (PROC 5 & 10)</p> <p>Avoid manual contact with wet work pieces (PROC 10, 11 & 13)</p> <p>Apply with a vented cab supplied with filtered air under positive pressure and with a protection factor of > 20 (PROC 11)</p>
Organisational measures to prevent /limit releases, dispersion and exposure
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)</p> <p>Clear lines prior to decoupling (PROC 4 & 8b)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>
Conditions and measures related to personal protection, hygiene and health evaluation
<ol style="list-style-type: none"> 1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11)
9.6.3. Exposure information and reference to its source
9.6.3.1. Prediction of environmental exposure resulting from the conditions described above
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p>
<p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk</p>

spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.6.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 - 20	0
PROC 2	20	0
PROC 3	25	0
PROC 4	5	0
PROC 5	30	0
PROC 8a	20 - 30	0
PROC 8b	5	0
PROC 10	30	0
PROC 11	17	0
PROC 13	30	0
PROC 15	10	0
PROC 19	30	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 – 0.500	n.a.	0 – 0.500
PROC 2	0.500	n.a.	0.500
PROC 3	Not available	Not available	Not available
PROC 4	0.125	n.a.	0.125
PROC 5	0.750	n.a.	0.750
PROC 8a	0.500 - 0.750	n.a.	0.500 - 0.750
PROC 8b	0.125	n.a.	0.125
PROC 10	0.750	n.a.	0.750
PROC 11	0.425	n.a.	0.425
PROC 13	0.750	n.a.	0.750
PROC 15	0.250	n.a.	0.250
PROC 19	0.750	n.a.	0.750

9.6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.6.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES7):

Use of Aviation Kerosene in coatings – Consumer

9.7.1. Use of Aviation Kerosene in coatings: Consumer	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC1 : Adhesives, sealants PC4 : Anti-Freeze and de-icing products PC9a : Coatings, paints, thinners, removers PC9b : Fillers, putties, plasters, model-ling clay PC9c : Finger paints PC15 : Non-metal-surface treatment products PC18 : Ink and toners PC23 : Leather tanning, dye, finishing, impregnation and care products PC24 : Lubricants, greases, release products PC31 : Polishes and wax blends PC34 : Textile dyes, finishing and impregnating products; including bleaches and other processing aids ERC8a : Wide dispersive indoor use of processing aids in open systems ERC8d : Wide dispersive indoor use of reactive substances in open systems
Specific environmental release category	ESVOC SpERC 8.3c.v1
9.7.2. Operational conditions and risk management measures	
9.7.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	0.10 t/year (maximum in worst case)
Regional tonnage	210 t/year
Fraction of regional tonnage used locally	0.01
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.99
Release fraction to wastewater from wide dispersive use	0.01

Release fraction to soil from wide dispersive use (regional only)	0.005					
Conditions and measures related to municipal sewage treatment plant						
Risk from environmental exposure is driven by freshwater						
Estimated substance removal from wastewater via domestic sewage treatment	94.7%					
Maximum allowable site tonnage (M_{safe}) (kg/d)	36					
Assumed domestic sewage treatment plant flow (m^3/d)	2,000					
Conditions and measures related to external treatment of waste for disposal						
External treatment and disposal of waste should comply with applicable local and/or national regulations						
Conditions and measures related to external recovery of waste						
External recovery and recycling of waste should comply with applicable local and/or national regulations.						
9.7.2.2. Control of consumer exposure						
Substance content in the product	Up to 100%					
Amounts of product used / applied per event	Up to 13,800 g					
Frequency and duration of use/exposure	Covers use frequency up to 1 times per day					
	Duration of exposure: up to 6 hours per event					
Consumer related measures	Covers concentrations 1 – 100%; Covers use 1 – 365 days/year; Covers use up to 4 times/on day of use; Covers skin contact area 35.70 – 857.50 cm^2 for each use event; Covers use amounts 0.5 – 13,800 g; Covers use in room size of 20 m^3 ; For each use event, covers exposure up to 0.02 - 6.00hr/event; RMM: No specific RMMs identified beyond those OCs stated					
Other Operational Conditions affecting exposure	Assumes use at ambient temperatures; assumes use in a 20 m^3 room; assumes use with typical ventilation.					
9.7.3. Exposure information and reference to its source						
9.7.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.7.3.2. Prediction of consumer exposure resulting from the conditions described above

The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD.

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.

Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 35.83	0 – 13.50	0 – 38.67

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PCs	Not available	0 – 0.72	0 – 0.97	0 – 0.97

9.7.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.7.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES8):

Use of Aviation Kerosene in cleaning agents – Industrial

9.8.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in cleaning agents – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 7 : Industrial spraying</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p>
Specific environmental release category	ESVOC SpERC 4.4a.v1
9.8.2. Operational conditions and risk management measures	
9.8.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	5,000 kg/day
Annually at point sources	100 t/year (maximum in worst case)
Annually total	31,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)

Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	1.0
Release fraction to waste water from process before RMMs	0.000003
Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 70%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. Prevent discharge of undissolved substance to or recover from onsite wastewater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	630,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.8.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 7, 8a, 8b & 13) < 4 hours/ day (PROC 10)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3)	

<p>Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 8a & 8b) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2) Use drum pumps or carefully pour from container (PROC 8b)</p>						
<p>Technical conditions and measures to control dispersion from source towards the worker</p>						
<p>No specific measure identified. The following measures are recommended: Provide extract ventilation to points where emissions occur (PROC 4 & 13) Avoid carrying out operations for more than 4 hours (PROC 10) Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (PROC 7 & 10) Segregate activity away from other operations (PROC 7) Ensure operatives are trained to minimise exposures (PROC 10) Avoid manual contact with wet work pieces (PROC 13)</p>						
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p>						
<p>No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Drain down systems prior to equipment break-in or maintenance (PROC 8a) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a) Clear lines prior to decoupling (PROC 8a & 8b) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>						
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p>						
<p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying</p>						
<p>9.8.3. Exposure information and reference to its source</p>						
<p>9.8.3.1. Prediction of environmental exposure resulting from the conditions described above</p>						
<p>Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p>						
<p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.8.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10	0
PROC 2	10	0
PROC 3	25	0
PROC 4	10	0
PROC 7	25	0
PROC 8a	1.50 – 30	0
PROC 8b	1.50 – 5	0
PROC 10	5 - 30	0
PROC 13	5	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250	n.a.	0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.036 – 0.625	n.a.	0.036 – 0.625
PROC 4	0.250	n.a.	0.250
PROC 7	0.625	n.a.	0.625
PROC 8a	0.038 – 0.750	n.a.	0.038 – 0.750
PROC 8b	0.038 – 0.125	n.a.	0.038 – 0.125
PROC 10	0.125 - 0.750	n.a.	0.125 - 0.750
PROC 13	0.125	n.a.	0.125

9.8.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.8.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES9):

Uses of Aviation Kerosene in cleaning agents – Professional

9.9.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in cleaning agents – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>ERC8a : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.4b.v1
9.9.2. Operational conditions and risk management measures	
9.9.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	6.1 kg/day
Annually at point sources	2.2 t/year (maximum in worst case)
Annually total	4,500 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	

Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.02
Release fraction to waste water from process before RMMs	0.000001
Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No secondary wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	790
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.9.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 11 & 13) < 4 hours/day (PROC 8a, 8b & 10)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 2, 3 & 4)	

<p>Store substance within a closed system (PROC 1 & 2) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2)</p>														
<p>Technical conditions and measures to control dispersion from source towards the worker</p> <p>No specific measure identified. The following measures are recommended: Provide extract ventilation to points where emissions occur (PROC 10) Provide a good standard of general ventilation (PROC 10, 11 & 13) Avoid carrying out operations for more than 4 hours (PROC 8a, 8b & 10) Ensure operatives are trained to minimise exposures (PROC 8a, 8b, 10, 11 & 13) Limit the substance content in the product to 1% (PROC 11) Limit the substance content in the product to 5-10% (PROC 10)</p>														
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p> <p>No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Ensure operation is undertaken outdoors (PROC 8a, 8b & 10) Drain down systems prior to equipment break-in or maintenance (PROC 8a) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>														
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11)</p>														
<p>9.9.3. Exposure information and reference to its source</p>														
<p>9.9.3.1. Prediction of environmental exposure resulting from the conditions described above</p> <p>Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>														
<table border="1"> <thead> <tr> <th>Environmental exposure</th> <th>In STP/ untreated wastewater (mg/l)</th> <th>In local freshwater (mg/l)</th> <th>In local soil (mg/kg dw)</th> <th>In local marine water (mg/l)</th> <th>In sediment freshwater (mg/kg dw)</th> <th>In sediment marine water (mg/kg dw)</th> </tr> </thead> <tbody> <tr> <td>PEC</td> <td>0.066</td> <td>0.0066</td> <td>0.0074</td> <td>0.00066</td> <td>0.12</td> <td>0.000066</td> </tr> </tbody> </table>	Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)	PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)								
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066								

9.9.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	20	0
PROC 2	20	0
PROC 3	25	0
PROC 4	3.50 - 20	0
PROC 8a	7 - 35.70	0
PROC 8b	35.70	0
PROC 10	20 – 36	0
PROC 11	35	0
PROC 13	35.40	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.500	n.a.	0.500
PROC 2	0.500	n.a.	0.500
PROC 3	0.625	n.a.	0.625
PROC 4	0.088 - 0.500	n.a.	0.088 - 0.500
PROC 8a	0.175 - 0.893	n.a.	0.175 - 0.893
PROC 8b	0.893	n.a.	0.893
PROC 10	0.500 – 0.900	n.a.	0.500 – 0.900
PROC 11	0.875	n.a.	0.875
PROC 13	0.895	n.a.	0.895

9.9.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.9.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES10):

Use of Aviation Kerosene in cleaning agents – Consumer

9.10.1. Use of Aviation Kerosene in cleaning agents: Consumer	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC3 : Air care products PC4 : Anti-Freeze and de-icing products PC9a : Coatings, paints, thinners, removers PC24 : Lubricants, greases, release products PC35 : Washing and cleaning products (including solvent based products) PC38 : Welding and soldering products (with flux coatings or flux cores.), flux products ERC8a : Wide dispersive indoor use of processing aids in open systems ERC8d : Wide dispersive indoor use of reactive substances in open systems
Specific environmental release category	ESVOC SpERC 8.4c.v1
9.10.2. Operational conditions and risk management measures	
9.10.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	0.74 t/year (maximum in worst case)
Regional tonnage	1,500 t/year
Fraction of regional tonnage used locally	0.01
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.95
Release fraction to wastewater from wide dispersive use	0.025
Release fraction to soil from wide dispersive use (regional only)	0.025
Conditions and measures related to municipal sewage treatment plant	
Risk from environmental exposure is driven by freshwater	
Estimated substance removal from wastewater	94.7%

via domestic sewage treatment						
Maximum allowable site tonnage (M_{safe}) (kg/d)	240					
Assumed domestic sewage treatment plant flow (m^3/d)	2,000					
Conditions and measures related to external treatment of waste for disposal						
External treatment and disposal of waste should comply with applicable local and/or national regulations						
Conditions and measures related to external recovery of waste						
External recovery and recycling of waste should comply with applicable local and/or national regulations.						
9.10.2.2. Control of consumer exposure						
Substance content in the product	Up to 100%					
Amounts of product used / applied per event	Up to 2760 g					
Frequency and duration of use/exposure	Covers use frequency up to 4 times per day					
	Duration of exposure: up to 8 hours per event					
Consumer related measures	Covers concentrations 1 – 100%; Covers use 1- 365 days/year; Covers use up to 4 times/on day of use; Covers skin contact area 35.70 – 857.50 cm^2 for each use event; Covers use amounts 0.1 - 2760 g; Covers use in room size of 20 m^3 ; For each use event, covers exposure up to 0.02 - 8.00hr/event; RMM: No specific RMMs identified beyond those OCs stated					
Other Operational Conditions affecting exposure	Assumes use at ambient temperatures; assumes use in a 20 m^3 room; assumes use with typical ventilation.					
9.10.3. Exposure information and reference to its source						
9.10.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
9.10.3.2. Prediction of consumer exposure resulting from the conditions described above						
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD.						

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.

Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 71.46	0 – 13.50	0 – 12.60

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PCs	Not available	0	0 – 0.31	0 – 0.31

9.10.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.10.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES11):

Use of Aviation Kerosene in lubricants – Industrial

9.11.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in lubricants – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC7 : Industrial spraying</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC17 : Lubrication at high energy conditions and in partly open process</p> <p>PROC18 : Greasing at high energy conditions</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p> <p>ERC7 : Industrial use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 4.6a.v1
9.11.2. Operational conditions and risk management measures	
9.11.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	5,000 kg/day

Annually at point sources	100 t/year (maximum in worst case)
Annually total	550 t/year total market
Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.005
Release fraction to waste water from process before RMMs	0.00003
Release fraction to soil from process before RMMs	0.001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 70%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. Prevent discharge of undissolved substance to or recover from onsite wastewater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	490,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.11.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	

Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 1, 2)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 3, 4 & 8b)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Use drum pumps or carefully pour from container (PROC 8a & 8b)</p>
Technical conditions and measures to control dispersion from source towards the worker
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 9, 17 & 18)</p> <p>Provide a good standard of general ventilation (PROC 8a & 8b)</p> <p>Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) (PROC 8a, 8b, 9, 10 & 13)</p> <p>Carry out in a vented booth or extracted enclosure (PROC 7)</p> <p>Provide extract ventilation to transfer points (PROC 8b)</p> <p>Use long handled brushes and rollers where possible (PROC 10)</p> <p>Allow time for product to drain from work piece (PROC 13)</p>
Organisational measures to prevent /limit releases, dispersion and exposure
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 9)</p> <p>Clear lines prior to decoupling (PROC 8b)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>
Conditions and measures related to personal protection, hygiene and health evaluation
<ol style="list-style-type: none"> 1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying.
9.11.3. Exposure information and reference to its source
9.11.3.1. Prediction of environmental exposure resulting from the conditions described above
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p>
<p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.11.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10	0
PROC 2	10	0
PROC 3	2.50	0
PROC 4	2	0
PROC 7	25	0
PROC 8a	35	0
PROC 8b	1.50 – 35	0
PROC 9	5 – 35	0
PROC 10	35	0
PROC 13	35	0
PROC 17	5	0
PROC 18	5	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250	n.a.	0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.063	n.a.	0.063
PROC 4	0.050	n.a.	0.050
PROC 7	0.625	n.a.	0.625
PROC 8a	0.875	n.a.	0.875
PROC 8b	0.038 – 0.875	n.a.	0.038 – 0.875
PROC 9	0.125 – 0.875	n.a.	0.125 – 0.875
PROC 10	0.875	n.a.	0.875
PROC 13	0.875	n.a.	0.875
PROC 17	0.125	n.a.	0.125
PROC 18	0.125	n.a.	0.125

9.11.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.11.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES12):

Use of Aviation Kerosene in lubricants – Professional: Low Environmental Release

9.12.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in lubricants – Professional: Low Environmental Release	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC17 : Lubrication at high energy conditions and in partly open process</p> <p>PROC18 : Greasing at high energy conditions</p> <p>PROC20 : Heat and pressure transfer fluids in dispersive, professional use but closed systems</p> <p>ERC9a : Wide dispersive indoor use of substances in closed systems</p> <p>ERC9b : : Wide dispersive outdoor use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 9.6b.v1
9.12.2. Operational conditions and risk management measures	
9.12.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP

Amounts used	
Daily at point sources	0.37 kg/day
Annually at point sources	0.14 t/year (maximum in worst case)
Annually total	270 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.01
Release fraction to waste water from process before RMMs	0.01
Release fraction to soil from process before RMMs	0.01
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No secondary wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	48
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.12.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 8a, 8b, 9, 10, 13, 18 & 20) < 4 hours/day (PROC 11) < 1 hour/day (PROC 17)

Human factors not influenced by risk management
Not applicable.
Other given operational conditions affecting workers exposure
Assumes use at not more than 20° above ambient temperature, unless stated differently.
Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 4, 8b & 20) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2) Use drum pumps or carefully pour from container (PROC 8a & 8b)
Technical conditions and measures to control dispersion from source towards the worker
No specific measure identified. The following measures are recommended: Provide extract ventilation to points where emissions occur (PROC 10, 11, 13, 17 & 18) Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) (PROC 4, 8b) Provide a good standard of controlled ventilation (not less than 10 to 15 air changes per hour) (PROC 8a & 10) Avoid carrying out operations for more than 1 hour (PROC 17) Avoid carrying out operations for more than 4 hours (PROC 11) Allow time for the product to drain from work piece (PROC 13)
Organisational measures to prevent /limit releases, dispersion and exposure
No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Ensure operation is undertaken outdoors (PROC 17) Drain down systems prior to equipment break-in or maintenance (PROC 8a & 9) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 9) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)
Conditions and measures related to personal protection, hygiene and health evaluation
1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11) 3. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)
9.12.3. Exposure information and reference to its source
9.12.3.1. Prediction of environmental exposure resulting from the conditions described above
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the

resulting risk characterisation ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.12.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 - 20	0
PROC 2	20	0
PROC 3	20	0
PROC 4	5	0
PROC 8a	20 - 30	0
PROC 8b	35	0
PROC 9	20	0
PROC 10	10 – 30	0
PROC 11	30	0
PROC 13	10	0
PROC 17	20 – 28	0
PROC 18	20	0
PROC 20	20	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 - 0.500	n.a.	0 - 0.500
PROC 2	0.500	n.a.	0.500
PROC 3	0.625	n.a.	0.625
PROC 4	0.125	n.a.	0.125
PROC 8a	0.500 - 0.750	n.a.	0.500 - 0.750
PROC 8b	0.875	n.a.	0.875
PROC 9	0.500	n.a.	0.500
PROC 10	0.250 – 0.750	n.a.	0.250 – 0.750
PROC 11	0.750	n.a.	0.750
PROC 13	0.250	n.a.	0.250
PROC 17	0.500 – 0.700	n.a.	0.500 – 0.700
PROC 18	0.500	n.a.	0.500
PROC 20	0.500	n.a.	0.500

9.12.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.12.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES13):

Use of Aviation Kerosene in lubricants – Professional: High Environmental Release

9.13.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in lubricants – Professional: High Environmental Release	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC17 : Lubrication at high energy conditions and in partly open process</p> <p>PROC18 : Greasing at high energy conditions</p> <p>PROC20 : Heat and pressure transfer fluids in dispersive, professional use but closed systems</p> <p>ERC8a : : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.6c.v1
9.13.2. Operational conditions and risk management measures	
9.13.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP

Amounts used	
Daily at point sources	0.37 kg/day
Annually at point sources	0.14 t/year (maximum in worst case)
Annually total	270 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.15
Release fraction to waste water from process before RMMs	0.05
Release fraction to soil from process before RMMs	0.05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No secondary wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	47
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.13.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 8a, 8b, 9, 10, 13, 18 & 20) < 4 hours/day (PROC 11) < 1 hour/day (PROC 17)

Human factors not influenced by risk management
Not applicable.
Other given operational conditions affecting workers exposure
Assumes use at not more than 20° above ambient temperature, unless stated differently.
Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 4, 8b & 20) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2) Use drum pumps or carefully pour from container (PROC 8a & 8b)
Technical conditions and measures to control dispersion from source towards the worker
No specific measure identified. The following measures are recommended: Provide extract ventilation to points where emissions occur (PROC 10, 11, 13, 17 & 18) Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) (PROC 4, 8b) Provide a good standard of controlled ventilation (not less than 10 to 15 air changes per hour) (PROC 8a & 10) Avoid carrying out operations for more than 1 hour (PROC 17) Avoid carrying out operations for more than 4 hours (PROC 11) Allow time for the product to drain from work piece (PROC 13)
Organisational measures to prevent /limit releases, dispersion and exposure
No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Ensure operation is undertaken outdoors (PROC 17) Drain down systems prior to equipment break-in or maintenance (PROC 8a & 9) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 9) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)
Conditions and measures related to personal protection, hygiene and health evaluation
1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11) 3. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)
9.13.3. Exposure information and reference to its source
9.13.3.1. Prediction of environmental exposure resulting from the conditions described above
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the

resulting risk characterisation ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.13.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01 - 20	0
PROC 2	20	0
PROC 3	20	0
PROC 4	5	0
PROC 8a	20 - 30	0
PROC 8b	35	0
PROC 9	20	0
PROC 10	10 - 30	0
PROC 11	30	0
PROC 13	10	0
PROC 17	20 - 28	0
PROC 18	20	0
PROC 20	20	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0 - 0.500	n.a.	0 - 0.500
PROC 2	0.500	n.a.	0.500
PROC 3	0.625	n.a.	0.625
PROC 4	0.125	n.a.	0.125
PROC 8a	0.500 - 0.750	n.a.	0.500 - 0.750
PROC 8b	0.875	n.a.	0.875
PROC 9	0.500	n.a.	0.500
PROC 10	0.250 – 0.750	n.a.	0.250 – 0.750
PROC 11	0.750	n.a.	0.750
PROC 13	0.250	n.a.	0.250
PROC 17	0.500 – 0.700	n.a.	0.500 – 0.700
PROC 18	0.500	n.a.	0.500
PROC 20	0.500	n.a.	0.500

9.13.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.13.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES14):

Use of Aviation Kerosene in lubricants – Consumer: Low Environmental Release

9.14.1. Use of Aviation Kerosene in lubricants: Consumer (Low Environmental Release)	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC1 : Adhesives, sealants PC24 : Lubricants, greases, release products PC31 : Polishes and wax blends ERC9a : Wide dispersive indoor use of substances in closed systems ERC9b : Wide dispersive outdoor use of substances in closed systems
Specific environmental release category	ESVOC SpERC 9.6d.v1
9.14.2. Operational conditions and risk management measures	
9.14.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 50%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	0.14 t/year (maximum in worst case)
Regional tonnage	270 t/year
Fraction of regional tonnage used locally	0.1
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.01
Release fraction to wastewater from wide dispersive use	0.01
Release fraction to soil from wide dispersive use (regional only)	0.01
Conditions and measures related to municipal sewage treatment plant	
Risk from environmental exposure is driven by freshwater	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	48
Assumed domestic sewage treatment plant flow (m^3/d)	2,000

Conditions and measures related to external treatment of waste for disposal						
External treatment and disposal of waste should comply with applicable local and/or national regulations						
Conditions and measures related to external recovery of waste						
External recovery and recycling of waste should comply with applicable local and/or national regulations.						
9.14.2.2. Control of consumer exposure						
Substance content in the product		Up to 100%				
Amounts of product used / applied per event		Up to 2200 g				
Frequency and duration of use/exposure		Covers use frequency up to 4 times per day				
		Duration of exposure: up to 8 hours per event				
Consumer related measures		<p>Covers concentrations 1 – 100%;</p> <p>Covers use 1- 365 days/year;</p> <p>Covers use up to 4 times/on day of use;</p> <p>Covers skin contact area 35.70 – 468.00 cm² for each use event;</p> <p>Covers use amounts 0.1 - 2200 g;</p> <p>Covers use in room size of 20m³;</p> <p>For each use event, covers exposure up to 0.02 - 8.00hr/event;</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>				
Other Operational Conditions affecting exposure		Assumes use at ambient temperatures; assumes use in a 20m ³ room; assumes use with typical ventilation.				
9.14.3. Exposure information and reference to its source						
9.14.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic.						
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1.						
PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
9.14.3.2. Prediction of consumer exposure resulting from the conditions described above						
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD.						
Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.						
Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.						

Aviation Kerosene

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: August 4, 2011

Supersedes:

Version: 1.0

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 8	0 – 2.68	0 – 19.32

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PCs	Not available	0	0 – 0.88	0 – 0.88

9.14.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ectoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.14.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES15):

Use of Aviation Kerosene in lubricants – Consumer: High Environmental Release

9.15.1. Use of Aviation Kerosene in lubricants: Consumer (High Environmental Release)	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC1 : Adhesives, sealants PC24 : Lubricants, greases, release products PC31 : Polishes and wax blends ERC8a : Wide dispersive indoor use of processing aids in open systems ERC8d : Wide dispersive indoor use of reactive substances in open systems
Specific environmental release category	ESVOC SpERC 8.6e.v1
9.15.2. Operational conditions and risk management measures	
9.15.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	0.14 t/year (maximum in worst case)
Regional tonnage	270 t/year
Fraction of regional tonnage used locally	0.01
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.15
Release fraction to wastewater from wide dispersive use	0.05
Release fraction to soil from wide dispersive use (regional only)	0.05
Conditions and measures related to municipal sewage treatment plant	
Risk from environmental exposure is driven by freshwater	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	47
Assumed domestic sewage treatment plant flow (m^3/d)	2,000

Conditions and measures related to external treatment of waste for disposal						
External treatment and disposal of waste should comply with applicable local and/or national regulations						
Conditions and measures related to external recovery of waste						
External recovery and recycling of waste should comply with applicable local and/or national regulations.						
9.15.2.2. Control of consumer exposure						
Substance content in the product		Up to 100%				
Amounts of product used / applied per event		Up to 2200 g				
Frequency and duration of use/exposure		Covers use frequency up to 4 times per day				
		Duration of exposure: up to 8 hours per event				
Consumer related measures		<p>Covers concentrations 1 – 100%;</p> <p>Covers use 1- 365 days/year;</p> <p>Covers use up to 4 times/on day of use;</p> <p>Covers skin contact area 35.70 – 468.00 cm² for each use event;</p> <p>Covers use amounts 0.1 - 2200 g;</p> <p>Covers use in room size of 20m³;</p> <p>For each use event, covers exposure up to 0.02 - 8.00hr/event;</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>				
Other Operational Conditions affecting exposure		Assumes use at ambient temperatures; assumes use in a 20m ³ room; assumes use with typical ventilation.				
9.15.3. Exposure information and reference to its source						
9.15.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic.						
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1.						
PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
9.15.3.2. Prediction of consumer exposure resulting from the conditions described above						
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD.						
Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.						
Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.						

Aviation Kerosene

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: August 4, 2011

Supersedes:

Version: 1.0

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 8	0 – 2.68	0 – 19.32

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PROCs	Not available	0	0 – 0.88	0 – 0.88

9.15.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.15.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES16):

Use of Aviation Kerosene in metal working fluids/rolling oils – Industrial

9.16.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in metal working fluids/rolling oils – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC7 : Industrial spraying</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC17 : Lubrication at high energy conditions and in partly open process</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p>
Specific environmental release category	ESVOC SpERC 4.7a.v1
9.16.2. Operational conditions and risk management measures	
9.16.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	5,000 kg/day

Annually at point sources	100 t/year (maximum in worst case)
Annually total	550 t/year total market
Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.02
Release fraction to waste water from process before RMMs	0.00003
Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 70%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. Prevent discharge of undissolved substance to or recover from onsite wastewater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	490,000
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.16.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	

Assumes a good basic standard of occupational hygiene is implemented.
Technical conditions and measures at process level (source) to prevent release
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 2 & 3)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure material transfers are under containment or extract ventilation (PROC 4)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Use drum pumps or carefully pour from container (PROC 5, 8b & 9)</p>
Technical conditions and measures to control dispersion from source towards the worker
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 4, 7, 10, 13 & 17)</p> <p>Provide extract ventilation to transfer points (PROC 8b)</p> <p>Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 5, 8b & 9)</p> <p>Use ventilation to extract vapours from freshly coated articles/objects (PROC 10)</p>
Organisational measures to prevent /limit releases, dispersion and exposure
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a & 8b)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 8b)</p> <p>Clear lines prior to decoupling (PROC 8b)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>
Conditions and measures related to personal protection, hygiene and health evaluation
<ol style="list-style-type: none"> 1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying.
9.16.3. Exposure information and reference to its source
9.16.3.1. Prediction of environmental exposure resulting from the conditions described above
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.16.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10	0
PROC 2	0.01 – 10	0
PROC 3	25	0
PROC 4	2	0
PROC 5	15	0
PROC 7	2 – 25	0
PROC 8a	10	0
PROC 8b	1.50 – 15	0
PROC 9	15	0
PROC 10	5	0
PROC 13	5	0
PROC 17	2 – 10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250	n.a.	0.250
PROC 2	0 – 0.250	n.a.	0 – 0.250
PROC 3	0.625	n.a.	0.625
PROC 4	0.050	n.a.	0.050
PROC 5	0.375	n.a.	0.375
PROC 7	0.050 - 0.625	n.a.	0.050 - 0.625
PROC 8a	0.250	n.a.	0.250
PROC 8b	0.038 – 0.375	n.a.	0.038 – 0.375
PROC 9	0.375	n.a.	0.375
PROC 10	0.125	n.a.	0.125
PROC 13	0.125	n.a.	0.125
PROC 17	0.050 – 0.250	n.a.	0.050 – 0.250

9.16.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.16.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES17):

Use of Aviation Kerosene in metal working fluids/rolling oils – Professional

9.17.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in metal working fluids/rolling oils – Professional	
Use descriptors related to the life cycle stage	<p>SU3 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC17 : Lubrication at high energy conditions and in partly open process</p> <p>ERC8a : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.7c.v1
9.17.2. Operational conditions and risk management measures	
9.17.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	0.75 kg/day
Annually at point sources	0.27 t/year (maximum in worst case)

Annually total	550 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.15
Release fraction to waste water from process before RMMs	0.05
Release fraction to soil from process before RMMs	0.05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	90
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.17.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 5, 8a, 8b, 9, 10, 13 & 17) < 4 hours/day (PROC 11)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	

<p>Technical conditions and measures at process level (source) to prevent release</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Handle substance within closed systems (PROC 1, 2 & 3)</p> <p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Use drum pumps or carefully pour from container (PROC 8a, 8b & 9)</p>
<p>Technical conditions and measures to control dispersion from source towards the worker</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide extract ventilation to points where emissions occur (PROC 11, 13 & 17)</p> <p>Provide extract ventilation to transfer points (PROC 8b)</p> <p>Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 8a, 8b, 9, 10, 11 & 13)</p> <p>Avoid carrying out operations for more than 4 hours (PROC 11)</p> <p>Use ventilation to extract vapours from freshly coated articles/ objects (PROC 10)</p>
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a & 8b)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 8b)</p> <p>Clear lines prior to decoupling (PROC 8b)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <ol style="list-style-type: none"> 1. PPE: Wear gloves (Type EN374) if regular skin contact likely 2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11) 3. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)
<p>9.17.3. Exposure information and reference to its source</p>
<p>9.17.3.1. Prediction of environmental exposure resulting from the conditions described above</p> <p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.17.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	20	0
PROC 2	20	0
PROC 3	25	0
PROC 5	Not available	Not available
PROC 8a	20 - 30	0
PROC 8b	1.50 – 15	0
PROC 9	30	0
PROC 10	10 – 30	0
PROC 11	2 – 30	0
PROC 13	10 – 30	0
PROC 17	5 – 20	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.500	n.a.	0.500
PROC 2	0.500	n.a.	0.500
PROC 3	0.625	n.a.	0.625
PROC 5	Not available	Not available	Not available
PROC 8a	0.500 – 0.750	n.a.	0.500 – 0.750
PROC 8b	0.038 – 0.375	n.a.	0.038 – 0.375
PROC 9	0.750	n.a.	0.750
PROC 10	0.250 – 0.750	n.a.	0.250 – 0.750
PROC 11	0.050 - 0.750	n.a.	0.050 - 0.750
PROC 13	0.250 – 0.750	n.a.	0.250 – 0.750
PROC 17	0.125 – 0.500	n.a.	0.125 – 0.500

9.17.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrорisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.17.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES18):

Use of Aviation Kerosene as release agents or binders – Industrial

9.18.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as release agents or binders – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC6 : Calendering operations</p> <p>PROC7 : Industrial spraying</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>PROC14 : Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles</p>
Specific environmental release category	ESVOC SpERC 4.10a.v1
9.18.2. Operational conditions and risk management measures	
9.18.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	40,000 kg/day
Annually at point sources	800 t/year (maximum in worst case)
Annually total	800 t/year total market
Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)

Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	1.0
Release fraction to waste water from process before RMMs	0.000003
Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 80%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. Prevent discharge of undissolved substance to or recover from onsite wastewater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	4,100,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.18.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 6, 8b, 10, 13 & 14) < 4 hours/day (PROC 7)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3)	

<p>Store substance within a closed system (PROC 1 & 2)</p> <p>Ensure dedicated sample points are provided (PROC 1 & 2)</p> <p>Avoid dip sampling (PROC 1 & 2)</p> <p>Transfer materials directly to mixing vessels (PROC 3)</p>														
<p>Technical conditions and measures to control dispersion from source towards the worker</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide a good standard of general ventilation (PROC 3, 4, 6, 8b, 10, 13 & 14)</p> <p>Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 7)</p> <p>Avoid carrying out operations for more than 4 hours (PROC 7)</p> <p>Ensure operatives are trained to minimise exposures (PROC 7)</p> <p>Apply ventilation or undertake in ventilated enclosure (PROC 7)</p> <p>Automate activity where possible (PROC 7)</p> <p>Use long handled brushes and rollers where possible (PROC 10)</p>														
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p> <p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>														
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely</p> <p>2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 7)</p>														
<p>9.18.3. Exposure information and reference to its source</p>														
<p>9.18.3.1. Prediction of environmental exposure resulting from the conditions described above</p> <p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p> <table border="1"> <thead> <tr> <th>Environmental exposure</th> <th>In STP/ untreated wastewater (mg/l)</th> <th>In local freshwater (mg/l)</th> <th>In local soil (mg/kg dw)</th> <th>In local marine water (mg/l)</th> <th>In sediment freshwater (mg/kg dw)</th> <th>In sediment marine water (mg/kg dw)</th> </tr> </thead> <tbody> <tr> <td>PEC</td> <td>0.066</td> <td>0.0066</td> <td>0.0074</td> <td>0.00066</td> <td>0.12</td> <td>0.000066</td> </tr> </tbody> </table>	Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)	PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)								
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066								
<p>9.18.3.2. Prediction of workers exposure resulting from the conditions described above</p> <p>Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.</p>														

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10 - 25	0
PROC 2	10 - 25	0
PROC 3	25	0
PROC 4	20	0
PROC 6	35	0
PROC 7	12.50 – 37.50	0
PROC 8b	35	0
PROC 10	35	0
PROC 13	35	0
PROC 14	35	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250 - 0.625	n.a.	0.250 - 0.625
PROC 2	0.250 - 0.625	n.a.	0.250 - 0.625
PROC 3	0.625	n.a.	0.625
PROC 4	0.500	n.a.	0.500
PROC 6	0.875	n.a.	0.875
PROC 7	0.313 – 0.936	n.a.	0.313 – 0.936
PROC 8b	0.875	n.a.	0.875
PROC 10	0.875	n.a.	0.875
PROC 13	0.875	n.a.	0.875
PROC 14	0.875	n.a.	0.875

9.18.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.18.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES19):

Use of Aviation Kerosene as release agents or binders – Professional

9.19.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as release agents or binders – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed batch process (synthesis or formulation)</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC6 : Calendering operations</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC14 : Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>ERC8a : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.10b.v1
9.19.2. Operational conditions and risk management measures	
9.19.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	1.1 kg/day
Annually at point sources	0.4 t/year (maximum in worst case)
Annually total	800 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365

Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.95
Release fraction to waste water from process before RMMs	0.025
Release fraction to soil from process before RMMs	0.025
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of ≥ 0%.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M _{safe}) (kg/d)	130
Assumed domestic sewage treatment plant flow (m ³ /d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.19.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 3, 4, 6, 8a, 8b, 10 & 14) < 1 hour/day (PROC 11)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended:	

Handle substance within closed systems (PROC 1, 2 & 3)
Store substance within a closed system (PROC 1 & 2)
Ensure dedicated sample points are provided (PROC 1 & 2)
Avoid dip sampling (PROC 1 & 2)
Transfer materials directly to mixing vessels (PROC 3)

Technical conditions and measures to control dispersion from source towards the worker

No specific measure identified.
The following measures are recommended:
Provide a good standard of general ventilation (PROC 3, 4, 8b & 11)
Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 6, 10, 13 & 14)
Avoid carrying out operations for more than 1 hour (PROC 11)
Apply ventilation or undertake in ventilated enclosure (PROC 11)
Automate activity where possible (PROC 11)
Use long handled brushes and rollers where possible (PROC 10)
Segregate away from other operations (PROC 11)

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measure identified.
The following measures are recommended:
Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Clean up contamination/spills as soon as they occur (all PROCs)
Wash off skin contamination immediately (all PROCs)
Have the system examined and tested against its performance standard – generally at least every 14 months (PROC 6 & 14)
Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)

Conditions and measures related to personal protection, hygiene and health evaluation

1. PPE: Wear gloves (Type EN374) if regular skin contact likely
2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11)
3. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)

9.19.3. Exposure information and reference to its source

9.19.3.1. Prediction of environmental exposure resulting from the conditions described above

Substance is a complex UVCB. Predominantly hydrophobic.
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.
PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.19.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	20 - 25	0
PROC 2	20 - 25	0
PROC 3	25	0
PROC 4	35	0
PROC 6	30	0
PROC 8a	Not available	Not available
PROC 8b	35	0
PROC 10	30	0
PROC 11	20 – 35	0
PROC 14	30	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.500 - 0.625	n.a.	0.500 - 0.625
PROC 2	0.500 - 0.625	n.a.	0.500 - 0.625
PROC 3	0.625	n.a.	0.625
PROC 4	0.875	n.a.	0.875
PROC 6	0.750	n.a.	0.750
PROC 8a	Not available	Not available	Not available
PROC 8b	0.875	n.a.	0.875
PROC 10	0.750	n.a.	0.750
PROC 11	0.500 – 0.975	n.a.	0.500 – 0.975
PROC 14	0.750	n.a.	0.750

9.19.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.19.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES20):

Use of Aviation Kerosene in agrochemicals – Professional

9.20.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in agrochemicals – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>ERC8a : Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p>
Specific environmental release category	ESVOC SpERC 8.11a.v1
9.20.2. Operational conditions and risk management measures	
9.20.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	1.7 kg/day
Annually at point sources	0.62 t/year (maximum in worst case)
Annually total	310 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.9

Release fraction to waste water from process before RMMs	0.01
Release fraction to soil from process before RMMs	0.09
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of 0%. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	210
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external recovery of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or international regulations.	
9.20.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 2, 4, 8 & 11) < 4 hours/ day (PROC 13)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Store substance within a closed system (PROC 1 & 2) Ensure dedicated sample points are provided (PROC 1 & 2) Avoid dip sampling (PROC 1 & 2)	
Technical conditions and measures to control dispersion from source towards the worker	

No specific measure identified.

The following measures are recommended:

Provide extract ventilation to transfer points (PROC 8b)

Provide a good standard of general ventilation (PROC 8b)

Avoid carrying out operations for more than 4 hours (PROC 13)

Ensure operatives are trained to minimise exposures (PROC 8b, 11 & 13)

Apply from within a vented cab supplied with filtered air under positive pressure and with a protection factor of > 20 (PROC 11)

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measure identified.

The following measures are recommended:

Avoid direct skin contact with product (all PROCs)

Identify potential areas for indirect skin contact (all PROCs)

Clean up contamination/spills as soon as they occur (all PROCs)

Wash off skin contamination immediately (all PROCs)

Ensure operation is undertaken outdoors (PROC 4, 11 & 13)

Drain down systems prior to equipment break-in or maintenance (PROC 8a)

Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)

Clear lines prior to decoupling (PROC 4)

Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)

Conditions and measures related to personal protection, hygiene and health evaluation

1. PPE: Wear gloves (Type EN374) if regular skin contact likely

2. PPE: Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to leave to substantial aerosol release, e.g. spraying. (PROC 11)

3. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)

9.20.3. Exposure information and reference to its source

9.20.3.1. Prediction of environmental exposure resulting from the conditions described above

Substance is a complex UVCB. Predominantly hydrophobic.

The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.20.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	20	0
PROC 2	20	0
PROC 4	35	0
PROC 8a	20	0
PROC 8b	35	0
PROC 11	17.50 - 35	0
PROC 13	35.70	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.500	n.a.	0.500
PROC 2	0.500	n.a.	0.500
PROC 4	0.875	n.a.	0.875
PROC 8a	0.500	n.a.	0.500
PROC 8b	0.875	n.a.	0.875
PROC 11	0.438 – 0.875	n.a.	0.438 – 0.875
PROC 13	0.893	n.a.	0.893

9.20.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.20.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES21):

Use of Aviation Kerosene in agrochemicals – Consumer

9.21.1. Use of Aviation Kerosene in agrochemicals: Consumer	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC12 : Fertilizers PC27 : Plant protection products ERC8a : Wide dispersive indoor use of processing aids in open systems ERC8d : Wide dispersive indoor use of reactive substances in open systems
Specific environmental release category	ESVOC SpERC 8.11b.v1
9.21.2. Operational conditions and risk management measures	
9.21.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 50%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	0.62 t/year (maximum in worst case)
Regional tonnage	310 t/year
Fraction of regional tonnage used locally	0.1
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.9
Release fraction to wastewater from wide dispersive use	0.01
Release fraction to soil from wide dispersive use (regional only)	0.09
Conditions and measures related to municipal sewage treatment plant	
Risk from environmental exposure is driven by freshwater	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	210
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste for disposal	

External treatment and disposal of waste should comply with applicable local and/or national regulations						
Conditions and measures related to external recovery of waste						
External recovery and recycling of waste should comply with applicable local and/or national regulations.						
9.21.2.2. Control of consumer exposure						
Substance content in the product		Up to 50%				
Amounts of product used / applied per event		Up to 50 g				
Frequency and duration of use/exposure		Covers use frequency up to 1 time per day				
		Duration of exposure: up to 0.5 hours per event				
Consumer related measures		<p>Covers concentrations 1 – 50%;</p> <p>Covers use 1- 365 days/year;</p> <p>Covers use up to 1 times/on day of use;</p> <p>Covers skin contact area 35.70 – 857.50 cm² for each use event;</p> <p>Covers use amounts 0.1 - 50 g;</p> <p>Covers use in room size of 20m³;</p> <p>For each use event, covers exposure up to 0.25 – 0.50hr/event;</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>				
Other Operational Conditions affecting exposure		Assumes use at ambient temperatures; assumes use in a 20m ³ room; assumes use with typical ventilation.				
9.21.3. Exposure information and reference to its source						
9.21.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
9.21.3.2. Prediction of consumer exposure resulting from the conditions described above						
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD. Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.						
Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.						

Aviation Kerosene

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: August 4, 2011

Supersedes:

Version: 1.0

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 71.46	0 – 15	0 – 24.17

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PCs		0 – 0.80	0 – 0.11	0 – 0.91

9.21.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ectoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.21.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES22):

Use of Aviation Kerosene as a fuel – Industrial

9.22.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as a fuel – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC16 : Using material as fuel sources, limited exposure to unburned product to be expected</p> <p>ERC7 : Industrial use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 7.12a.v1
9.22.2. Operational conditions and risk management measures	
9.22.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	1,800,000 kg/day
Annually at point sources	550,000 t/year (maximum in worst case)
Annually total	550,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	300
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.005
Release fraction to waste water from process before RMMs	0.00001

Release fraction to soil from process before RMMs	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 95%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of $\geq 84.6\%$. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater sediment. If discharging to domestic STP, no onsite wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	5,300,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
9.22.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2, 3 & 16) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 8b) Ensure dedicated sample points are provided (PROC 1 & 2)	

Avoid dip sampling (PROC 1 & 2)																				
Technical conditions and measures to control dispersion from source towards the worker																				
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Provide a good standard of general ventilation (PROC 8b)</p> <p>Ensure operatives are trained to minimise exposures (PROC 8b)</p> <p>Apply vessel entry procedures including use of force supplied air (PROC 8a)</p>																				
Organisational measures to prevent /limit releases, dispersion and exposure																				
<p>No specific measure identified.</p> <p>The following measures are recommended:</p> <p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Clean up contamination/spills as soon as they occur (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Ensure operation is undertaken outdoors (PROC 8b)</p> <p>Transfer via enclosed lines (PROC 8a)</p> <p>Drain down systems prior to equipment break-in or maintenance (PROC 8a)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)</p> <p>Clear lines prior to decoupling (PROC 8b)</p> <p>Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>																				
Conditions and measures related to personal protection, hygiene and health evaluation																				
1. PPE: Wear gloves (Type EN374) if regular skin contact likely																				
9.22.3. Exposure information and reference to its source																				
9.22.3.1. Prediction of environmental exposure resulting from the conditions described above																				
<p>Substance is a complex UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p> <p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1.</p> <p>PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>																				
<table border="1"> <thead> <tr> <th>Environmental exposure</th> <th>In STP/ untreated wastewater (mg/l)</th> <th>In local freshwater (mg/l)</th> <th>In local soil (mg/kg dw)</th> <th>In local marine water (mg/l)</th> <th>In sediment freshwater (mg/kg dw)</th> <th>In sediment marine water (mg/kg dw)</th> </tr> </thead> <tbody> <tr> <td>PEC</td> <td>0.066</td> <td>0.0066</td> <td>0.0074</td> <td>0.00066</td> <td>0.12</td> <td>0.000066</td> </tr> </tbody> </table>							Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)	PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)														
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066														
9.22.3.2. Prediction of workers exposure resulting from the conditions described above																				
<p>Workers exposure estimation is calculated with Ectoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.</p> <p>Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.</p>																				

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10	0
PROC 2	10	0
PROC 3	25	0
PROC 8a	5 - 10	0
PROC 8b	35	0
PROC 16	5	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250	n.a.	0.250
PROC 2	0.250	n.a.	0.250
PROC 3	0.625	n.a.	0.625
PROC 8a	0.125 – 0.250	n.a.	0.125 – 0.250
PROC 8b	0.875	n.a.	0.875
PROC 16	0.125	n.a.	0.125

9.22.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.22.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES23):

Use of Aviation Kerosene as a fuel – Professional

9.23.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as a fuel – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC16 : Using material as fuel sources, limited exposure to unburned product to be expected</p> <p>ERC9a : Wide dispersive indoor use of substances in closed systems</p> <p>ERC9b : Wide dispersive outdoor use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 9.12b.v1
9.23.2. Operational conditions and risk management measures	
9.23.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	6,100 kg/day
Annually at point sources	2,200 t/year (maximum in worst case)
Annually total	4,400,000 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.001
Release fraction to waste water from process before	0.00001

RMMs	
Release fraction to soil from process before RMMs	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of $\geq 0\%$. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	690,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
9.23.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 2, 3 & 16) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 8b) Ensure dedicated sample points are provided (PROC 1 & 2)	

<p>Avoid dip sampling (PROC 1 & 2) Use drum pumps or carefully pour from container (PROC 8b)</p>																				
<p>Technical conditions and measures to control dispersion from source towards the worker</p>																				
<p>No specific measure identified. The following measures are recommended: Provide a good standard of general ventilation (PROC 8b) Ensure operatives are trained to minimise exposures (PROC 8b)</p>																				
<p>Organisational measures to prevent /limit releases, dispersion and exposure</p>																				
<p>No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Ensure operation is undertaken outdoors (PROC 8b) Drain down systems prior to equipment break-in or maintenance (PROC 8a) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a) Apply vessel entry procedures including use of forced supply air (PROC 8a) Transfer via enclosed lines (PROC 8a) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)</p>																				
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p>																				
<p>1. PPE: Wear gloves (Type EN374) if regular skin contact likely</p>																				
<p>9.23.3. Exposure information and reference to its source</p>																				
<p>9.23.3.1. Prediction of environmental exposure resulting from the conditions described above</p>																				
<p>Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.</p>																				
<p>When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterisation ratios are expected to be less than 1. PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.</p>																				
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Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)														
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066														
<p>9.23.3.2. Prediction of workers exposure resulting from the conditions described above</p>																				
<p>Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2. Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.</p>																				

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	20	0
PROC 2	20	0
PROC 3	25	0
PROC 8a	20	0
PROC 8b	29.75 – 35	0
PROC 16	10	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.500	n.a.	0.500
PROC 2	0.500	n.a.	0.500
PROC 3	0.625	n.a.	0.625
PROC 8a	0.500	n.a.	0.500
PROC 8b	0.744 – 0.875	n.a.	0.744 – 0.875
PROC 16	0.250	n.a.	0.250

9.23.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.23.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES24):

Use of Aviation Kerosene as a fuel – Consumer

9.24.1. Use of Aviation Kerosene as a fuel: Consumer	
Use descriptors related to the life cycle stage	SU21 : Consumer uses: Private households (= general public = consumers) PC13 : Fuels ERC9a : Wide dispersive indoor use of substances in closed systems ERC9b : Wide dispersive outdoor use of substances in closed systems
Specific environmental release category	ESVOC SpERC 9.12c.v1
9.24.2. Operational conditions and risk management measures	
9.24.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 - 10 kPa at STP
Amounts used	
Annually at point sources	89 t/year (maximum in worst case)
Regional tonnage	180,000 t/year
Fraction of regional tonnage used locally	0.1
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Local Freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional only)	0.001
Release fraction to wastewater from wide dispersive use	0.00001
Release fraction to soil from wide dispersive use (regional only)	0.00001
Conditions and measures related to municipal sewage treatment plant	
Risk from environmental exposure is driven by freshwater	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	31,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in	

regional exposure assessment.																				
Conditions and measures related to external recovery of waste																				
This substance is consumed during use and no waste of the substance is generated.																				
9.24.2.2. Control of consumer exposure																				
Substance content in the product		Up to 100%																		
Amounts of product used / applied per event		Up to 50,000 g																		
Frequency and duration of use/exposure		Covers use frequency up to 0.143 times per day																		
		Duration of exposure: up to 2 hours per event																		
Consumer related measures		<p>Covers concentrations 1 – 100%;</p> <p>Covers use 1- 365 days/year;</p> <p>Covers use up to 1 time/on day of use;</p> <p>Covers skin contact area 100.00 – 420.00 cm² for each use event;</p> <p>Covers use amounts 1,000 – 50,000 g;</p> <p>Covers use in room size of 20m³;</p> <p>For each use event, covers exposure up to 0.03 – 0.50hr/event;</p> <p>RMM: No specific RMMs identified beyond those OCs stated</p>																		
Other Operational Conditions affecting exposure		Assumes use at ambient temperatures; assumes use in a 20m ³ room; assumes use with typical ventilation.																		
9.24.3. Exposure information and reference to its source																				
9.24.3.1. Prediction of environmental exposure resulting from the conditions described above																				
Substance is a complex UVCB. Predominantly hydrophobic.																				
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.																				
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed exposures the resulting risk characterisation ratios are expected to be less than 1.																				
PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier - see Product Library tab in Petrorisk spreadsheet.																				
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Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)														
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066														
9.24.3.2. Prediction of consumer exposure resulting from the conditions described above																				
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD.																				
Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented.																				
Ranges for exposure estimates and RCR are listed below. For more information contact the supplier or refer to the CSR. For DNEL values, please refer to Page 2.																				

Aviation Kerosene

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: August 4, 2011

Supersedes:

Version: 1.0

Consumers exposure	Dermal (mg/kg/day)	Oral (mg/kg/day)	Inhalation (mg/kg for 24hr day)
Exposure estimates	0 – 7	0	1.08 – 9.71

Risk characterization:

Process category	RCR (dermal)	RCR (oral)	RCR (inhalation)	RCR (all routes)
All PCs	Not available	0	0.03 – 0.24	0.03 – 0.24

9.24.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The consumer exposure and environmental emissions have been evaluated using Ectoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.24.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES25):

Use of Aviation Kerosene as functional fluids – Industrial

9.25.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene as functional fluids – Industrial	
Use descriptors related to the life cycle stage	<p>SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC2 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC4 : Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>ERC7 : Industrial use of substances in closed systems</p>
Specific environmental release category	ESVOC SpERC 7.13a.v1
9.25.2. Operational conditions and risk management measures	
9.25.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	500 kg/day
Annually at point sources	10 t/year (maximum in worst case)
Annually total	550 t/year total market
Frequency and duration of use/exposure	
Emission days per year	20
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.005

Release fraction to waste water from process before RMMs	0.00003
Release fraction to soil from process before RMMs	0.001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of 0%
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of $\geq 0\%$. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. Prevent discharge of undissolved substance to or recover from onsite wastewater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	63,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or national regulations.	
9.25.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 1, 2 & 3) Store substance within a closed system (PROC 1 & 2) Ensure material transfers are under containment or extract ventilation (PROC 9) Ensure dedicated sample points are provided (PROC 1 & 2)	

Avoid dip sampling (PROC 1 & 2) Use drum pumps (PROC 8b)						
Technical conditions and measures to control dispersion from source towards the worker						
No specific measure identified. The following measures are recommended: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) (PROC 4, 8a & 9)						
Organisational measures to prevent /limit releases, dispersion and exposure						
No specific measure identified. The following measures are recommended: Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Clean up contamination/spills as soon as they occur (all PROCs) Wash off skin contamination immediately (all PROCs) Drain down systems prior to equipment break-in or maintenance (PROC 8a) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a) Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)						
Conditions and measures related to personal protection, hygiene and health evaluation						
1. PPE: Wear gloves (Type EN374) if regular skin contact likely						
9.25.3. Exposure information and reference to its source						
9.25.3.1. Prediction of environmental exposure resulting from the conditions described above						
Substance is a complex UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.						
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterization ratios are expected to be less than 1. PNECs have been derived using HC5statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier – see Product Library tab in Petrorisk spreadsheet.						
Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066
9.25.3.2. Prediction of workers exposure resulting from the conditions described above						
Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2. Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.						

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	10 - 25	0
PROC 2	10 - 25	0
PROC 3	25	0
PROC 4	2 - 20	0
PROC 8a	10 - 35	0
PROC 8b	10	0
PROC 9	5 - 35	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0.250 - 0.625	n.a.	0.250 - 0.625
PROC 2	0.250 - 0.625	n.a.	0.250 - 0.625
PROC 3	0.625	n.a.	0.625
PROC 4	0.050 - 0.500	n.a.	0.050 - 0.500
PROC 8a	0.250 - 0.875	n.a.	0.250 - 0.875
PROC 8b	0.250	n.a.	0.250
PROC 9	0.125 - 0.875	n.a.	0.125 - 0.875

9.25.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.25.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES26):

Use of Aviation Kerosene in road and construction applications – Professional

9.26.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in road and construction applications – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9 : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10 : Roller application or brushing</p> <p>PROC11 : Non industrial spraying</p> <p>PROC13 : Treatment of articles by dipping and pouring</p> <p>ERC8d : Wide dispersive outdoor use of processing aids in open systems</p> <p>ERC8f : Wide dispersive outdoor use resulting in inclusion into or onto a matrix</p>
Specific environmental release category	ESVOC SpERC 8.15.v1
9.26.2. Operational conditions and risk management measures	
9.26.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	7.0 kg/day
Annually at point sources	2.5 t/year (maximum in worst case)
Annually total	5,100 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.95
Release fraction to waste water from process before RMMs	0.01

Release fraction to soil from process before RMMs	0.04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of $\geq 0\%$. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	780
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or national regulations.	
9.26.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 8b, 9 & 11) < 4 hours/day (PROC 10 & 13) < 1 hour/day (PROC 8a)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measures identified.	
Technical conditions and measures to control dispersion from source towards the worker	
No specific measure identified. The following measures are recommended: Avoid carrying out operations for more than 1 hour (PROC 8a) Avoid carrying out operations for more than 4 hours (PROC 10 & 13) Use long handled brushes and rollers where possible (PROC 10)	

Ensure operatives are trained to minimise exposures (PROC 10 & 13)
Apply from within a vented cab supplied with filtered air under positive pressure and with a protection factor of > 20 (PROC 11)
Segregate the activity away from other operations (PROC 11)

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measure identified.
The following measures are recommended:
Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Clean up contamination/spills as soon as they occur (all PROCs)
Wash off skin contamination immediately (all PROCs)
Ensure operation is undertaken outdoors (PROC 8a, 10, 11 & 13)
Drain down systems prior to equipment break-in or maintenance (PROC 8a)
Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)
Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)

Conditions and measures related to personal protection, hygiene and health evaluation

1. PPE: Wear gloves (Type EN374) if regular skin contact likely
2. PPE: Wear a respirator conforming to EN140 with Type A filter or better (PROC 11)

9.26.3. Exposure information and reference to its source

9.26.3.1. Prediction of environmental exposure resulting from the conditions described above

Substance is a complex UVCB. Predominantly hydrophobic.
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterization ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier – see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.26.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.
Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 8a	14 – 20	0
PROC 8b	Not available	Not available
PROC 9	Not available	Not available
PROC 10	35.70	0
PROC 11	35	0
PROC 13	35.70	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 8a	0.350 – 0.500	n.a.	0.350 – 0.500
PROC 8b	Not available	Not available	Not available
PROC 9	Not available	Not available	Not available
PROC 10	0.893	n.a.	0.893
PROC 11	0.875	n.a.	0.875
PROC 13	0.893	n.a.	0.893

9.26.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.26.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.

Exposure Scenario (ES27):

Use of Aviation Kerosene in explosives manufacture and use – Professional

9.27.1. Exposure scenario addressing uses carried out by workers	
Use of Aviation Kerosene in explosives manufacture and use – Professional	
Use descriptors related to the life cycle stage	<p>SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</p> <p>PROC1 : Use in closed process, no likelihood of exposure</p> <p>PROC3 : Use in closed, continuous process with occasional controlled exposure</p> <p>PROC5 : Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>ERC8e : Wide dispersive outdoor use of reactive substances in open systems</p>
Specific environmental release category	Not applicable
9.27.2. Operational conditions and risk management measures	
9.27.2.1. Control of environmental exposure	
Product characteristic	
Physical state	Liquid
Concentration of substance in product	Up to 100%
Vapour pressure of substance	0.5 – 10 kPa at STP
Amounts used	
Daily at point sources	1.7 kg/day
Annually at point sources	0.62 t/year (maximum in worst case)
Annually total	1,200 t/year total market
Frequency and duration of use/exposure	
Emission days per year	365
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18,000 m ³ /day (default)
Other given operational conditions affecting environmental exposure	
Release fraction to air from process before RMMs	0.001
Release fraction to waste water from process before RMMs	0.02
Release fraction to soil from process before RMMs	0.01

Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates are used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Apply technical measures aiming at reducing releases to air (containment by preference or catalytic or thermal gas oxidation)	Treat air emissions to provide a typical removal efficiency of N/A
Apply technical measures aiming at reduction and cleaning of waste water (WWTP /local STP (e.g. biological treatment))	Typical onsite wastewater treatment technology provides removal efficiency of $\geq 0\%$. If discharging to domestic STP, provide the required onsite wastewater removal efficiency of $\geq 0\%$.
Risk from environmental exposure is driven by freshwater. No wastewater treatment required.	
Organizational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment	94.7%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	94.7%
Maximum allowable site tonnage (M_{safe}) (kg/d)	200
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to external treatment of waste	
External treatment, disposal, recovery and recycling of waste should comply with applicable local and/or national regulations.	
9.27.2.2. Control of worker exposure	
Frequency and duration of use/exposure	
Frequency of use for which the ES ensures control of risk	days/year: not restricted
Duration of use for which the ES ensures control of risk	8 hours/day (PROC 1, 3, 5 & 8b) < 4 hours/day (PROC 8a)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use at not more than 20° above ambient temperature, unless stated differently.	
Assumes a good basic standard of occupational hygiene is implemented.	
Technical conditions and measures at process level (source) to prevent release	
No specific measure identified. The following measures are recommended: Handle substance within closed systems (PROC 3) Store substance within a closed system (PROC 1) Ensure material transfers are under containment or extract ventilation (PROC 8b) Use drum pumps (PROC 8a)	
Technical conditions and measures to control dispersion from source towards the worker	
No specific measure identified. The following measures are recommended:	

Provide a good standard of general ventilation (PROC 8b)
Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 5 & 8a)
Avoid carrying out operations for more than 4 hours (PROC 8a)
Ensure operatives are trained to minimise exposures (PROC 8a & 8b)
Minimise exposure by enclosing the operation or equipment and provide extract ventilation at openings (PROC 5)
Apply vessel entry procedures including use of forced supply air (PROC 8a)
Transfer via enclosed lines (PROC 8a)

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measure identified.
The following measures are recommended:
Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Clean up contamination/spills as soon as they occur (all PROCs)
Wash off skin contamination immediately (all PROCs)
Ensure operation is undertaken outdoors (PROC 8a & 8b)
Drain down systems prior to equipment break-in or maintenance (PROC 8a)
Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a)
Clear lines prior to decoupling (PROC 8b)
Provide basic employee training to prevent/minimise exposures and to report and skin effects that may develop (all PROCs)

Conditions and measures related to personal protection, hygiene and health evaluation

1. PPE: Wear gloves (Type EN374) if regular skin contact likely

9.27.3. Exposure information and reference to its source

9.27.3.1. Prediction of environmental exposure resulting from the conditions described above

Substance is a complex UVCB. Predominantly hydrophobic.
The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment.

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed the resulting risk characterization ratios are expected to be less than 1.

PNECs have been derived using HC5 statistical extrapolation method and the target lipid model using representative structures. For more detailed information contact supplier – see Product Library tab in Petrorisk spreadsheet.

Environmental exposure	In STP/ untreated wastewater (mg/l)	In local freshwater (mg/l)	In local soil (mg/kg dw)	In local marine water (mg/l)	In sediment freshwater (mg/kg dw)	In sediment marine water (mg/kg dw)
PEC	0.066	0.0066	0.0074	0.00066	0.12	0.000066

9.27.3.2. Prediction of workers exposure resulting from the conditions described above

Workers exposure estimation is calculated with Ecetoc TRA model. Where applicable, predicted exposures and RCR values are reported as ranges. For DNEL values, please refer to Page 2.

Since the DNEL for dermal irritation cannot be calculated, risk management measures (RMM) are derived from a qualitative risk assessment, reflecting industry standards for this class of substances.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0
PROC 3	25	0
PROC 5	30	0
PROC 8a	20 - 35.70	0
PROC 8b	25 – 35	0

Predicted exposures are not expected to exceed the applicable exposure limits (DNEL as provided above) when the operational conditions/risk management measures described above are implemented

Risk characterization:

Process category	RCR (inhalation)	RCR (dermal)	RCR (all routes)
PROC 1	0	n.a.	0
PROC 3	0.625	n.a.	0.625
PROC 5	0.750	n.a.	0.750
PROC 8a	0.500 – 0.893	n.a.	0.500 – 0.893
PROC 8b	0.875	n.a.	0.875

9.27.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool and Hydrocarbon Block Method with the Petrorisk model respectively.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

9.27.5. Additional good practice advice beyond the REACH CSA

Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.