

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

1.1. Product identifier

Chemical type	: Substance
Substance name	: Residues (petroleum), atmospheric
Trade name	: Straight Run
EC index no	: 649-019-00-1
EC no	: 269-777-3
CAS No.	: 68333-22-2
REACH registration No.	: 01-2119485969-10- 0043
Product code	: 281 SDS#PbR00281
Synonyms	: Straight Run Fuel Oil

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	:
Use of the substance/preparation	: Manufacture of substances Intermediate Formulation [mixing] of preparations and/or re-packaging Coatings Building and construction work. Road work Fuels

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:

Petrobras Europe Ltd
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]

Carc. 1B	H350
Acute Tox. 4 (Inhalation)	H332
Repr. 2	H361
STOT RE 2	H373
Aquatic Chronic 1	H410
Aquatic Acute 1	H400
	EUH066

Full text of H-phrases: see section 16.

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

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

Full text of R-phrases: see section 16.

Adverse physicochemical, human health and environmental effects

May cause cancer. Repeated exposure may cause skin dryness or cracking. In case of large spills the product may be hazardous to aquatic organisms due to possible formation of a film on the surface water which can diminish dissolved oxygen levels.

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2.2. Label elements

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

Hazard pictograms (CLP) :



Signal word (CLP) :
Hazard statements (CLP) :

- Danger
- H332 - Harmful if inhaled
H350 - May cause cancer
H361 - Suspected of damaging fertility or the unborn child
H373 - May cause damage to organs through prolonged or repeated exposure
H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects
- P201 - Obtain special instructions before use
P260 - Do not breathe mist, spray, vapours.
P273 - Avoid release to the environment
P281 - Use personal protective equipment as required
P308+P313 - IF exposed or concerned: Get medical advice/attention
P501 - Dispose of contents/container to Comply with applicable local, national and international regulation..
- EUH phrases : EUH066 - Repeated exposure may cause skin dryness or cracking

2.3. Other hazards

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

other hazards which do not result in classification : Combustible liquid. Spills of this product present a serious slipping hazard.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Directive 67/548/EEC
Residues (petroleum), atmospheric (Main constituent)	(CAS No.) 68333-22-2 (EC no) 269-777-3 (EC index no) 649-019-00-1 (REACH-no) 01-2119485969-10	100	Carc.Cat.2; R45 Xn; R20 Xn; R48/21 R66 Repr.Cat.3; R63 N; R50/53
Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Residues (petroleum), atmospheric (Main constituent)	(CAS No.) 68333-22-2 (EC no) 269-777-3 (EC index no) 649-019-00-1 (REACH-no) 01-2119485969-10	100	Carc. 1B, H350 Acute Tox. 4 (Inhalation), H332 Repr. 2, H361 STOT RE 2, H373 Aquatic Chronic 1, H410 Aquatic Acute 1, H400 EUH066

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 general : Consult a doctor/medical service if you feel unwell.
- First-aid measures after inhalation : Remove victim to fresh air. In case of breathing difficulties administer oxygen. If symptoms persist call a doctor.
- First-aid measures after skin contact : Remove contaminated clothing and shoes. Rinse immediately with plenty of water for 15 minutes. If skin irritation occurs: Get medical advice/attention. Seek medical advice (show the label where possible).
- First-aid measures after eye contact : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, take medical advice.
- First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Do not induce vomiting. Seek medical advice (show the label where possible).

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

Symptoms/injuries : Repeated exposure may cause liver damage or failure. May cause photosensitization.

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Symptoms/injuries after inhalation	: sensation of dryness and pain in the nose. Irritation of mucous membranes. High concentration of vapours may induce: headache, dizziness, drowsiness, nausea and vomiting. Excessive concentrations may lead to unconsciousness.
Symptoms/injuries after skin contact	: Repeated exposure may cause skin dryness or cracking. Skin irritation. Redness.
Symptoms/injuries after eye contact	: Irritating to eyes.
Symptoms/injuries after ingestion	: Ingestion may cause nausea, vomiting and diarrhea. stomach pain.

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

Avoid any direct contact with the product. Keep victim warm and rested. Never give anything by mouth to an unconscious person. Symptomatic treatment should include: measured support as correction of hydroelectrolytic and metabolic disturbances.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:	: Carbon dioxide (CO ₂). dry chemical powder. Foam. Water spray.
Unsuitable extinguishing media	: Do not use a water jet since it may cause the fire to spread.

5.2. Special hazards arising from the substance or mixture

Fire hazard	: Combustible liquid. Will float and can be reignited on water surface.
Explosion hazard	: In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container. May form flammable/explosive vapour-air mixture.

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.
Other information	: A layer of floating combustible liquid may be present.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment	: Wear suitable protective clothing, gloves and eye/face protection. Refer to section 8.
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6.1.2. For emergency responders

Protective equipment	: In case of fire: Wear self-contained breathing apparatus. Refer to section 8.
Emergency procedures	: Contact with walking surface may result in formation of slippery film/falling hazard. Keep upwind. Eliminate all sources of ignition, avoid sparks, flames and do not smoke in risk area. Avoid contact with skin and eyes.

6.2. Environmental precautions

Do not discharge into drains or the environment. Prevent spreading over great surfaces (e.g. by damming or installing oil booms). Relevant water authorities should be notified of any large spillage to water course or drain.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up	: Prevent spreading over great surfaces (e.g. by damming or installing oil booms). Sweep up or vacuum up the product. Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents). Place spent adsorbent in sealed packages and contact specialist waste disposal contractor. Collect up the product and place it in a spare container: - suitably labelled.
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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	: Provide local exhaust or general room ventilation to minimize vapour concentrations. Avoid contact with skin, eye and clothing. Do not breathe gas, fumes, vapour or spray. Keep container closed when not in use. Avoid all unnecessary exposure. Do not eat, drink and do not smoke in areas where product is used. Handle in accordance with good industrial hygiene and safety procedures.
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7.2. Conditions for safe storage, including any incompatibilities

Technical measures:	: Use only in well-ventilated areas. Keep away from food, drink and animal feedingstuffs. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Storage condition(s)	: Keep container tightly closed in a cool, well-ventilated place. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Incompatible materials	: Strong oxidizing agents. Strong acid.

7.3. Specific end use(s)

No additional information available

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Straight Run (68333-22-2)	
DNEL/DMEL (Workers)	
Acute - systemic effects, inhalation	4700 mg/m ³
Long-term - systemic effects, dermal	0.06 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	0.12 mg/m ³ /day
DNEL/DMEL (General population)	
Long-term - systemic effects, oral	0.02 mg/kg bodyweight/day

8.2. Exposure controls

Appropriate engineering controls : Exposures should be minimized in accordance with good industrial hygiene practices. Provide local exhaust or general room ventilation to minimize vapour concentrations. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment.

Personal protective equipment : Combined gas/dust mask with filter type A/P2. Protective goggles. Protective clothing.



Hand protection : Impermeable protective nitrile gloves.

Eye protection : Chemical goggles or face shield with safety glasses.

Skin and body protection : Wear suitable protective clothing. Wear fire/flame resistant/retardant clothing.

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment. Combined gas/dust mask with filter type A/P2. In confined space use self-contained breathing apparatus.

Environmental exposure controls : Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Relevant water authorities should be notified of any large spillage to water course or drain.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Oily, viscous.
Colour	: amber coloured.
Odour	: hydrocarbons.
Odour threshold	: No data available
pH	: Not applicable
Melting point	: < 30 °C
Solidification point	: No data available
Boiling point	: 269.8-720 °C ASTM D86
Flash point	: 274 °C ASTM D 92
Relat. evapor. rate comp. to butylacetate	: No data available
Flammability (solid, gas)	: Non flammable.
Explosive limits	: No data available
Vapour pressure	: No data available
Relative vapour density at 20 °C	: No data available
Relative density	: 0.975 g/cm ³
Solubility	: insoluble in water.
Log Pow	: > 3
Self ignition temperature	: 220-550 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: 6556 cSt (at 60 °C) (ASTM D445)
Explosive properties	: not explosive.
Oxidising properties	: Non oxidizing.

9.2. Other information

No additional information available

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SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Avoid ignition sources. heat sources. High temperature. Incompatible materials.

10.5. Incompatible materials

Strong oxidizing agents. strong acids.

10.6. Hazardous decomposition products

low molecular weight hydrocarbons. Carbon oxides (CO, CO₂). Nitrogen oxides (NO_x). Sulfur oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Harmful if inhaled.

Straight Run (68333-22-2)	
LD50 oral rat	> 5000 mg/kg
LD50 dermal rat	> 2000 mg/kg
LC50 inhalation rat (mg/l)	> 3.5 mg/l/4h

Skin corrosion/irritation : Not classified
moderate skin irritation
pH: Not applicable

Serious eye damage/irritation : Not classified
Not irritating
pH: Not applicable

Respiratory or skin sensitisation : Not classified
Not sensitizing

Germ cell mutagenicity : Not classified
Negative

Carcinogenicity : May cause cancer.

Reproductive toxicity : Suspected of damaging fertility or the unborn child.

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : In case of large spills the product may be hazardous to aquatic organisms due to possible formation of a film on the surface water which can diminish dissolved oxygen levels.

Ecology - air : Photo-chemical ozone recombination potential:.

Straight Run (68333-22-2)	
LC50 fishes	> 79 mg/l 96 hours
LC50 other aquatic organisms	> 1000 mg/l 72 hours- microorganism
EC50 Daphnia	> 2 mg/l 48 hours
NOEC (acute)	14.91 mg/l 72 hours- microorganism
ErC50 (algae)	> 0.75 mg/l 72 hours

12.2. Persistence and degradability

Straight Run (68333-22-2)	
Persistence and degradability	Product is not easily biodegradable.

12.3. Bioaccumulative potential

Straight Run (68333-22-2)	
Log Pow	> 3

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12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

Straight Run (68333-22-2)

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

12.6. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Disposal must be done according to official regulations. Dispose of this material and its container to hazardous or special waste collection point.

SECTION 14: Transport information

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

14.1. UN number

UN-No. : 3082

14.2. UN proper shipping name

Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Transport document description : UN 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., 9, III, (E)

14.3. Transport hazard class(es)

Class (UN) : 9
Hazard labels (UN) : 9



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

14.6.1. Overland transport

Hazard identification number (Kemler No.) : 90
Classification code : M6
Orange plates :



Tunnel restriction code : E
Limited quantities (ADR) : LQ07
Excepted quantities (ADR) : E1
EAC code : +3Z

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

Not applicable

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SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

Other regulations, restrictions and prohibition regulations : Compliance with following regulations: Regulation (EC) 1907/2006 as amended. Regulation (EC) 1272/2008 as amended. Directive 67/548/EEC as amended. Directive 1999/45/EC as amended.

15.1.2. National regulations

No additional information available

15.2. Chemical safety assessment

CSA has been carried out.

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:

Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Aquatic Acute 1	Hazardous to the aquatic environment - acute hazard Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment - chronic hazard Category 1
Carc. 1B	Carcinogenicity Category 1B
Repr. 2	Reproductive toxicity Category 2
STOT RE 2	Specific target organ toxicity (repeated exposure) Category 2
H332	Harmful if inhaled
H350	May cause cancer
H361	Suspected of damaging fertility or the unborn child
H373	May cause damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects
R20	Harmful by inhalation.
R45	May cause cancer.
R48/21	Harmful: danger of serious damage to health by prolonged exposure in contact with skin.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R63	Possible risk of harm to the unborn child.
R66	Repeated exposure may cause skin dryness or cracking.

SDS PETROBRAS USES

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.



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according to Regulation (EC) No. 453/2010
Revision date: July 14, 2011

Supersedes:

Version: 1.0

Exposure Scenarios for: Straight Run

Trade Name : Straight Run
CAS Number : 68333-22-2
EC Number : 269-777-3
SDS Reference : PbR00281

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Summary of parameters used for assessing safe use:

DNEL: Worker - inhalation (acute): 4700 mg/m³/15 min
Worker - inhalation (long term): 0.12 mg/m³/8 h
Worker - dermal (long term): 0.065 mg/kg/8 h

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 Straight Run - Industrial

9.1.1. Exposure scenario addressing uses carried out by workers	
Manufacture of Straight Run - Industrial	
Use descriptors related to the life cycle stage	SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites SU8 : Manufacture of bulk, large scale chemicals (including petroleum products) SU9 : Manufacture of fine chemicals PROC1 : Use in closed process, no likelihood of exposure PROC2 : Use in closed, continuous process with occasional controlled exposure PROC3 : Use in closed batch process (synthesis or formulation) PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15 : Use as laboratory reagent ERC1 : Manufacture of substances ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles
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 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	11,000,000 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	0.0001

Release fraction to waste water from process before RMMs	0.000003
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 85.9%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	2,300,000
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 (PROC 1, 3, 8a & 15) <15 minutes/day (PROC 2) <4 hours/day (PROC 2 & 8b)
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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 2) Transfer via enclosed lines (PROC 8b) Clear transfer lines prior to de-coupling (PROC 8b) Ensure material transfers are under containment or extract ventilation (PROC 8b)	

Technical conditions and measures to control dispersion from source towards the worker						
<p>Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs)</p> <p>Avoid carrying activities involving exposure for more than 15 minutes (PROC 2)</p> <p>Avoid carrying activities involving exposure for more than 4 hours (PROC 2 & 8b)</p> <p>Handle substance within a closed system (PROC 1 & 3)</p> <p>Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)</p>						
Organisational measures to prevent /limit releases, dispersion and exposure						
<p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Sample via a closed loop or other system intended to avoid exposure (PROC 2)</p> <p>Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 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						
<p>Restrict access to authorized staff *</p> <p>Clean up spills immediately and dispose of wastes safely* (all PROCs)</p> <p>Consider the need for risk based health surveillance* (all PROCs)</p> <p>1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)</p> <p>2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)</p> <p>*mandatory RMM for R45 derived by qualitative risk assessment</p>						
9.1.3. Exposure information and reference to its source						
9.1.3.1. Prediction of environmental exposure resulting from the conditions described above						
<p>Substance is a complex hydrocarbon UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment. 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> <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>						
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	0.00023	0.00066	0.85	0.000066
9.1.3.2. 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 1.</p>						

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Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04 - 0.34	0.03
PROC 3	0.34	0.03
PROC 8a	0	0.05
PROC 8b	0.03 – 0.04	0.02 – 0.03
PROC 15	0.05	0.01

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	0.058	0.567	0.625
PROC 2	0.292 – 0.320	0.567	0.858 – 0.887
PROC 3	0.320	0.567	0.887
PROC 8a	0.020	0.833	0.853
PROC 8b	0.283 – 0.320	0.340 – 0.567	0.623 – 0.887
PROC 15	0.417	0.100	0.517

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 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.

9.1.5. 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 Straight Run as as an intermediate - Industrial

9.2.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run as as an intermediate - Industrial	
Use descriptors related to the life cycle stage	SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites SU8 : Manufacture of bulk, large scale chemicals (including petroleum products) SU9 : Manufacture of fine chemicals PROC1 : Use in closed process, no likelihood of exposure PROC2 : Use in closed, continuous process with occasional controlled exposure PROC3 : Use in closed batch process (synthesis or formulation) PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15 : Use as laboratory reagent ERC6a : Industrial use resulting in manufacture of another substance (use of intermediates)
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 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	130,000,000 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	0.00001

Release fraction to waste water from process before RMMs	0.00001
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 54%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	190,000
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to treatment of waste	
During manufacturing no waste of the substance is generated to treat or recover.	
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 (PROC 1, 3, 8a & 15) <15 minutes/day (PROC 2) <1 hour/day (PROC 8b) <4 hours/day (PROC 2)
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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 2) Transfer via enclosed lines (PROC 8b) Clear transfer lines prior to de-coupling (PROC 8b) Ensure material transfers are under containment or extract ventilation (PROC 8b)	

Technical conditions and measures to control dispersion from source towards the worker																				
<p>Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs)</p> <p>Avoid carrying activities involving exposure for more than 15 minutes (PROC 2)</p> <p>Avoid carrying activities involving exposure for more than 1 hour (PROC 8b)</p> <p>Avoid carrying activities involving exposure for more than 4 hours (PROC 2)</p> <p>Handle substance within a closed system (PROC 1, 2 & 3)</p> <p>Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)</p>																				
Organisational measures to prevent /limit releases, dispersion and exposure																				
<p>Avoid direct skin contact with product (all PROCs)</p> <p>Identify potential areas for indirect skin contact (all PROCs)</p> <p>Wash off skin contamination immediately (all PROCs)</p> <p>Sample via a closed loop or other system intended to avoid exposure (PROC 2)</p> <p>Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)</p> <p>Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 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																				
<p>Restrict access to authorized staff *</p> <p>Clean up spills immediately and dispose of wastes safely* (all PROCs)</p> <p>Consider the need for risk based health surveillance* (all PROCs)</p> <ol style="list-style-type: none"> 1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs) 2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs) <p>*mandatory RMM for R45 derived by qualitative risk assessment</p>																				
9.2.3. Exposure information and reference to its source																				
9.2.3.1. Prediction of environmental exposure resulting from the conditions described above																				
<p>Substance is a complex hydrocarbon UVCB. Predominantly hydrophobic.</p> <p>The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment. 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> <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>																				
<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>0.00023</td> <td>0.00066</td> <td>0.85</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	0.00023	0.00066	0.85	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	0.00023	0.00066	0.85	0.000066														
9.2.3.2. 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 1.</p>																				

Straight Run

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: July 14, 2011

Supersedes:

Version: 1.0

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04	0.03
PROC 3	0.04	0.03
PROC 8a	0	0.05
PROC 8b	0.03 – 0.04	0.02 – 0.03
PROC 15	0.05	0.01

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	0.058	0.567	0.625
PROC 2	0.292 – 0.320	0.567	0.858 – 0.887
PROC 3	0.320	0.567	0.887
PROC 8a	0.020	0.833	0.853
PROC 8b	0.283 – 0.320	0.340 – 0.567	0.623 – 0.887
PROC 15	0.417	0.100	0.517

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 Straight Run - Industrial

9.3.1. Exposure scenario addressing uses carried out by workers	
Distribution of Straight Run - 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>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>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 1.1bv1
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 kPa at STP

Amounts used	
Daily at point sources	77,000 kg/day
Annually at point sources	23,000 t/year (maximum in worst case)
Annually total	11,000,000 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	0.0001
Release fraction to waste water from process before RMMs	0.0000001
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%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M _{safe}) (kg/d)	380,000
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 of waste should comply with applicable 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 (PROC 8a & 15) <15 minutes/day (PROC 2) <4 hours/day (PROC 1, 2, 3 & 8b)
Human factors not influenced by risk management	
Not applicable.	

Other given operational conditions affecting workers exposure
Assumes use not >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
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 2) Transfer via enclosed lines (PROC 8b) Clear transfer lines prior to de-coupling (PROC 8b) Ensure material transfers are under containment or extract ventilation (PROC 8b)
Technical conditions and measures to control dispersion from source towards the worker
Minimise exposure using measures such as closed systems, dedicated facilities and suitable genera/ local exhaust ventilation* (all PROCs) Avoid carrying activities involving exposure for more than 15 minutes (PROC 2) Avoid carrying activities involving exposure for more than 4 hours (PROC 1, 2, 3 & 8b) Handle substance within a closed system (PROC 1 & 3) Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)
Organisational measures to prevent /limit releases, dispersion and exposure
Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Wash off skin contamination immediately (all PROCs) Sample via a closed loop or other system intended to avoid exposure (PROC 1, 2 & 3) Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs) Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 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
Restrict access to authorized staff * Clean up spills immediately and dispose of wastes safely* (all PROCs) Consider the need for risk based health surveillance* (all PROCs) 1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs) 2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs) *mandatory RMM for R45 derived by qualitative risk assessment
9.3.3. Exposure information and reference to its source
9.3.3.1. Prediction of environmental exposure resulting from the conditions described above
Substance is a complex hydrocarbon UVCB. Predominantly hydrophobic. The Hydrocarbon Block Method with the Petrorisk model is used for environmental risk assessment. 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.
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.

Environmental exposure	In STP/ untreated waste water (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	0.00023	0.00066	0.85	0.000066

9.3.3.2. 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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04	0.03
PROC 3	0.04	0.03
PROC 8a	0	0.05
PROC 8b	0.03 – 0.04	0.03
PROC 15	0.05	0.01

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	0.058	0.567	0.625
PROC 2	0.292 – 0.320	0.567	0.858 – 0.887
PROC 3	0.320	0.567	0.887
PROC 8a	0.020	0.833	0.853
PROC 8b	0.283 – 0.320	0.567	0.850 – 0.887
PROC 15	0.417	0.100	0.517

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 Straight Run - Industrial

9.4.1. Exposure scenario addressing uses carried out by workers	
Formulation & (Re)packing of Straight Run - Industrial	
Use descriptors related to the life cycle stage	SU3 : Industrial uses: Uses of substances as such or in preparations at industrial sites SU10 : Formulation [mixing] of preparations and/or re-packaging (excluding alloys) PROC1 : Use in closed process, no likelihood of exposure PROC2 : Use in closed, continuous process with occasional controlled exposure PROC3 : Use in closed batch process (synthesis or formulation) PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15 : Use as laboratory reagent ERC2 : Formulation of preparations
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 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	11,000,000 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	0.0022
Release fraction to waste water from process before RMMs	0.000005
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 54%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	110,000
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 of 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 (PROC 8a & 15) <15 minutes/day (PROC 2) <1 hour/day (PROC 8b) <4 hours/day (PROC 1, 2, 3 & 8b)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use not >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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 2) Transfer via enclosed lines (PROC 8b) Clear transfer lines prior to de-coupling (PROC 8b) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable genera/ local exhaust ventilation* (all PROCs)	

Avoid carrying activities involving exposure for more than 15 minutes (PROC 2)
 Avoid carrying activities involving exposure for more than 1 hour (PROC 8b)
 Avoid carrying activities involving exposure for more than 4 hours (PROC 1, 2, 3 & 8b)
 Provide a good standard of controlled ventilation (not less than 3 to 5 air changes per hour) (PROC 8b)
 Handle substance within a closed system (PROC 1, 2 & 3)
 Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid direct skin contact with product (all PROCs)
 Identify potential areas for indirect skin contact (all PROCs)
 Wash off skin contamination immediately (all PROCs)
 Sample via a closed loop or other system intended to avoid exposure (PROC 1, 2 & 3)
 Ensure operations is undertaken outdoors (PROC 8b)
 Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)
 Retain drain downs in sealed storage pending disposal or for subsequent recycle (PROC 8a & 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

Restrict access to authorized staff *
 Clean up spills immediately and dispose of wastes safely* (all PROCs)
 Consider the need for risk based health surveillance* (all PROCs)
 1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
 2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
 *mandatory RMM for R45 derived by qualitative risk assessment

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

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.

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	0.00023	0.00066	0.85	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 1.

Straight Run

Annex to the Safety Data Sheet

according to Regulation (EC) No. 453/2010
Revision date: July 14, 2011

Supersedes:

Version: 1.0

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04	0.03
PROC 3	0.04	0.03
PROC 8a	0	0.05
PROC 8b	0.02 – 0.03	0.03
PROC 15	0.05	0.01

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	0.058	0.567	0.625
PROC 2	0.292 – 0.320	0.567	0.858 – 0.887
PROC 3	0.320	0.567	0.887
PROC 8a	0.020	0.833	0.853
PROC 8b	0.175 – 0.320	0.567	0.742 – 0.887
PROC 15	0.417	0.100	0.517

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 Straight Run in coatings - Industrial

9.5.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run 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>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>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 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	1000 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	0.00002
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 0%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	110,000
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 of 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 (all PROCs)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use not >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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 1) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs) Provide a good standard of controlled ventilation (not less than 10 to 15 air changes per hour) (PROC 3 & 8b) Provide extract ventilation to points where emissions occur (PROC 2 & 3) Handle substance within a closed system (PROC 3) Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)	

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Wash off skin contamination immediately (all PROCs)
Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)
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

Restrict access to authorized staff *
Clean up spills immediately and dispose of wastes safely* (all PROCs)
Consider the need for risk based health surveillance* (all PROCs)
1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
*mandatory RMM for R45 derived by qualitative risk assessment

9.5.3. Exposure information and reference to its source

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

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

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.

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	0.00023	0.00066	0.85	0.000066

9.5.3.2. 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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.05	0.01
PROC 3	0.03	0.03
PROC 8a	0.01	0.05
PROC 8b	0.03	0.03
PROC 15	0.05	0.03

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	0.083	0.567	0.650
PROC 2	0.417	0.233	0.650
PROC 3	0.250	0.500	0.750
PROC 8a	0.073	0.833	0.907
PROC 8b	0.283	0.567	0.850
PROC 15	0.417	0.500	0.917

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 Straight Run in coatings – Professional

9.6.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run in coatings – Professional	
Use descriptors related to the life cycle stage	SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen) PROC1 : Use in closed process, no likelihood of exposure PROC2 : Use in closed, continuous process with occasional controlled exposure PROC3 : Use in closed batch process (synthesis or formulation) PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15 : Use as laboratory reagent ERC8a : Wide dispersive indoor use of processing aids in open systems ERC8b : Wide dispersive indoor use of reactive substances in open systems
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 kPa at STP
Amounts used	
Daily at point sources	0.14 kg/day
Annually at point sources	0.05 t/year (maximum in worst case)
Annually total	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	0.98
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%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	0.7
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 of waste should comply with applicable 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 (all PROCs) <15 minutes/day (PROC 8a & 8b)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use not >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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Store substance within a closed system (PROC 1) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable genera/ local exhaust ventilation* (all PROCs) Avoid carrying out activities involving exposure for more than 15 minutes (PROC 8a & 8b) Provide extract ventilation to points where emissions occur (PROC 2 & 3) Handle substance within a closed system (PROC 2 & 3) Limit the substance content in the products to 5% (PROC 2 & 3) Limit the substance content in the products to 1% (PROC 8a & 8b) Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure (PROC 15)	
Organisational measures to prevent /limit releases, dispersion and exposure	

Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Wash off skin contamination immediately (all PROCs)
Deal with spills immediately (PROC 8a)
Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)
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

Restrict access to authorized staff *
Clean up spills immediately and dispose of wastes safely* (all PROCs)
Consider the need for risk based health surveillance* (all PROCs)
1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
*mandatory RMM for R45 derived by qualitative risk assessment

9.6.3. Exposure information and reference to its source

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

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

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.

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	0.00023	0.00066	0.85	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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04	0.03
PROC 3	0.04	0.01
PROC 8a	0.05	0.01
PROC 8b	0.05	0.03
PROC 15	0.05	0.03

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	0.083	0.567	0.650
PROC 2	0.333	0.467	0.800
PROC 3	0.333	0.100	0.433
PROC 8a	0.417	0.229	0.645
PROC 8b	0.417	0.572	0.988
PROC 15	0.417	0.500	0.917

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 Straight Run as a fuel – Industrial

9.7.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run 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 batch process (synthesis or formulation)</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
9.7.2. 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 kPa at STP
Amounts used	
Daily at point sources	5,000,000 kg/day
Annually at point sources	1,500,000 t/year (maximum in worst case)
Annually total	11,000,000 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	0.0007
Release fraction to waste water from process before RMMs	0.00000044
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%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is required. Prevent discharge of undissolved substance to or recover from onsite wastewater.	
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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	0.7
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 of waste should comply with applicable regulations.	
9.7.2.2. 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 8a & 16) <1 hour/day (PROC 2 & 8b) <4 hours/day (PROC 1, 2, 3 & 8b)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use not >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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Transfer via enclosed lines (PROC 8b) Store substance within a closed system (PROC 2) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs) Avoid carrying out activities involving exposure for more than 1 hour (PROC 2 & 8b) Avoid carrying out activities involving exposure for more than 4 hours (PROC 1, 2, 3 & 8b) Provide a good standard of controlled ventilation (3 to 5 air changes per hour) (PROC 2 & 8b) Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 2) Handle substance within a closed system (PROC 1, 2 & 3)	

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Wash off skin contamination immediately (all PROCs)
Sample via a closed loop or other system intended to avoid exposure (PROC 1, 2 & 3)
Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)
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

Restrict access to authorized staff *
Clean up spills immediately and dispose of wastes safely* (all PROCs)
Consider the need for risk based health surveillance* (all PROCs)
1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
*mandatory RMM for R45 derived by qualitative risk assessment

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

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.

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	0.00023	0.00066	0.85	0.000066

9.7.3.2. 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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.03	0.03
PROC 3	0.04	0.03
PROC 8a	0	0.05
PROC 8b	0.03 – 0.04	0.03
PROC 16	0.01	0.03

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	0.058	0.567	0.625
PROC 2	0.250 – 0.320	0.567	0.817 – 0.887
PROC 3	0.320	0.567	0.887
PROC 8a	0.020	0.833	0.853
PROC 8b	0.283 – 0.320	0.567	0.850 – 0.887
PROC 16	0.083	0.567	0.650

9.7.4. 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.

9.7.5. 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 Straight Run as a fuel – Professional

9.8.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run 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 batch process (synthesis or formulation)</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
9.8.2. 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 kPa at STP
Amounts used	
Daily at point sources	460 kg/day
Annually at point sources	170 t/year (maximum in worst case)
Annually total	330,000 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	0.0001
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 0%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is 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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	2,300
Assumed domestic sewage treatment plant flow (m^3/d)	2,000
Conditions and measures related to treatment of waste	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. This substance is consumed during use and no waste of the substance is generated to recover.	
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 8a & 16) <1 hour/day (PROC 2 & 8b) <4 hours/day (PROC 1, 2, 3 & 8b)
Human factors not influenced by risk management	
Not applicable.	
Other given operational conditions affecting workers exposure	
Assumes use not >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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs) Avoid carrying out activities involving exposure for more than 1 hour (PROC 1, 2, 3 & 8b) Provide a good standard of controlled ventilation (10 to 15 air changes per hour) (PROC 1, 2, 3 & 8b) Handle substance within a closed system (PROC 1, 2 & 3)	

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid direct skin contact with product (all PROCs)
Identify potential areas for indirect skin contact (all PROCs)
Wash off skin contamination immediately (all PROCs)
Clear spills immediately (PROC 8a)
Sample via a closed loop or other system intended to avoid exposure (PROC 1, 2 & 3)
Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs)
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

Restrict access to authorized staff *
Clean up spills immediately and dispose of wastes safely* (all PROCs)
Consider the need for risk based health surveillance* (all PROCs)
1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
*mandatory RMM for R45 derived by qualitative risk assessment

9.8.3. Exposure information and reference to its source

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

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

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.

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	0.00023	0.00066	0.85	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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 1	0.01	0.03
PROC 2	0.04 - 0.06	0.02 – 0.03
PROC 3	0.03	0.03
PROC 8a	0.01	0.05
PROC 8b	0.03	0.03
PROC 16	0.01	0.03

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	0.083	0.567	0.650
PROC 2	0.320 - 0.500	0.283 – 0.567	0.783 – 0.887
PROC 3	0.250	0.567	0.817
PROC 8a	0.073	0.833	0.907
PROC 8b	0.283	0.567	0.850
PROC 16	0.083	0.567	0.650

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):

Use of Straight Run in road and construction applications – Professional

9.9.1. Exposure scenario addressing uses carried out by workers	
Use of Straight Run in road and construction applications – Professional	
Use descriptors related to the life cycle stage	SU22 : Professional uses: Public domain (administration, education, entertainment, services, craftsmen) PROC8a : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b : Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities ERC8d : Wide dispersive outdoor use of processing aids in open systems ERC8f : Wide dispersive outdoor use resulting in inclusion into or onto a matrix
Specific environmental release category	ESVOC SpERC 8.15.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 kPa at STP
Amounts used	
Daily at point sources	30 kg/day
Annually at point sources	11 t/year (maximum in worst case)
Annually total	22,000 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	0.95
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 30.2%.
Risk from environmental exposure is driven by humans via indirect exposure. No wastewater treatment is 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	88.8%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs	88.8%
Maximum allowable site tonnage (M_{safe}) (kg/d)	110
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 applicable 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	<15 minutes/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	
Consider technical advances and process upgrades (including automation) for the elimination of releases (all PROCs) Regularly inspect, test and maintain all control measures (all PROCs) Ensure material transfers are under containment or extract ventilation (PROC 8b)	
Technical conditions and measures to control dispersion from source towards the worker	
Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/ local exhaust ventilation* (all PROCs) Avoid carrying out activities involving exposure for more than 15 minutes (all PROCs) Limit the substance content in the product to 1% (all PROCs)	
Organisational measures to prevent /limit releases, dispersion and exposure	
Avoid direct skin contact with product (all PROCs) Identify potential areas for indirect skin contact (all PROCs) Wash off skin contamination immediately (all PROCs) Deal with spills immediately (PROC 8a) Drain down systems and clear transfer lines prior to breaking containment. Clean/ flush equipment, where possible, prior to maintenance* (all PROCs) 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	
Restrict access to authorized staff * Clean up spills immediately and dispose of wastes safely* (all PROCs) Consider the need for risk based health surveillance* (all PROCs)	

1. PPE: wear suitable gloves (tested to EN374) and coveralls to prevent skin contamination (all PROCs)
 2. PPE: wear respiratory protection when its use is identified for certain contributing scenarios* (all PROCs)
- *mandatory RMM for R45 derived by qualitative risk assessment

9.9.3. Exposure information and reference to its source

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

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

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.

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	0.00023	0.00066	0.85	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 1.

Process category	Inhalatory worker exposure (mg/m ³)	Dermal worker exposure (mg/kg/day)
PROC 8a	0.05	0.01
PROC 8b	0.05	0.03

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	0.417	0.229	0.645
PROC 8b	0.417	0.572	0.988

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.