

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY / UNDERTAKING****1.1 Product identifier**

Commercial Product Name: UPM BIOVERNO DIESEL
 Chemical name: Renewable hydrocarbons of wood origin (diesel type fraction)
 EC number: 700-916-7
 CAS number: not assigned
 REACH registration number: 01-2120052680-62-0000

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

Recommended use Distribution and formulation and use as intermediate
 Use as fuel or in coatings
 Uses Advised Against: Only the uses covered by the exposure scenarios are recommended (see annex)

1.3 Details of the supplier of the safety data sheet

Supplier: UPM-Kymmene Oyj
 Street address: Alvar Aallon katu 1
 Postcode and post office: PO Box 380, FI-00101 Helsinki
 Country: Finland
 Telephone: +358 204 15 111
 Email: msds@upm.com

1.4 Emergency telephone number

Telephone number, name and address: See section 16.6 for the list of telephone numbers of poison centres in the European Economic Area.
 Poison Centre, Tukholmankatu 17, PL 790, 00029 HUS (Helsinki), (24h) +358 (0)9 4711, direct number +358 (0)9 471977.

SECTION 2. HAZARDS IDENTIFICATION

This substance is classified as hazardous in accordance with the CLP regulation 1272/2008 and the Directive 67/548/EEC. This substance causes skin irritation. It may be fatal if swallowed and enters airways. It may cause damage to organs through prolonged or repeated exposure. This substance is harmful to aquatic life with long lasting effects

2.1 Classification of the substance or mixture

1272/2008 (CLP):

Flam. Liquid 3	H226
Asp. Tox. 1	H304
Skin Irrit. 2	H315
Aquatic Chronic Cat 3	H412

67/548/EEC (DSD):

Xn; R65
 Xi; R38
 R52-53

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



2.2 Label elements
1272/2008 (CLP)



Signal word:

Danger

Hazard Statements:

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H412	Harmful to aquatic life with long lasting effects

Precautionary Statements:

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P331	Do NOT induce vomiting.
P501	Dispose of contents/container to... (according to local waste management regulations)

2.3 Other hazards

The criteria for PBT and vPvB are not met and this substance is not hazardous to ozone layer.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 This substance is an UVCB substance and predominantly rich in saturated hydrocarbons with a carbon number range from C9 to C20.

EC number:	Chemical name of the substance:	Concentration:	Classification: EC 1272/2008 (CLP):
700-916-7	Renewable hydrocarbons of wood origin (diesel type fraction)	100 % w/w	Flamm. liquid Cat.3; H226 Asp. Tox. 1; H304 Skin Irrit. 2; H315 Aquatic Chronic Cat 3; H412
			Classification: 67/548/EEC (DSD):
			Xn; R65
			Xi; R38
			R52-53

3.3 Other information

Predominantly rich in saturated hydrocarbons with a carbon number range from C9 to C20. The substance contains benzene ≥ 0 to < 0.1 % (w/w), naphthalene ≥ 0.001 — ≤ 0.5 % (w/w) and n-hexane ≥ 0 to < 2.0 % (w/w).

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**SECTION 4. FIRST AID MEASURES****4.1 Description of first aid measures**

Inhalation:	If oil mist has been inhaled, obtain medical attention (risk of chemical pneumonitis).
Skin contact:	Wash the skin with plenty of water and soap. Remove contaminated clothing and shoes and wash/clean before reuse. If skin irritation persists, consult a physician.
Eye contact:	Rinse immediately with plenty of water, also under the eyelids. Continue irrigation for several minutes while moving eyes to extreme positions. Consult a physician.
Ingestion:	DO NOT INDUCE VOMITING. Obtain medical assistance immediately (risk of aspiration into the lungs especially if nausea or irritation occurs). If vomiting occurs, help to keep the victim's head down so that aspiration to the lungs will not occur.

4.2 Most important symptoms and effects, both acute and delayed

Causes skin irritation. May be fatal if swallowed and enters airways. It may cause damage to organs through prolonged or repeated exposure.

4.3 Indication of immediate medical attention and special treatment needed

Show this safety data sheet to the doctor in attendance. Treat symptomatically.

SECTION 5. FIRE FIGHTING MEASURES**5.1 Extinguishing media**

Suitable extinguishing media:	Carbon dioxide, dry chemical or foam. Do not use water for fire extinction.
Extinguishing media which must not be used for safety reasons:	Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products:	None known. Thermal decomposition and burning may produce irritating or toxic fumes.
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5.3 Advice for fire-fighters

Special precautions for fire-fighters:	Cool product containers and tanks near the fire with water spray from a sufficiently safe distance. Use full protective clothing and a self-contained breathing apparatus.
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SECTION 6. ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures**

Evacuate people upwind from the spill area. Remove all ignition sources. Stop the leak if it can be done safely. Use appropriate personal protection equipment.

6.2 Environmental precautions

Prevent entry into municipal sewers, soil and waterways. If the product contaminates soil, watercourses or drainage systems, inform the local authorities.

6.3 Methods and materials for containment and cleaning up

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

Immediately start clean-up of the liquid and contaminated soil. Pay attention to the fire and health hazards caused by the product. Small volumes can be absorbed with inert materials (e.g. sand, diatomaceous earth, commercial absorbent) and collect in suitable labelled containers to be disposed of in accordance with local regulations. Large volumes should be pumped into containers. Ensure adequate ventilation.

6.4 Reference to other sections

See also section 8 and exposure scenarios in Annexes.

SECTION 7. HANDLING AND STORAGE**7.1 Precautions for safe handling**

Keep away from sources of ignition. Take precautionary measures (e.g. earthing) against static discharges. Avoid skin contact and inhalation of oil mist. Wear protective equipment when needed. Thoroughly clean contaminated skin and change dirty clothing and equipment. During tank operations follow special instructions (risk of oxygen displacement and hydrocarbons).

7.2 Conditions for safe storage, including any incompatibilities

Store in tightly sealed, appropriately labelled containers which are impermeable to the product. Store in containers and areas suitable for the storage of combustible liquids. Take precautionary measures to prevent product spills into municipal sewers, soil or water courses.

7.3 Specific end use(s)

The exposure scenarios for identified uses are presented in the Annexes of this SDS.

List of Exposure Scenarios:

ES 1	Distribution, use as an intermediate, and/or formulation & (re)packing of renewable diesel
ES 2	Industrial uses of renewable diesel in coatings
ES 3	Professional uses of renewable diesel in coatings
ES 4	Industrial use of renewable diesel as a fuel
ES 5	Professional use of renewable diesel as a fuel

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION**8.1 Control parameters**

Occupational exposure limits for the critical constituents of the substance:

Oil mist: 5 mg/m³ (8 h)

Naphthalene: 5 mg/m³ / 10 ppm (8 h), 10 mg/m³ / 2 ppm (15 min)

n-Hexane: 72 mg/m³ / 20 ppm (8 h) (skin)

The critical DNELs for workers:

DNEL (inhalation–systemic-long-term effects): 9.4 mg/m³ (NOAEC: 705.26 mg/m³ based on AF of 75). The DNEL is derived from the subacute dermal animal study conducted for the similar fossil fuels.

DNEL (dermal-systemic-long-term effects): 1.3 mg/kg bw/day (NOAEL: 400 mg/kg bw/day based on AF of 300). The DNEL is derived from the subacute dermal animal study conducted for the similar fossil fuels.

DNEL (dermal-local-long-term effects): Low hazard is assigned since the substance is a skin irritant. The appropriate RMMs to protect skin contact need to be worn (See section 8.2 and Annex)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



The critical DNELs for consumers:

DNEL (inhalation-systemic long-term effects):	7.02 mg/m ³ (NOAEC: 1052.63 mg/m ³ , based on AF of 150). The DNEL is derived from the subacute dermal animal study conducted for the similar fossil fuels.
DNEL (dermal-systemic-long-term-effects):	0.67 mg/kg bw/day (NOAEL: 400 mg/kg bw/day, based on AF of 600). The DNEL is derived from the subacute dermal animal study conducted for the similar fossil fuels.
DNEL (oral-systemic-long-term effects):	0.67 mg/kg bw/day (NOAEL: 400 mg/kg/day, based on AF of 600). The DNEL is derived from the chronic dermal animal study conducted for the similar fossil fuels.

PNECs:

PNEC aqua (freshwater and marine water):	0.56 µg/L to 770 µg/L. The overall range (all representative components of the substance) estimated with the PETRORISK tool.
PNEC sediment (freshwater and marine water)	0.29 mg/kg ww to 73000 mg/kg ww. The overall range (all representative components of the substance) estimated with the PETRORISK tool.
PNEC STP	8.4 µg/L to 12 000 µg/L. The overall range (all representative components of the substance) estimated with the PETRORISK tool.
PNEC soil	0.12 mg/kg ww to 29000 mg/kg ww. The overall range (all representative components of the substance) estimated with the PETRORISK tool.

8.2 Exposure controls

Appropriate engineering controls:	<p><u>Containment:</u> In case of enclosure and automatic processes no other containment required. Handle the product in closed systems or provide sufficient ventilation. During tank operations follow special instructions (see annexes).</p> <p><u>Local exhaust ventilation:</u> Provide local exhaust ventilation for points of potential exposure</p> <p><u>General ventilation:</u> Provide good general ventilation (3 – 5 air changes per hour).</p>
Individual protection measures:	<p><u>Respiratory protection</u> Substance/task appropriate respirator for points of potential exposure.</p> <p>Wear a respirator or half face mask. Select combined filter suitable for organic gases and vapours, solid and liquid particles, filter type A2-P3. If filter respirators are unsuitable for the conditions (e.g. high concentration levels, low oxygen level or confined space), use compressed-air or fresh-air breathing apparatus. Filter must be replaced frequently enough.</p> <p><u>Hand protection</u> Use chemically resistant gloves (EN374).</p> <p><u>Eye/face protection</u> Wear suitable eye protection (goggles or safety glasses with side shields conforming to EN166).</p> <p><u>Skin protection</u> Use additional protection (face shield, full skin coverage) for activities with significant potential of exposure (see annexes).</p>
Environmental exposure controls:	<p>Good hygiene and housekeeping. Avoid release to the environment. Treat waste water and air emissions in a proper way. All residues of the substance should be treated as hazardous waste (see annexes).</p>

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Important Health Safety and Environmental Information**

Appearance:	Organic colourless, bright and clear liquid.
Odour:	No data available
Odour threshold:	No data available
pH:	No data available
Melting point/freezing point:	<0 °C (can be adjusted)
Initial boiling point and boiling range:	150-370 °C at 101.3 kPa (EN ISO 3405)
Flash point:	>55 °C at 101.3 kPa (EN ISO 2719)
Evaporation rate:	No data available
Flammability (solid, gas):	Non-flammable liquid.
Explosive properties:	Lower explosion limit: Not known. Upper explosion limit: Not known.
Vapour pressure:	<0.1 kPa at 37.8 °C (DIN EN 13016 -1)
Vapour density:	No data available
Density:	800-830 kg/m ³ at 15 °C
Solubility(ies):	Water solubility: 1 mg/l at 25°C (EU A.8) Fat solubility: No data available
Partition coefficient: n-octanol/water:	Log Kow: 6 at 22 °C (EU A.8)
Auto-ignition temperature:	ca. 220 °C at 101.3 kPa (EU A.15)
Decomposition temperature:	No data available
Viscosity:	≤ 4.5 mm ² /s at (40 °C) (DIN EN ISO 3104)
Explosive properties:	Not explosive (EU A.14)
Oxidising properties:	Not oxidising

9.2 Other information:

Adsorption coefficient (log Koc)	The overall range (all components) for the estimated log Koc values is from 2.31 to 9.53 (PETRORISK modelling).
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SECTION 10. STABILITY AND REACTIVITY**10.1 Reactivity**

Not reactive under normal use and storage conditions.

10.2 Chemical stability

Chemically stable under normal storage conditions.

10.3 Possibility of hazardous reactions

No hazardous reactions under normal use and storage conditions.

10.4 Conditions to avoid

Keep away from sources of ignition.

10.5 Incompatible materials

None known.

10.6 Hazardous decomposition products

None known. Thermal decomposition and burning may produce irritating or toxic fumes.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**SECTION 11. TOXICOLOGICAL INFORMATION****11.1 Information on toxicological effects**

Basic toxicokinetics:	There are no experimental studies available and the assessment has been conducted qualitatively on the basis of the physical and chemical properties and the toxicokinetic information from the constituents of the substance						
Absorption:	Uptake of this substance may occur from the gastrointestinal tract and by lung. Dermal absorption is expected to be low.						
Distribution:	The substance is likely to distribute mainly in adipose tissue.						
Metabolism:	There is no experimental data available on the fuel oils to estimate the route of metabolism and possible metabolites. The aliphatic and aromatic hydrocarbons are oxidised to various alcohols and carboxylic acid derivatives.						
Excretion:	The aliphatic and aromatic hydrocarbons are rapidly excreted, either exhaled from the lungs or excreted in the urine.						
Acute toxicity:	<table border="0"> <tr> <td style="padding-right: 20px;">Oral:</td> <td>LD50 (rat): >2000 mg/kg bw (OECD 420)</td> </tr> <tr> <td>Inhalation:</td> <td>LC50 (rat): 23400 mg/m³ (8-hour exposure; volatile constituent in the substance; nonane)</td> </tr> <tr> <td>Dermal:</td> <td>LD50 (mouse): 40000 mg/kg bw (animals were exposed to similar fossil fuels, equivalent or similar to OECD 402)</td> </tr> </table>	Oral:	LD50 (rat): >2000 mg/kg bw (OECD 420)	Inhalation:	LC50 (rat): 23400 mg/m ³ (8-hour exposure; volatile constituent in the substance; nonane)	Dermal:	LD50 (mouse): 40000 mg/kg bw (animals were exposed to similar fossil fuels, equivalent or similar to OECD 402)
Oral:	LD50 (rat): >2000 mg/kg bw (OECD 420)						
Inhalation:	LC50 (rat): 23400 mg/m ³ (8-hour exposure; volatile constituent in the substance; nonane)						
Dermal:	LD50 (mouse): 40000 mg/kg bw (animals were exposed to similar fossil fuels, equivalent or similar to OECD 402)						
Skin irritation and corrosion:	The substance is irritating to skin based on the <i>in vivo</i> study (rabbits were exposed to similar fossil fuels, equivalent or similar to OECD 405).						
Serious eye damage/irritation:	The substance is not irritating to eyes based on the <i>in vitro</i> data (SkinEthic HCE model, corneal epithelium, GLP) and <i>in vivo</i> data (rabbits were exposed to similar fossil fuels, equivalent or similar to OECD 405).						
Sensitisation:	Not sensitising based on the Guinea Pig Maximisation Test (GPMT) (OECD 406).						
Germ cell mutagenicity:	<p>This substance is not considered germ cell mutagen.</p> <p>Negative with or without metabolic activation (OECD 471)</p> <p>Weakly mutagenic with or without metabolic activation (the test was conducted using similar fossil fuels, OECD 476).</p> <p>Negative with or without metabolic activation (the test was conducted using similar fossil fuel, OECD 475)</p>						
Reproductive toxicity:	No sufficient data available.						
STOT-single exposure:	This substance has not been classified for STOT SE.						
STOT-repeated exposure:	No systemic effects after repeated exposure were observed based on the data from similar fossil fuel						
Aspiration hazard:	Aspiration of this substance may be fatal.						
11.2 Other information:	No other adverse effects known.						

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**SECTION 12. ECOLOGICAL INFORMATION**

- 12.1 Toxicity**
- Aquatic toxicity: This substance is classified for aquatic chronic category 3.
- Short-term toxicity:
- Invertebrate: 48-h EL50 (immobilization, *Daphnia magna*) 68 mg/l; OECD 202; GLP; analogue substance fossil diesel fuel
- Algae: 72-h EL50 (growth rate, *Desmodesmus subspicatus*) > 100 mg/l; OECD 201; GLP
- Fish: 96-h LL50 (mortality, *Oncorhynchus mykiss*) 21 mg/l; OECD 203; GLP; analogue substance fossil diesel fuel
- Long-term Toxicity: No data
- Toxicity to other organisms:
- Toxicity to activated sludge respiration: EL10 (3h): 39.25 mg/l (OECD 209; GLP)
- 12.2 Persistence and degradability**
- Biodegradation: Not biodegradable (28-d biodeg-% 33; OECD 301B; GLP).
- 12.3 Bioaccumulative potential**
- This is a general term describing a process by which chemicals are taken up by aquatic organisms directly from water as well as from exposure through other routes, such as consumption of food and sediment containing the chemicals. The range of log Kow values and BCF-factors indicate that there might be constituents present in the substance having potential for bioaccumulation. However, there is evidence that the majority of organic chemicals with log Pow values of > ca. 7 would show low tendency to bioaccumulate.
- 12.4 Mobility in soil**
- Based on low water solubility and high absorption potential to organic matter the migration to groundwater is expected to be low. According to the PETRORISK modelling results, major part of the emissions of the substance are distributed to air (ca. 88.7 %). Fractions distributed to other environmental compartments is expected to be low; sediment (6.2 %), soil (3.2 %), water (1.9 %).
- 12.5 Results of PBT and vPvB assessment**
- Persistent Based on the biodegradation potential estimated with BIOWIN model, the substance is classified as persistent (P).
- Bioaccumulation Based on test results from the octanol-water partitioning coefficient study (log Kow of 6) the substance might contain substances having potential for bioaccumulation. However, the estimated log BCF value for the ten most abundant individual structures of the substance ranged from 1.98 to 3.18 (BCF 95 to 1514 L/kg). Because the estimated BCF values are less than B or vB criteria (2000 and 5000 L/kg), this substance is concluded as not B or vB.
- Toxic Based on the aquatic toxicity test results of the substance and the results of long-term toxicological studies with surrogate material, this substance is not fulfilling the criteria as toxic (T).
- Overall conclusion: The criteria for PBT or vPvB are not met.
- 12.6 Other adverse effects**
- The substance has no potential for stratospheric ozone depletion for structural reasons. No reason for any hazard classification under CLP or DSD for atmospheric environment (the ozone layer).

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste should only be disposed of via a licensed waste contractor. The European Waste Catalogue (EWC) and European Waste List (EWL) is a harmonized list of wastes. Waste materials should be classified prior to final disposal with EWC-codes. Wastes and empty containers should be treated based on their classification and properties referring to local and national waste management regulations.

Waste management options All waste containing residues of the substance should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006. Based on the waste type and the fulfilment of the acceptance criteria of the Council Directive 1999/31/EC additional waste management methods such as landfill disposal might be used.

Packaging: The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste legislation and any local waste management regulations.

Special precautions: Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC. Clean packaging material should be subjected to waste management schemes (recovery, recycling, re-use) according to local waste management regulations.

The substance and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and municipal sewers.

Waste from residues / unused products: Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities. All wastes containing residues of the substance or its hazardous degradation products shall be classified as hazardous waste.

Proposed suitable waste codes:

16 03 05* off-specification batches and unused products; organic wastes containing dangerous substances"

15 01 10* Packaging containing residues of or contaminated by dangerous substances

15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

SECTION 14. TRANSPORT INFORMATION

		<i>ADR/RID</i>
14.1	UN number	1202
14.2	UN proper shipping name	Diesel Fuel
14.3	Transport hazard class(es)	3
14.4	Packing group	III
14.5	Environmental hazards	-
14.6	Special precautions for users	None
	Additional information:	None

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

Alkanes (C9-C24) linear, branched and cyclic. Renewable hydrocarbons of wood origin (diesel type fraction) (Flashpoint $\leq 60^{\circ}\text{C}$): MARPOL Annex II, Category Y and ShipType 2. This means that cargo shall be carried on chemical tankers with prewash requirements (15.19.6).

Alkanes (C9-C24) linear, branched and cyclic. Renewable hydrocarbons of wood origin (diesel type fraction) (Flashpoint $>60^{\circ}\text{C}$): MARPOL Annex II, Category Y and ShipType 2. This means that cargo shall be carried on chemical tankers with prewash requirements (15.19.6).

SECTION 15. REGULATORY INFORMATION**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

EU Regulation (EC) No. 1907/2006 (REACH)	Annex XIV - List of substances subject to authorization substances of very high concern:	None of the components are listed.
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15.2 Chemical safety assessment

In accordance with Regulation (EC) No. 1907/2006 (REACH) Article 14, a Chemical Safety Assessment has been carried out for this substance.

SECTION 16. OTHER INFORMATION**16.1 Additions, Deletions, Revisions**

This safety data sheet is drawn up to comply with the requirements Annex II of Regulation (EC) No. 1907/2006 (REACH), as amended by Annex I to Commission Regulation (EU) No. 453/2010 of 20 May 2010.

Version 3.0

Section 2 and 3 Hazards: Flammable liquid category 3 updated.

Section 14 Bulk transport information updated.

16.2 Key or legend to abbreviations and acronyms

AF	Assessment factor
BCF	Bioconcentration factor
CLP	Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
DNEL	Derived no-effect level
DMEL	Derived minimum effect level
DSD	Council Directive 67/548/EEC (Dangerous Substances Directive)
EL50	Loading rate of the substance that causes 50 % reduction of a certain effect on test organisms
EWC	European Waste Catalogue
GLP	Good Laboratory Practice
Koc	Soil adsorption coefficient
Kow	Octanol-Water Partition Coefficient
LL50	Loading rate of the substance that causes 50 % mortality of the test population
NOAEC	No observed adverse effect concentration
NOAEL	No observed adverse effect level
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational exposure limit
PBT/vPvB	Persistent, bioaccumulative and toxic/ very persistent and very bioaccumulative
PNEC	Predicted no-effect concentration
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



STOT RE	Specific Target Organ Toxicity, Repeated Exposure
STOT SE	Specific Target Organ Toxicity, Single Exposure
UVCB	Substances of Unknown or Variable Composition

16.3 Key literature references and sources for data

REACH Chemical Safety Report: Renewable hydrocarbons of wood origin (diesel type fraction) dated 2014-03-04.
All referenced studies within this safety data sheet can be found from the original Chemical Safety Report.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**16.4 Classification procedure**

The self-classification is conducted based on the experimental data on the substance and the read-across data on similar fossil fuels taken into account also the harmonised classification entries of fossil fuels, and the critical components in the renewable fuels (polyaromatic hydrocarbons). For long-term health hazards, the CLP mixture rules were applied when there was no adequate experimental data on the substance available.

16.5 List of relevant R phrases, hazard statements, safety phrases and/or precautionary statements

R65 Harmful: may cause lung damage if swallowed.
 R38 Irritating to skin.
 R52-53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

16.6 Emergency telephone number

Europe-wide emergency number: 112
 Contact a poison control centre. List of Telephone Numbers: **AUSTRIA** (Vienna Wien) +43 1 406 43 43; **BELGIUM** (Brussels Bruxelles) +32 70 245 245; **BULGARIA** (Sofia) +359 2 9154 409; **CZECH REPUBLIC** (Prague Praha) +420 224 919 293; **DENMARK** (Copenhagen) 82 12 12 12; **ESTONIA** (Tallinn) 112; **FINLAND** (Helsinki) +358 9 471 977; **FRANCE** (Paris) +33 1 40 0548 48; **GERMANY** (Berlin) +49 30 19240; **GREECE** (Athens Athinai) +30 10 779 3777; **HUNGARY** (Budapest) 06 80 20 11 99; **ICELAND** (Reykjavik) +354 525 111, +354 543 2222; **IRELAND** (Dublin) +353 1 8379964; **ITALY** (Rome) +3906 305 4343; **LATVIA** (Riga) +371 704 2468; **LITHUANIA** (Vilnius) +370 5 236 20 52 or +370 687 53378; **MALTA** (Valletta) 2425 0000; **NETHERLANDS** (Bilthoven) +31 30 274 88 88; **NORWAY** (Oslo) 22 591300; **POLAND** (Gdansk) +48 58301 65 16 or +48 58 349 2831; **PORTUGAL** (Lisbon Lisboa) 808 250 143; **ROMANIA** (Bucharest) +40 21 3183606; **SLOVAKIA** (Bratislava) +421 2 54 77 4166; **SLOVENIA** (Ljubljana) +386 41 650500; **SPAIN** (Barcelona) +34 93 227 98 33 or +34 93 227 54 00 bleep 190; **SWEDEN** (Stockholm) 112 or +46 833 12 31 (mon-fri 9.00-17.00); **UNITED KINGDOM** (London) 112 or 0845 4647 (NHS Direct).

16.7 Recommended restrictions**DISCLAIMER OF LIABILITY:**

The information in this SDS was obtained from recent Chemical Safety Report of this substance from REACH registration. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This SDS was prepared and is to be used only for this product. If the product is used as a component in another product, this SDS information may not be applicable.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Annex to extended Safety Data Sheet

Table of Contents

SDS-ES Nro	CSR-ES Nro	Exposure scenario (ES) name	Page
1	ES2 ES3 ES4	Distribution, use as an intermediate, and/or formulation & (re)packing of renewable diesel	13
2	ES5	Industrial uses of renewable diesel in coatings	20
3	ES6	Professional uses of renewable diesel in coatings	27
4	ES7	Industrial use of renewable diesel as a fuel	34
5	ES8	Professional use of renewable diesel as a fuel	40

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

1: Distribution, use as an intermediate, and/or formulation & (re)packing of renewable diesel

1. Title of Exposure scenario	
Free text title:	
Distribution of renewable diesel (" Distribution ")	CSR-ES 2
Industrial use of renewable diesel as an intermediate (" Intermediate ")	CSR-ES 3
Formulation (&re-packaging) of renewable diesel (" Formulation ")	CSR-ES 4
Market sector: Distribution, use as an intermediate, formulation and (re)packing	PC: -
Description of process(es) covered in the Exposure Scenario:	
Environment:	
Distribution: ESVOC SPERC 1.1b.v1 Distribution of substance (industrial): solvent-borne	ESVOC SPERC 1.1b.v1
Intermediate: ESVOC SPERC 6.1a.v1 Use as an Intermediate (industrial): solvent-borne	ESVOC SPERC 6.1a.v1
Formulation: ESVOC SPERC 2.2.v1 Formulation and (re)packing of substances and mixtures (industrial): solvent-borne	ESVOC SPERC 2.2.v1
Worker contributing scenarios (Distribution, Intermediate, Formulation)	SU 3
Equipment cleaning and maintenance - indoor	PROC 8a
Equipment cleaning and maintenance - outdoor	PROC 8a
Bulk loading and unloading, bulk transfers	PROC 8b
General process exposures - closed process (no sampling)	PROC 1
General process exposures - closed continuous process (with sampling)	PROC 2
General process exposures - closed batch process (with sampling)	PROC 3
General process exposures - batch process with exposure	PROC 4
Mixing operations (open systems) (Formulation)	PROC 5
Drum and small package filling (Distribution, Formulation)	PROC 9
Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14
Laboratory activities	PROC 15
Description of activities covered in the Exposure Scenario:	
Distribution: Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities.	
Intermediate: Use of a substance as an intermediate (industrial use resulting in manufacture of another substance). Includes material transfers, general process exposures, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities. Covers use in standard operating conditions in refineries.	
Formulation: Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities.	
2. Conditions of use affecting exposure	
2.1 Control of environmental exposure	
Product characteristics	
<u>Properties of Renewable hydrocarbons (diesel type fraction):</u>	
As the substance is a UVCB substance, it was not possible to determine single definite values for the physico-chemical properties. Instead the assessment was based on the properties of representative individual structures as determined by the modelling tool (PETRORISK v6.02). Ranges for the representative structures are reported below.	
Water solubility	6.3E-10 - 510 mg/L (experimental test result for the substance: 1 mg/L)
Log Henry's Law Constants	-6.08 – 2.65 (atm·m ³ /mol)
Log Kow	2.55 – 13.23 (experimental test result for the substance: 6)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Log Koc	2.31 – 9.53		
Half-life – Air	0.64 – 40 h		
Half-life – Water	3.7 – 7300 d		
Half-life – Soil	3.7 – 7300 d		
Half-life – Sediment	15 – 29000 d		
Half-life – Wastewater	0.46 – 2300 h		
Amounts used			
Annual use at a site:	Distribution: ≤ 200 tonnes/year Intermediate: ≤ 100 000 tonnes/year Formulation: ≤ 10 000 tonnes/year		
Daily use at a site:	Distribution: ≤ 0.667 tonnes/day (SPERC default emission days 300 d/year) Intermediate: ≤ 333 tonnes/day (SPERC default emission days 300 d/year) Formulation: ≤ 33 tonnes/day (SPERC default emission days 300 d/year)		
Frequency and duration of use			
Continuous use/release (used > 12 times per year). Intermittent releases not evaluated.			
Environment factors not influenced by risk management			
Dilution factor - freshwater:	10		
Dilution factor – marine:	100		
Other given operational conditions affecting environmental exposure			
<p>The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.</p> <p>Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs. Substance losses to waste water are generally restricted to equipment cleaning as processes operate without contact with water. Such uses and substance properties result in limited to no discharge to wastewater or to soil from the industrial site.</p>			
Technical conditions and measures at process level (source) to prevent release			
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil			
Containment	Process optimized for efficient use of raw materials (minimal environmental release). Volatile compounds subject to air emission controls. Negligible wastewater emissions as process operates without water contact. Negligible air emissions as process operates in a contained system. Wastewater emission generated from equipment cleaning with water.		
	Emission factors to wastewater are based on water solubility. Assumes no free product in wastewater stream; oil-water separation (e.g. <i>via</i> oil water separators, oil skimmers, dissolved air floatation) may be required under some circumstances.		
	Emission factor	Distribution	Intermediate
	water	0.0001 %	0.003 %
	air (final)	0.001 %	0.002 %
soil	0.001 %	0.1 %	
soil	0.01 %	0.01 %	
Technical measures to reduce releases to air	Assumed air treatment efficiency: Distribution: 90 % Intermediate: 80 % Formulation: 0 % (incorporated in air emission factor)		
RMM that may be used to achieve required emission reduction:			

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

	Wet scrubber – gas removal (70 %), air filtration – particle removal (80-99 %), thermal oxidation (98 %), vapour recovery – adsorption (80-90 %)
Technical measures to reduce releases to water	Off-site / on-site technology (waste water treatment)
Technical measures to reduce releases to soil	-
Organizational measures to prevent/limit release from site	
Environmental, health and safety guidelines or written instructions on the standard operating procedure (SOP) are utilized. Environment, health and safety (EHS) responsibilities are defined and assigned in writing. Emergency action plans (Rescue training for accidental emissions) are created. Personnel are trained in environment, health and safety issues, i.e. in safe handling of chemicals and good housekeeping. General good hygiene and housekeeping.	
Conditions and measures related to municipal sewage treatment plant	
Municipal STP (off-site):	Yes (effectiveness 80 %). <i>(alternatively treatment at an on-site WWTP)</i>
Discharge rate of effluent	2000 m ³ /d
Application of sludge to soil	No
Conditions and measures related to external treatment of waste for disposal	
Suitable waste codes:	
05 01 09* Sludges from on-site effluent treatment containing dangerous substances	
05 01 03* Tank bottom sludges	
05 01 06* Oily sludges from maintenance operations of the plant or equipment	
15 01 10* Packaging containing residues of or contaminated by dangerous substances	
15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	
16 03 05 * Organic wastes containing dangerous substances	
16 08 02* Spent catalysts containing dangerous transition metals (3) or dangerous transition metal compounds	
Suitable disposal:	
All wastes containing residues of the substance or its hazardous degradation products should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006.	
Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC.	
Conditions and measures related to external recovery of waste	
Not relevant.	
2.2 Control of workers exposure	
Product characteristic	
Assessment approach:	
Quantitative exposure assessment and risk characterisation was conducted for long-term systemic effects via inhalation route and via dermal route. Qualitative exposure assessment and risk characterisation is conducted for skin irritation effects and aspiration toxicity effects.	
Physical form:	liquid
Molecular weight:	205 g/mol (average molecular weight based on analytical substance identification data)
Vapour pressure:	100 Pa at 37 °C (test result: Vp < 0.1 kPa) 10 001 Pa at > 40 °C (model default value for elevated temperature)
Concentration of substance in product:	As such (100 %)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

Frequency and duration of use/exposure and other operational conditions affecting workers exposure				
Contributing scenario	PROC	duration	place of use	temperature
Equipment cleaning and maintenance - indoor	PROC 8a	1. < 1 h 2. < 8 h	Indoor	≤ 40 °C
Equipment cleaning and maintenance - outdoor	PROC 8a	1. < 1 h 2. < 8 h	Outdoor	≤ 40 °C
Bulk loading and unloading, bulk transfers	PROC 8b	< 4 h	Outdoor	≤ 40 °C
General process exposures - closed process (no sampling)	PROC 1	< 8 h	Indoor	1. ≤ 40 °C 2. > 40 °C
General process exposures - closed continuous process (with sampling)	PROC 2	< 8 h	Indoor	1. ≤ 40 °C 2. > 40 °C
General process exposures - closed batch process (with sampling)	PROC 3	< 8 h	Indoor	≤ 40 °C
General process exposures - batch process with exposure	PROC 4	< 8 h	Indoor	≤ 40 °C
Mixing operations (open systems) (Formulation)	PROC 5	< 8 h	Indoor	≤ 40 °C
Drum and small package filling (Distribution, Formulation)	PROC 9	< 8 h	Indoor	≤ 40 °C
Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14	< 8 h	Indoor	≤ 40 °C
Laboratory activities	PROC 15	< 8 h	Indoor	≤ 40 °C
Technical conditions and measures at process level (source) to prevent release				
Organisational measures to prevent /limit releases, dispersion and exposure				
Occupational Health and Safety Management System: Advanced				
Contributing scenario	PROC	Level of containment		
Equipment cleaning and maintenance – indoor/outdoor	PROC 8a	No containment		
Bulk loading and unloading, bulk transfers	PROC 8b	Semi-closed process with occasional controlled exposure		
General process exposures - closed process (no sampling)	PROC 1	Closed system (minimal contact during routine operations)		
General process exposures - closed continuous process (with sampling)	PROC 2	Closed continuous process with occasional controlled exposure		
General process exposures - closed batch process (with sampling)	PROC 3	Closed batch process with occasional controlled exposure		
General process exposures - batch process with exposure	PROC 4	Semi-closed process with occasional controlled exposure		
Mixing operations (open systems) (Formulation)	PROC 5	No containment		
Drum and small package filling (Distribution, Formulation)	PROC 9	Semi-closed process with occasional controlled exposure		
Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14	No containment		
Laboratory activities	PROC 15	No containment		

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Technical conditions and measures to control dispersion from source towards the worker				
Contributing scenario	PROC	Local exhaust ventilation / other RMM (Eff. Inhal: %)	General ventilation <i>*or operation undertaken outdoors</i>	
Equipment cleaning and maintenance - indoor	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (90 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	Good (3-5 air changes per hour)	
Equipment cleaning and maintenance - outdoor	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (90 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	not applicable	
Bulk loading and unloading, bulk transfers	PROC 8b	No (0 %)	not applicable	
General process exposures - closed process (no sampling)	PROC 1	No (0 %)	Good (3-5 air changes per hour)*	
General process exposures - closed continuous process (with sampling)	PROC 2	1. No (0 %) <i>T ≤ 40 °C</i> 2. Yes (90 %) <i>T > 40 °C: LEV / closed or semi-closed sampling points</i>	Good (3-5 air changes per hour)*	
General process exposures - closed batch process (with sampling)	PROC 3	No (0 %)	Good (3-5 air changes per hour)*	
General process exposures - batch process with exposure	PROC 4	No (0 %)	Good (3-5 air changes per hour)*	
Mixing operations (open systems) (Formulation)	PROC 5	Yes (90 %): <i>LEV to points where emission occur</i>	Good (3-5 air changes per hour)	
Drum and small package filling (Distribution, Formulation)	PROC 9	No (0 %)	Good (3-5 air changes per hour)*	
Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14	No (0 %)	Good (3-5 air changes per hour)	
Laboratory activities	PROC 15	No (0 %)	Good (3-5 air changes per hour)	
Conditions and measures related to personal protection, hygiene and health evaluation				
Contributing scenario	PROC	Respiratory Protection (RPE) (Effectiveness Inhal: %)	Dermal protection	Eye/face protection:
Equipment cleaning and maintenance – indoor / outdoor	PROC 8a	Yes (90 %)	Yes (95 %)	Eye protection: Goggles or safety glasses with side shields (EN166)
Bulk loading and unloading, bulk transfers	PROC 8b	Yes (90 %)	Yes (95 %)	
General process exposures - closed process (no sampling)	PROC 1	No (0 %)	No (0 %)	<i>Eye protection where there is potential for exposure.</i> (PROC1: good practice advice, see below)
General process exposures - closed continuous process (with sampling)	PROC 2	No (0 %)	Yes (95 %)	
General process exposures - closed batch process (with sampling)	PROC 3	Yes (90 %) (Or provide LEV)	Yes (95 %)	
General process exposures - batch process with exposure	PROC 4	Yes (90 %) (Or provide LEV)	Yes (95 %)	
Mixing operations (open systems) (Formulation)	PROC 5	No (0 %)	Yes (95 %)	
Drum and small package filling (Distribution, Formulation)	PROC 9	Yes (90 %)	Yes (95 %)	

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14	Yes (90 %)	Yes (95 %)
Laboratory activities	PROC 15	No (0 %)	Yes (95 %)

Additional good practise advice beyond the REACH CSA

Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH, Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Housekeeping: General good hygiene and housekeeping

PROC1: Eye protection: Goggles or safety glasses with side shields (EN166) *Eye protection where there is potential for exposure.*

3. Exposure estimation and reference to its source

Environment: PETRORISK v6.02 risk assessment tool. The model calculations are based on physicochemical and ecotoxicological properties of individual hydrocarbon structures, so that PEC and PNEC and the risk characterisation by RCR are derived for representative structures that are used to simulate the UVCB substance. The sum of all individual RCR values indicates the overall risk for the substance as the environmental effects of the individual components are considered additive. RCR = PEC/PNEC, RCR value below 1 indicates safe use. PNEC determined by the PETRORISK tool for each representative constituent, range of PNEC values: PNECwastewater= 8.4 µg/L to 12 000 µg/L, PNECaquatic= 0.56 µg/L to 770 µg/L, PNECsoil= 0.12 mg/kg ww to 29 000 mg/kg ww, PNECsediment= 0.29 mg/kg ww to 73 000 mg/kg ww. The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Worker: CHESAR v. 2.2 - ECETOC TRA v. 3. RCR = Exposure estimate/DMEL, RCR value below 1 indicates safe use. Quantitative assessment: long-term systemic effects (inhalation, dermal). Qualitative assessment: skin irritation and aspiration toxicity.

Environment

Local exposure estimation and risk characterisation

The predicted exposure concentrations (PEC) and risk characterisation ratios (RCR) are reported in the following table. Concentration range for Distribution scenario is given for different end use scenarios (fuels, intermediate, coatings)

Protection target	Distribution	Intermediate	Formulation
Environmental Exposure			
PEC effluent (mg/L)	1.5E-05	2.3E-01	5.3E-02
PEC freshwater (mg/L)	1.5E-06 - 5.8E-05	2.3E-02	5.3E-03
PEC marine (mg/L)	1.5E-07 - 3.6E-07	2.3E-03	5.3E-04
PEC freshwater sediment (mg/kg ww)	5.6E-05 - 8.3E-04	8.3E-01	1.9E-01
PEC marine sediment (mg/kg ww)	5.6E-06	8.3E-02	1.9E-02
PEC agricultural soil (mg/kg ww)	4.9E-07 - 1.5E-05	2.0E-05	3.9E-03
Environmental Risk			
RCR effluent	2.0E-05	3.0E-01	7.1E-02
RCR freshwater	3.0E-05 - 1.5E-03	4.5E-01	1.1E-01
RCR marine	3.0E-06 - 9.2E-06	4.5E-02	1.1E-02
RCR freshwater sediment	3.4E-05 - 6.0E-04	5.1E-01	1.2E-01
RCR marine sediment	3.4E-06	5.1E-02	1.2E-02
RCR agricultural soil	1.4E-07 - 3.8E-06	4.4E-05	1.2E-02

Risk characterisation for man via the environment

Exposure estimation and risk characterisation was conducted quantitatively with the PETRORISK tool for indirect human exposure (inhalation, oral). According to modelling results, the estimated exposure level is low (combined RCR ranging from < 0.0001 to 0.07).

Worker exposure

Quantitative assessment (long-term, systemic effects, inhalation and dermal route)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

Estimated exposure via inhalation and dermal route and the corresponding risk characterisation ratios (RCR) are reported in the below table. Combined RCR = inhalation + dermal. DNEL (inhalation) = 9.4 mg/m³, DNEL (dermal) = 1.3 mg/kg bw/day.

Contributing scenario	PROC	Inhalation		Dermal		Combined RCR
		Estimate (mg/m ³)	RCR	Estimate (mg/kg bw/day)	RCR	
Equipment cleaning and maintenance – indoor / outdoor	1. PROC 8a (duration < 1 h, no LEV)	1.19	0.127	0.685	0.527	0.654
	2. PROC 8a (duration < 8 h, LEV)	0.597	0.063	0.685	0.527	0.590
Bulk loading and unloading, bulk transfers	PROC 8b	1.79	0.179	0.685	0.527	0.718
General process exposures - closed process (no sampling)	1. PROC 1 (T ≤ 40 °C)	0.06	0.001	0.007	0.001	0.01
	2. PROC 1 (T > 40 °C)	0.06	0.001	0.007	0.001	0.01
General process exposures - closed continuous process (with sampling)	1. PROC 2 (T ≤ 40 °C, no LEV)	5.97	0.636	0.274	0.210	0.846
	2. PROC 2 (T > 40 °C, LEV)	1.49	0.159	0.274	0.210	0.369
General process exposures - closed batch process (with sampling)	PROC 3	1.79	0.190	0.138	0.106	0.297
General process exposures - batch process with exposure	PROC 4	2.99	0.318	0.343	0.263	0.581
Mixing operations (open systems) (Formulation)	PROC 5	2.99	0.318	0.685	0.527	0.845
Drum and small package filling (Distribution, Formulation)	PROC 9	2.99	0.318	0.343	0.263	0.263
Tabletting, compression, extrusion or pelletisation (Formulation)	PROC 14	2.99	0.318	0.686	0.527	0.845
Laboratory activities	PROC 15	2.99	0.318	0.068	0.052	0.370

Qualitative assessment

When implementing the presented conditions of use the risk level for systemic long term inhalation and dermal effects is low (RCR < 1), and contact with the substance is prevented/reduced so that adverse effects are avoided regarding skin irritancy. Aspiration toxicity: Oral exposure is not anticipated to be related to any of the supported uses. RMM to avoid contact or incidents by workers: do not ingest, implementation of basic standard of occupational hygiene, ensure adequate training and supervision, good standard of personal hygiene.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**Environment**

The exposure assessment and risk characterization for environment was conducted by using PETRORISK v6.02 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. See the relevant SPERC for additional information.

Human health exposure

The exposure assessment and risk characterization for inhalation exposure of workers was conducted by using Tier 1 ECETOC TRA v.3 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. Scaling of worker exposure can be done by using ECETOC TRA v.3 model by modifying the operational conditions.

This exposure scenario does not address consumers or professional workers.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

2: Industrial uses of renewable diesel in coatings

1. Title of Exposure scenario	
Free text title: Industrial uses of renewable diesel in coatings	CSR-ES 5
Market sector: Coatings (paints, inks, adhesives etc.)	PC: 9a
Description of process(es) covered in the Exposure Scenario:	
Environment: ESVOC SPERC 4.3a.v1 Uses in Coatings (industrial): solvent-borne	ESVOC SPERC 4.3a.v1
Worker contributing scenarios	SU 3
Transfer from/pouring from containers, manual (and cleaning and maintenance)	PROC 8a
Bulk transfers, material transfers	PROC 8b
Preparation of material for application. Mixing operations (open systems).	PROC 5
General process exposures - closed process	PROC 1
Film formation - force drying	PROC 2
Film formation - air drying	PROC 4
Spraying (manual / automatic)	PROC 7
Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9
Roller, spreader, flow application	PROC 10
Dipping, immersion and pouring	PROC 13
Production of preparations or articles by tableting, compression, extrusion, pelletisation.	PROC 14
Laboratory activities	PROC 15
Description of activities covered in the Exposure Scenario:	
Covers the use in coatings (paints, inks, adhesives, etc.) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.	
2. Conditions of use affecting exposure	
2.1 Control of environmental exposure	
Product characteristics	
Properties of Renewable hydrocarbons (diesel type fraction): As the substance is a UVCB substance, it was not possible to determine single definite values for the physico-chemical properties. Instead the assessment was based on the properties of representative individual structures as determined by the modelling tool (PETRORISK v6.02). Ranges for the representative structures are reported below.	
Water solubility	6.3E-10 - 510 mg/L (experimental test result for the substance: 1 mg/L)
Log Henry's Law Constants	-6.08 – 2.65 (atm·m ³ /mol)
Log Kow	2.55 – 13.23 (experimental test result for the substance: 6)
Log Koc	2.31 – 9.53
Half-life - Air	0.64 – 40 h
Half-life – Water	3.7 – 7300 d
Half-life – Soil	3.7 – 7300 d
Half-life – Sediment	15 – 29000 d
Half-life - Wastewater	0.46 – 2300 h
Amounts used	
Annual use at a site:	≤ 10 000 tonnes/year

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Daily use at a site:	≤ 33 tonnes/day (SPERC default emission days 300 d/year)	
Frequency and duration of use		
Continuous use/release (used > 12 times per year). Intermittent releases not evaluated.		
Environment factors not influenced by risk management		
Dilution factor - freshwater:	10	
Dilution factor – marine:	100	
Other given operational conditions affecting environmental exposure		
The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.		
Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs. Substance losses to waste water are generally restricted to equipment cleaning as processes operate without contact with water. Such uses and substance properties result in limited to no discharge to wastewater or to soil from the industrial site.		
Technical conditions and measures at process level (source) to prevent release		
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil		
Containment	Process optimized for efficient use of raw materials. Volatile compounds subject to air emission controls. Negligible wastewater emissions as process operates without water contact. Wastewater emissions generated from equipment cleaning with water.	
	Emission factors to wastewater are based on water solubility. Assumes no free product in wastewater stream; oil-water separation (e.g. <i>via</i> oil water separators, oil skimmers, dissolved air floatation) may be required under some circumstances.	
	Environmental compartment	Emission factor
	water	0.007 %
air (final)	9.8 %	
soil	0 %	
Technical measures to reduce releases to air	Assumed air treatment efficiency: 90 % RMM that may be used to achieve required emission reduction: Wet scrubber – gas removal (70 %), air filtration – particle removal (80-99 %), thermal oxidation (98 %), vapour recovery – adsorption (80 %)	
Technical measures to reduce releases to water	Off-site / on-site technology (waste water treatment)	
Technical measures to reduce releases to soil	-	
Organizational measures to prevent/limit release from site		
Environmental, health and safety guidelines or written instructions on the standard operating procedure (SOP) are utilized. Environment, health and safety (EHS) responsibilities are defined and assigned in writing. Emergency action plans (Rescue training for accidental emissions) are created. Personnel are trained in environment, health and safety issues, i.e. in safe handling of chemicals and good housekeeping. General good hygiene and housekeeping.		
Conditions and measures related to municipal sewage treatment plant		
Municipal STP (off-site):	Yes (effectiveness 80 %). (<i>alternatively treatment at an on-site WWTP</i>)	
Discharge rate of effluent	2000 m ³ /d	
Application of sludge to soil	No	

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Conditions and measures related to external treatment of waste for disposal

Suitable waste codes:

- 08 01 11* Waste paint and varnish containing organic solvents or other dangerous substances
- 08 01 13* Sludges from paint or varnish containing organic solvents or other dangerous substances
- 08 01 19* Aqueous sludges containing paint or varnish containing organic solvents or other dangerous substances
- 08 01 21* Waste paint or varnish remover
- 08 03 12* Waste ink containing dangerous substances
- 08 03 14* Ink sludges containing dangerous substances
- 08 03 17* Waste printing toner containing dangerous substances
- 15 01 10* Packaging containing residues of or contaminated by dangerous substances
- 15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

Suitable disposal:

All wastes containing residues of the substance or its hazardous degradation products should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006.

Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC.

Conditions and measures related to external recovery of waste

Not relevant.

2.2 Control of workers exposure

Product characteristic

Assessment approach:

Quantitative exposure assessment and risk characterisation was conducted for long-term systemic effects via inhalation route and via dermal route. Qualitative exposure assessment and risk characterisation is conducted for skin irritation effects and aspiration toxicity.

Physical form:	liquid
Molecular weight:	205 g/mol (average molecular weight based on analytical substance identification data)
Vapour pressure:	100 Pa at 37 °C (test result: Vp < 0.1 kPa) 10 001 Pa at > 40 °C (model default value for elevated temperature)
Concentration of substance in product:	as such (100 %) / > 25 % (up to 100 %) in the mixture

Frequency and duration of use/exposure and other operational conditions affecting workers exposure

Contributing scenario	PROC	duration	place of use	temperature
Transfer from/pouring from containers, manual (and cleaning and maintenance)	PROC 8a	1. < 1 h 2. < 8 h	Indoor	≤ 40 °C
Bulk transfers, material transfers	PROC 8b	< 4 h	Indoor	≤ 40 °C
Preparation of material for application. Mixing operations (open systems).	PROC 5	< 8 h	Indoor	≤ 40 °C
General process exposures - closed process	PROC 1	< 8 h	Indoor	≤ 40 °C
Film formation - force drying	PROC 2	< 8 h	Indoor	> 40 °C
Film formation - air drying	PROC 4	< 8 h	Indoor	≤ 40 °C
Spraying (manual / automatic)	PROC 7	< 8 h	Indoor	≤ 40 °C

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9	< 8 h	Indoor	≤ 40 °C
Roller, spreader, flow application	PROC 10	< 8 h	Indoor	≤ 40 °C
Dipping, immersion and pouring	PROC 13	< 8 h	Indoor	≤ 40 °C
Production of preparations by tableting, compression, extrusion, pelletisation.	PROC 14	< 8 h	Indoor	≤ 40 °C
Laboratory activities	PROC 15	< 8 h	Indoor	≤ 40 °C

**Technical conditions and measures at process level (source) to prevent release
Organisational measures to prevent /limit releases, dispersion and exposure**

Occupational Health and Safety Management System: Advanced

Contributing scenario	PROC	Level of containment
Transfer from/pouring from containers, manual (and cleaning and maintenance)	PROC 8a	No containment
Bulk transfers, material transfers	PROC 8b	Semi-closed process with occasional controlled exposure
Preparation of material for application. Mixing operations (open systems).	PROC 5	No containment
General process exposures - closed process	PROC 1	Closed system (minimal contact during routine operations)
Film formation - force drying	PROC 2	Closed continuous process with occasional controlled exposure
Film formation - air drying	PROC 4	Semi-closed process with occasional controlled exposure
Spraying (manual / automatic)	PROC 7	No containment
Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9	Semi-closed process with occasional controlled exposure
Roller, spreader, flow application	PROC 10	No containment
Dipping, immersion and pouring	PROC 13	No containment
Production of preparations by tableting, compression, extrusion, pelletisation.	PROC 14	No containment
Laboratory activities	PROC 15	No containment

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

Contributing scenario	PROC	Local exhaust ventilation / other RMM (Eff. Inhal: %)	General ventilation
Transfer from/pouring from containers, manual (and cleaning and maintenance)	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (90 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	Good (3-5 air changes per hour)
Bulk transfers, material transfers	PROC 8b	No (0 %)	Good (3-5 air changes per hour)
Preparation of material for application. Mixing operations (open systems).	PROC 5	No (0 %)	Good (3-5 air changes per hour)
General process exposures - closed process	PROC 1	No (0 %)	Good (3-5 air changes per hour)
Film formation - force drying	PROC 2	Yes (90 %): <i>LEV</i>	Good (3-5 air changes per hour)
Film formation - air drying	PROC 4	No (0 %)	Good (3-5 air changes per hour)
Spraying (manual / automatic)	PROC 7	Yes (95 %): <i>LEV (dermal 90 %)</i>	Good (3-5 air changes per hour)
Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9	No (0 %)	Good (3-5 air changes per hour)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Roller, spreader, flow application	PROC 10	Yes (90 %): <i>LEV (dermal 90 %)</i>	Good (3-5 air changes per hour)
Dipping, immersion and pouring	PROC 13	Yes (90 %): <i>LEV</i>	Good (3-5 air changes per hour)
Production of preparations by tableting, compression, extrusion, pelletisation.	PROC 14	No (0 %)	Good (3-5 air changes per hour)
Laboratory activities	PROC 15	No (0 %)	Good (3-5 air changes per hour)

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

Contributing scenario	PROC	Respiratory Protection (RPE) (Effectiveness Inhal: %)	Eye/face protection:	Dermal protection (gloves conforming to EN374) [Eff. Dermal: %]
Transfer from/pouring from containers, manual (and cleaning and maintenance)	PROC 8a	Yes (90 %)	Eye protection: Goggles or safety glasses with side shields (EN166) <i>Eye protection where there is potential for exposure.</i> (PROC1: good practice advice, see below)	Yes (95%)
Bulk transfers, material transfers	PROC 8b	Yes (90 %)		Yes (95%)
Preparation of material for application. Mixing operations (open systems).	PROC 5	Yes (90 %)		Yes (95%)
General process exposures - closed process	PROC 1	No (0 %)		Yes (80%)
Film formation - force drying	PROC 2	No (0 %)		Yes (80%)
Film formation - air drying	PROC 4	Yes (90 %) (or LEV)		Yes (95%)
Spraying (manual / automatic)	PROC 7	Yes (90 %) (or LEV)		Yes (95%)
Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9	Yes (90 %) (or LEV)		Yes (95%)
Roller, spreader, flow application	PROC 10	No (0 %)		Yes (90%)
Dipping, immersion and pouring	PROC 13	No (0 %)		Yes (90%)
Production of preparations by tableting, compression, extrusion, pelletisation.	PROC 14	Yes (90 %) (or LEV)		Yes (80%)
Laboratory activities	PROC 15	No (0 %)		Yes (80%)

Additional good practise advice beyond the REACH CSA

Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH, Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Housekeeping: General good hygiene and housekeeping

PROC1: Eye protection: Goggles or safety glasses with side shields (EN166) *Eye protection where there is potential for exposure.*

3. Exposure estimation and reference to its source

Environment: PETRORISK v6.02 risk assessment tool. The model calculations are based on physicochemical and ecotoxicological properties of individual hydrocarbon structures, so that PEC and PNEC and the risk characterisation by RCR are derived for representative structures that are used to simulate the UVCB substance. The sum of all individual RCR values indicates the overall risk for the substance as the environmental effects of the individual components are considered additive. RCR = PEC/PNEC, RCR value below 1 indicates safe use. PNEC determined by the PETRORISK tool for each representative constituent, range of PNEC values: PNECwastewater= 8.4 µg/L to 12 000 µg/L, PNECaquatic= 0.56 µg/L to 770 µg/L, PNECsoil= 0.12 mg/kg ww to 29 000 mg/kg ww, PNECsediment= 0.29 mg/kg ww to 73 000 mg/kg ww. The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Worker: CHESAR v. 2.2 - ECETOC TRA v. 3. RCR = Exposure estimate/DMEL, RCR value below 1 indicates safe use. Quantitative assessment: long-term systemic effects (inhalation, dermal). Qualitative assessment: skin irritation and aspiration toxicity.

Environment

Local exposure estimation and risk characterisation

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

Protection target	Environmental Exposure	Protection target	Environmental Risk
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SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

PEC effluent (mg/L)	5.3E-02	RCR effluent	7.1E-02
PEC freshwater (mg/L)	5.3E-03	RCR freshwater	1.1E-01
PEC marine (mg/L)	5.3E-04	RCR marine	1.1E-02
PEC freshwater sediment (mg/kg ww)	1.9E-01	RCR freshwater sediment	1.2E-01
PEC marine sediment (mg/kg ww)	1.9E-02	RCR marine sediment	1.2E-02
PEC agricultural soil (mg/kg ww)	3.9E-03	RCR agricultural soil	1.2E-02

Risk characterisation for man via the environment

Exposure estimation and risk characterisation was conducted quantitatively with the PETRORISK tool for indirect human exposure (inhalation, oral). According to modelling results, the estimated exposure level is low (combined RCR = 0.07).

Worker exposure**Quantitative assessment (long-term, systemic effects, inhalation and dermal route)**

Estimated exposure via inhalation and dermal route and the corresponding risk characterisation ratios (RCR) are reported in the below table. Combined RCR = inhalation + dermal. DNEL (inhalation) = 9.4 mg/m³, DNEL (dermal) = 1.3 mg/kg bw/day.

Contributing scenario	PROC	Inhalation		Dermal		Combined RCR
		Estimate (mg/m ³)	RCR	Estimate (mg/kg bw/day)	RCR	
Transfer from/pouring from containers, manual (and cleaning and maintenance)	1. PROC 8a (duration < 1 h, no LEV) 2. PROC 8a (duration < 8 h, LEV)	1.19	0.127	0.685	0.527	0.654
		0.597	0.063	0.685	0.527	0.590
Bulk transfers, material transfers	PROC 8b	1.79	0.179	0.685	0.527	0.718
Preparation of material for application. Mixing operations (open systems).	PROC 5	29.9	0.58	1.371	0.241	0.821
General process exposures - closed process	PROC 1	0.06	0.001	0.007	0.001	0.01
Film formation - force drying	PROC 2	1.495	0.159	0.274	0.210	0.369
Film formation - air drying	PROC 4	2.99	0.318	0.343	0.263	0.581
Spraying (manual / automatic)	PROC 7	2.99	0.318	0.2143	0.164	0.482
Material transfers. Drum/batch transfers. Transfer from/ pouring from containers.	PROC 9	2.99	0.318	0.342	0.263	0.581
Roller, spreader, flow application	PROC 10	5.973	0.636	0.274	0.211	0.847
Dipping, immersion and pouring	PROC 13	5.979	0.636	0.1371	0.105	0.741
Production of preparations by tableting, compression, extrusion, pelletisation.	PROC 14	2.99	0.318	0.686	0.527	0.845
Laboratory activities	PROC 15	2.99	0.318	0.068	0.052	0.370

Qualitative assessment

When implementing the presented conditions of use the risk level for systemic long term inhalation and dermal effects is low (RCR < 1), and contact with the substance is prevented/reduced so that adverse effects are avoided regarding skin irritancy. Aspiration toxicity: Oral exposure is not anticipated to be related to any of the supported uses. RMM to avoid contact or incidents by workers: do not ingest, implementation of basic standard of occupational hygiene, ensure adequate training and supervision, good standard of personal hygiene.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**Environment**

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



The exposure assessment and risk characterization for environment was conducted by using PETRORISK v6.02 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. See the relevant SPERC for additional information.

Human health exposure

The exposure assessment and risk characterization for inhalation exposure of workers was conducted by using Tier 1 ECETOC TRA v.3 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. Scaling of worker exposure can be done by using ECETOC TRA v.3 model by modifying the operational conditions.

This exposure scenario does not address consumers or professional workers.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

3: Professional uses of renewable diesel in coatings

1. Title of Exposure scenario	
Free text title: Professional uses of renewable diesel in coatings	CSR-ES 6
Market sector: Coatings (paints, inks, adhesives etc.)	PC: 9a
Description of process(es) covered in the Exposure Scenario:	
Environment: ESVOC SPERC 8.3b.v1 Uses in Coatings (wide dispersive uses): solvent-borne	ESVOC SPERC 8.3b.v1
Worker contributing scenarios	SU 22
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	PROC 8a
Filling / preparation of equipment (from drums or containers)	PROC 8b
Preparation of material for application. Mixing operations (open systems) (indoor / outdoor)	PROC 5
General process exposures - closed process	PROC 1
General process exposures - closed systems (occasional exposure)	PROC 2
Preparation or material for application. Mixing operations (closed systems)	PROC 3
Film formation - air drying (indoor / outdoor)	PROC 4
Roller, spreader, flow application (indoor / outdoor)	PROC 10
Manual spraying (indoor / outdoor)	PROC 11
Dipping, immersion and pouring (indoor / outdoor)	PROC 13
Hand application - fingerpaints, pastels, adhesives (indoor / outdoor)	PROC 19
Description of activities covered in the Exposure Scenario:	
Covers the use in coatings (paints, inks, adhesives, etc.) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities.	
2. Conditions of use affecting exposure	
2.1 Control of environmental exposure	
Product characteristics	
Properties of Renewable hydrocarbons (diesel type fraction):	
As the substance is a UVCB substance, it was not possible to determine single definite values for the physico-chemical properties. Instead the assessment was based on the properties of representative individual structures as determined by the modelling tool (PETRORISK v6.02). Ranges for the representative structures are reported below.	
Water solubility	6.3E-10 - 510 mg/L (experimental test result for the substance: 1 mg/L)
Log Henry's Law Constants	-6.08 – 2.65 (atm·m ³ /mol)
Log Kow	2.55 – 13.23 (experimental test result for the substance: 6)
Log Koc	2.31 – 9.53
Half-life - Air	0.64 – 40 h
Half-life – Water	3.7 – 7300 d
Half-life – Soil	3.7 – 7300 d
Half-life – Sediment	15 – 29000 d
Half-life - Wastewater	0.46 – 2300 h

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

Amounts used		
Annual use - local:	≤ 5 tonnes/year	
Daily use - local:	≤ 0.014 tonnes/day (SPERC default emission days 365 d/year)	
Frequency and duration of use		
Continuous use/release (used > 12 times per year). Intermittent releases not evaluated.		
Environment factors not influenced by risk management		
Dilution factor - freshwater:	10	
Dilution factor – marine:	100	
Other given operational conditions affecting environmental exposure		
The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.		
Assumes some disposal via wastewater. As a default wastewaters are treated off site (municipal STP) and sludge is applied to agricultural soil. No obligatory RMMs are assumed.		
Technical conditions and measures at process level (source) to prevent release		
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil		
Containment	Professional product use leading to emission of volatiles to air. Professional product use leading to disposal via the wastewater. RMM: None assumed.	
	Environmental compartment	Emission factor
	water	1 %
	air (final)	98 %
	soil	1 %
Technical measures to reduce releases to air	Assumed air treatment efficiency: 0 % Professional product use with limited or no technical control of emission.	
Technical measures to reduce releases to water	Off-site waste water treatment (municipal STP)	
Technical measures to reduce releases to soil	-	
Organizational measures to prevent/limit release from site		
General good hygiene and housekeeping.		
Conditions and measures related to municipal sewage treatment plant		
Municipal STP (off-site):	Yes (effectiveness 80 %).	
Discharge rate of effluent	2000 m ³ /d	
Application of sludge to soil	Yes	
Conditions and measures related to external treatment of waste for disposal		
Suitable waste codes:		
08 01 11* Waste paint and varnish containing organic solvents or other dangerous substances		
08 01 13* Sludges from paint or varnish containing organic solvents or other dangerous substances		
08 01 19* Aqueous sludges containing paint or varnish containing organic solvents or other dangerous substances		
08 01 21* Waste paint or varnish remover		
08 03 12* Waste ink containing dangerous substances		
08 03 14* Ink sludges containing dangerous substances		
08 03 17* Waste printing toner containing dangerous substances		
15 01 10* Packaging containing residues of or contaminated by dangerous substances		
15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances		

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Suitable disposal:

All wastes containing residues of the substance or its hazardous degradation products should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006.

Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC.

Conditions and measures related to external recovery of waste

Not relevant.

2.2 Control of workers exposure

Product characteristic

Assessment approach:

Quantitative exposure assessment and risk characterisation was conducted for long-term systemic effects via inhalation route and via dermal route. Qualitative exposure assessment and risk characterisation is conducted for skin irritation effects and aspiration toxicity.

Physical form:	liquid
Molecular weight:	205 g/mol (average molecular weight based on analytical substance identification data)
Vapour pressure:	100 Pa at 37 °C (test result: Vp < 0.1 kPa) 10 001 Pa at > 40 °C (model default value for elevated temperature)
Concentration of substance in product:	PROC8a, PROC8b, PROC5: as such (100 %) PROC1, PROC2, PROC3, PROC4, PROC13: > 25 % (up to 100 %) in the mixture PROC10: 5-25 % (<i>concentration limited to demonstrate safe use</i>) PROC11, PROC19: 1-5 % (<i>concentration limited to demonstrate safe use</i>)

Frequency and duration of use/exposure and other operational conditions affecting workers exposure

Contributing scenario	PROC	duration	place of use	temperature
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	PROC 8a	< 1 h	1. Indoor 2. Outdoor	≤ 40 °C
Filling / preparation of equipment (from drums or containers)	PROC 8b	< 8 h	Indoor	≤ 40 °C
Preparation of material for application. Mixing operations (open systems) (indoor / outdoor)	PROC 5	< 4 h	1. Indoor 2. Outdoor	≤ 40 °C
General process exposures - closed process	PROC 1	< 8 h	Indoor	≤ 40 °C
General process exposures - closed systems (occasional exposure)	PROC 2	< 8 h	Indoor	≤ 40 °C
Preparation or material for application. Mixing operations (closed systems)	PROC 3	< 8 h	Indoor	≤ 40 °C
Film formation - air drying (indoor / outdoor)	PROC 4	1. < 8 h 2. < 4 h	1. Indoor 2. Outdoor	≤ 40 °C
Roller, spreader, flow application (indoor / outdoor)	PROC 10	1. < 8 h 2. < 8 h 3. < 1 h	1. Indoor 2. Outdoor 3. Outdoor	≤ 40 °C
Manual spraying (indoor / outdoor)	PROC 11	1. < 8 h 2. < 1 h	1. Indoor 2. Outdoor	≤ 40 °C

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Dipping, immersion and pouring (indoor / outdoor)	PROC 13	1. < 8 h 2. < 4 h	1. Indoor 2. Outdoor	≤ 40 °C
Hand application - fingerpaints, pastels, adhesives (indoor / outdoor)	PROC 19	< 4 h	1. Indoor	≤ 40 °C

**Technical conditions and measures at process level (source) to prevent release
Organisational measures to prevent /limit releases, dispersion and exposure**

Occupational Health and Safety Management System: Basic

Contributing scenario	PROC	Level of containment
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	PROC 8a	No containment
Filling / preparation of equipment (from drums or containers)	PROC 8b	Semi-closed process with occasional controlled exposure
Preparation of material for application. Mixing operations (open systems) (indoor / outdoor)	PROC 5	No containment
General process exposures - closed process	PROC 1	Closed system (minimal contact during routine operations)
General process exposures - closed systems (occasional exposure)	PROC 2	Closed continuous process with occasional controlled exposure
Preparation or material for application. Mixing operations (closed systems)	PROC 3	Closed batch process with occasional controlled exposure
Film formation - air drying (indoor / outdoor)	PROC 4	Semi-closed process with occasional controlled exposure
Roller, spreader, flow application (indoor / outdoor)	PROC 10	No containment
Manual spraying (indoor / outdoor)	PROC 11	No containment
Dipping, immersion and pouring (indoor / outdoor)	PROC 13	No containment
Hand application - fingerpaints, pastels, adhesives (indoor / outdoor)	PROC 19	No containment

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

Contributing scenario	PROC	Local exhaust ventilation / other RMM (Eff. Inhal: %)	General ventilation (relevant for indoor location only)
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	PROC 8a	No (0 %)	Good (3-5 air changes per hour)
Filling / preparation of equipment (from drums or containers)	PROC 8b	Yes (90 %): LEV	Good (3-5 air changes per hour)
Preparation of material for application. Mixing operations (open systems) (indoor / outdoor)	PROC 5	No (0 %)	Good (3-5 air changes per hour)
General process exposures - closed process	PROC 1	No (0 %)	Good (3-5 air changes per hour)
General process exposures - closed systems (occasional exposure)	PROC 2	No (0 %)	Good (3-5 air changes per hour)
Preparation or material for application. Mixing operations (closed systems)	PROC 3	No (0 %)	Good (3-5 air changes per hour)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Film formation - air drying (indoor / outdoor)	PROC 4	1. Yes (80 %) <i>indoor: LEV</i> 2. No (0 %) <i>outdoor</i>	Good (3-5 air changes per hour)
Roller, spreader, flow application (indoor / outdoor)	PROC 10	1. Yes (80 %) <i>indoor: LEV</i> 2. No (0 %) <i>outdoor</i>	Good (3-5 air changes per hour)
Manual spraying (indoor / outdoor)	PROC 11	1. Yes (80 %) <i>indoor: LEV</i> 2. No (0 %) <i>outdoor</i>	Good (3-5 air changes per hour)
Dipping, immersion and pouring (indoor / outdoor)	PROC 13	1. Yes (80 %) <i>indoor: LEV</i> 2. No (0 %) <i>outdoor</i>	Good (3-5 air changes per hour)
Hand application - fingerpaints, pastels, adhesives (indoor / outdoor)	PROC 19	Yes (80 %)	Good (3-5 air changes per hour)

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

Contributing scenario	PROC	Respiratory Protection (RPE) (Effectiveness Inhal: %)	Eye/face protection:	Dermal protection (gloves conforming to EN374) [Eff. Dermal: %]
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	PROC 8a	Yes (90 %)	Eye protection: Goggles or safety glasses with side shields (EN166) <i>Eye protection where there is potential for exposure.</i> (PROC1: good practice advice, see below)	Yes (95%)
Filling / preparation of equipment (from drums or containers)	PROC 8b	Yes (90 %)		Yes (95%)
Preparation of material for application. Mixing operations (open systems) (indoor / outdoor)	PROC 5	Yes (90 %)		Yes (95%)
General process exposures - closed process	PROC 1	No (0 %)		Yes (80%)
General process exposures - closed systems (occasional exposure)	PROC 2	Yes (90 %)		Yes (80%)
Preparation or material for application. Mixing operations (closed systems)	PROC 3	Yes (90 %)		Yes (80%)
Film formation - air drying (indoor / outdoor)	PROC 4	Yes (90 %)		Yes (95%)
Roller, spreader, flow application (indoor / outdoor)	PROC 10	1. Yes (90 %) <i>indoor < 8 h</i> 3. Yes (90 %) <i>outdoor < 1 h</i>		Yes (95%)
Manual spraying (indoor / outdoor)	PROC 11	1. Yes (90 %) <i>indoor < 8 h, LEV</i> 2. Yes (90 %) <i>outdoor < 1 h</i>		Yes (95%)
Dipping, immersion and pouring (indoor / outdoor)	PROC 13	Yes (90 %)		Yes (90%)
Hand application - fingerpaints, pastels, adhesives (indoor / outdoor)	PROC 19	No (0 %)	Yes (90%)	

Additional good practise advice beyond the REACH CSA

Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH, Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Housekeeping: General good hygiene and housekeeping

PROC1: Eye protection: Goggles or safety glasses with side shields (EN166) *Eye protection where there is potential for exposure.*

3. Exposure estimation and reference to its source

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Environment: PETRORISK v6.02 risk assessment tool. The model calculations are based on physicochemical and ecotoxicological properties of individual hydrocarbon structures, so that PEC and PNEC and the risk characterisation by RCR are derived for representative structures that are used to simulate the UVCB substance. The sum of all individual RCR values indicates the overall risk for the substance as the environmental effects of the individual components are considered additive. RCR = PEC/PNEC, RCR value below 1 indicates safe use. PNEC determined by the PETRORISK tool for each representative constituent, range of PNEC values: PNECwastewater= 8.4 µg/L to 12 000 µg/L, PNECaquatic= 0.56 µg/L to 770 µg/L, PNECsoil= 0.12 mg/kg ww to 29 000 mg/kg ww, PNECsediment= 0.29 mg/kg ww to 73 000 mg/kg ww. The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Worker: CHESAR v. 2.2 - ECETOC TRA v. 3. RCR = Exposure estimate/DMEL, RCR value below 1 indicates safe use. Quantitative assessment: long-term systemic effects (inhalation, dermal). Qualitative assessment: skin irritation and aspiration toxicity.

Environment

Local exposure estimation and risk characterisation

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

Protection target	Environmental Exposure	Protection target	Environmental Risk
PEC effluent (mg/L)	3.1E-03	RCR effluent	4.2E-03
PEC freshwater (mg/L)	3.1E-04	RCR freshwater	6.2E-03
PEC marine (mg/L)	3.1E-05	RCR marine	6.2E-04
PEC freshwater sediment (mg/kg ww)	1.1E-02	RCR freshwater sediment	7.0E-03
PEC marine sediment (mg/kg ww)	1.1E-03	RCR marine sediment	7.0E-04
PEC agricultural soil (mg/kg ww)	3.5E-03	RCR agricultural soil	5.6E-03

Risk characterisation for man via the environment

Exposure estimation and risk characterisation was conducted quantitatively with the PETRORISK tool for indirect human exposure (inhalation, oral). According to modelling results, the estimated exposure level is low (combined RCR < 0.0001).

Worker exposure

Quantitative assessment (long-term, systemic effects, inhalation and dermal route)

Estimated exposure via inhalation and dermal route and the corresponding risk characterisation ratios (RCR) are reported in the below table. Combined RCR = inhalation + dermal. DNEL (inhalation) = 9.4 mg/m³, DNEL (dermal) = 1.3 mg/kg bw/day.

Contributing scenario	PROC	Inhalation		Dermal		Combined RCR
		Estimate (mg/m ³)	RCR	Estimate (mg/kg bw/day)	RCR	
Material transfers. Pumped drum/batch transfers. Cleaning and maintenance.	1. PROC 8a (indoor)	2.99	0.318	0.685	0.527	0.845
	2. PROC 8a (outdoor)	2.99	0.318	0.685	0.527	0.845
Filling / preparation of equipment (from drums or containers)	PROC 8b	0.597	0.06	0.685	0.527	0.590
Preparation of material for application. Mixing operations (indoor/outdoor)	1. PROC 5 (indoor)	3.587	0.381	0.685	0.527	0.908
	2. PROC 5 (outdoor)	3.587	0.381	0.685	0.527	0.908
General process exposures - closed process	PROC 1	0.06	0.001	0.007	<0.01	0.01
General process exposures - closed systems (occasional exposure)	PROC 2	2.99	0.318	0.274	0.210	0.528
Preparation or material for application. Mixing operations (closed systems)	PROC 3	1.794	0.190	0.138	0.106	0.297
Film formation - air drying (indoor / outdoor)	1. PROC 4 (indoor, LEV)	1.196	0.127	0.343	0.263	0.391
		3.587	0.381	0.343	0.263	0.645

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

	2. PROC 4 (outdoor, duration < 4 h)					
Roller, spreader, flow application (indoor / outdoor)	1. PROC 10 (indoor, LEV, RPE) 2. PROC 10 (outdoor, duration < 1 h, RPE)	1.794 1.794	0.190 0.190	0.823 0.823	0.633 0.633	0.823 0.823
Manual spraying (indoor / outdoor)	1. PROC 11 (indoor, LEV) 2. PROC 11 (outdoor, duration < 4 h)	3.417 2.392	0.363 0.254	1.075 1.075	0.428 0.428	0.792 0.683
Dipping, immersion and pouring (indoor / outdoor)	1. PROC 13 (indoor, LEV) 2. PROC 13 (outdoor, duration < 4 h)	1.196 3.587	0.127 0.381	0.686 0.686	0.527 0.527	0.654 0.909
Hand application - fingerprints, pastels, adhesives (indoor / outdoor)	1. PROC 19 (indoor)	3.588	0.381	0.565	0.435	0.816

Qualitative assessment

When implementing the presented conditions of use the risk level for systemic long term inhalation and dermal effects is low (RCR < 1), and contact with the substance is prevented/reduced so that adverse effects are avoided regarding skin irritancy. Aspiration toxicity: Oral exposure is not anticipated to be related to any of the supported uses. RMM to avoid contact or incidents by workers: do not ingest, implementation of basic standard of occupational hygiene, ensure adequate training and supervision, good standard of personal hygiene.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**Environment**

The exposure assessment and risk characterization for environment was conducted by using PETRORISK v6.02 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. See the relevant SPERC for additional information.

Human health exposure

The exposure assessment and risk characterization for inhalation exposure of workers was conducted by using Tier 1 ECETOC TRA v.3 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. Scaling of worker exposure can be done by using ECETOC TRA v.3 model by modifying the operational conditions.

This exposure scenario does not address consumers or industrial workers.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

4: Industrial use of renewable diesel as a fuel

1. Title of Exposure scenario	
Free text title: Industrial use of renewable diesel as a fuel	CSR-ES 7
Market sector: Fuels	PC: 13
Description of process(es) covered in the Exposure Scenario:	
Environment: ESVOC SPERC 7.12a.v1 Use as a Fuel (industrial): solvent-borne	ESVOC SPERC 7.12a.v1
Worker contributing scenarios	SU 3
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a
Bulk transfers (barge, rail and road). Transfers from drums and containers. Refuelling vehicles.	PROC 8b
General use exposures as a fuel (closed equipment)	PROC 1
General use exposures as a fuel (closed, occasional exposure)	PROC 2
Use as a fuel additive diluent	PROC 3
Use as a fuel	PROC 16
Description of activities covered in the Exposure Scenario:	
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.	
2. Conditions of use affecting exposure	
2.1 Control of environmental exposure	
Product characteristics	
Properties of Renewable hydrocarbons (diesel type fraction): As the substance is a UVCB substance, it was not possible to determine single definite values for the physico-chemical properties. Instead the assessment was based on the properties of representative individual structures as determined by the modelling tool (PETRORISK v6.02). Ranges for the representative structures are reported below.	
Water solubility	6.3E-10 - 510 mg/L (experimental test result for the substance: 1 mg/L)
Log Henry's Law Constants	-6.08 – 2.65 (atm·m ³ /mol)
Log Kow	2.55 – 13.23 (experimental test result for the substance: 6)
Log Koc	2.31 – 9.53
Half-life - Air	0.64 – 40 h
Half-life – Water	3.7 – 7300 d
Half-life – Soil	3.7 – 7300 d
Half-life – Sediment	15 – 29000 d
Half-life - Wastewater	0.46 – 2300 h
Amounts used	
Annual use at a site:	≤ 10 000 tonnes/year
Daily use at a site:	≤ 33 tonnes/day (SPERC default emission days 300 d/year)
Frequency and duration of use	
Continuous use/release (used > 12 times per year). Intermittent releases not evaluated.	

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Environment factors not influenced by risk management

Dilution factor - freshwater:	10
Dilution factor – marine:	100

Other given operational conditions affecting environmental exposure

The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Substance losses are reduced through use of general and site-specific risk management measures to maintain workplace concentrations of airborne VOCs and particulates below respective OELs; and through use of closed or covered equipment/processes to minimize evaporative losses of VOCs. Substance properties and uses result in limited to no discharge to wastewater or to soil from the industrial site.

Technical conditions and measures at process level (source) to prevent release

Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil

Containment	Process optimized for highly efficient use of raw materials (very minimal environmental release). Negligible wastewater emissions as process operates without water contact. Negligible air emissions as process operates in a contained system. No obligatory onsite RMMs assumed.	
	Environmental compartment	Emission factor
	water	0.001 %
	air (final)	0.025 %
	soil	0 %

Technical measures to reduce releases to air	Assumed air treatment efficiency: 95 % RMM that may be used to achieve required emission reduction: Wet scrubber –thermal oxidation (98 %)
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Technical measures to reduce releases to water	Off-site / on-site technology (waste water treatment)
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Technical measures to reduce releases to soil	-
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Organizational measures to prevent/limit release from site

Environmental, health and safety guidelines or written instructions on the standard operating procedure (SOP) are utilized. Environment, health and safety (EHS) responsibilities are defined and assigned in writing. Emergency action plans (Rescue training for accidental emissions) are created. Personnel are trained in environment, health and safety issues, i.e. in safe handling of chemicals and good housekeeping. General good hygiene and housekeeping.

Conditions and measures related to municipal sewage treatment plant

Municipal STP (off-site):	Yes (effectiveness 80 %). (alternatively treatment at an on-site WWTP)
Discharge rate of effluent	2000 m ³ /d
Application of sludge to soil	No

Conditions and measures related to external treatment of waste for disposal

Suitable waste codes:
 10 01 04* Oil fly ash and boiler dust
 10 01 13* Fly ash from emulsified hydrocarbons used as fuel
 10 01 20* Sludges from on-site effluent treatment containing dangerous substances
 10 01 22* Aqueous sludges from boiler cleansing containing dangerous substances
 13 05 02* Sludges from oil/water separators
 13 05 06* Oil from oil/water separators
 13 05 07* Oily water from oil/water separators
 13 05 08* Mixtures of wastes from grit chambers and oil/water separators

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



13 07 01* Fuel oil and diesel
 13 07 02* Petrol
 13 07 03* Other fuels (including mixtures)
 15 01 10* Packaging containing residues of or contaminated by dangerous substances
 15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

Suitable disposal:

All wastes containing residues of the substance or its hazardous degradation products should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006. The mineral wastes (e.g. ash) might be disposed off to the hazardous waste landfill if the acceptance criteria of waste at landfills are fulfilled according to Council Decision 2003/33/EC.

Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC.

Conditions and measures related to external recovery of waste

Not relevant.

2.2 Control of workers exposure

Product characteristic

Assessment approach:

Quantitative exposure assessment and risk characterisation was conducted for long-term systemic effects via inhalation route and via dermal route. Qualitative exposure assessment and risk characterisation is conducted for skin irritation effects and aspiration toxicity.

Physical form:	liquid
Molecular weight:	205 g/mol (average molecular weight based on analytical substance identification data)
Vapour pressure:	100 Pa at 37 °C (test result: Vp < 0.1 kPa) 10 001 Pa at > 40 °C (model default value for elevated temperature)
Concentration of substance in product:	As such (100 %)

Frequency and duration of use/exposure and other operational conditions affecting workers exposure

Contributing scenario	PROC	duration	place of use	temperature
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	1. < 1 h 2. < 8 h	Indoor	≤ 40 °C
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	1. < 1 h 2. < 8 h	Outdoor	≤ 40 °C
Bulk transfers (barge, rail and road). Transfers from drums and containers. Refuelling vehicles.	PROC 8b	< 4 h	1. Indoor 2. Outdoor	≤ 40 °C
General use exposures as a fuel (closed equipment)	PROC 1	< 8 h	Indoor	≤ 40 °C
General use exposures as a fuel (closed, occasional exposure)	PROC 2	< 8 h	Indoor	≤ 40 °C
Use as a fuel additive diluent	PROC 3	< 8 h	Indoor	≤ 40 °C
Use as a fuel	PROC 16	< 8 h	Indoor	≤ 40 °C

Technical conditions and measures at process level (source) to prevent release

Organisational measures to prevent /limit releases, dispersion and exposure

Occupational Health and Safety Management System: Advanced

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Contributing scenario	PROC	Level of containment		
Cleaning and maintenance (vehicles, boilers, storage tanks) - indoor/outdoor	PROC 8a	No containment		
Bulk transfers (barge, rail and road). Transfers from drums and containers. Refuelling vehicles.	PROC 8b	Semi-closed process with occasional controlled exposure		
General use exposures as a fuel (closed equipment)	PROC 1	Closed system (minimal contact during routine operations)		
General use exposures as a fuel (closed, occasional exposure)	PROC 2	Closed continuous process with occasional controlled exposure		
Use as a fuel additive diluent	PROC 3	Closed batch process with occasional controlled exposure		
Use as a fuel	PROC 16	Closed system (minimal contact during routine operations)		
Technical conditions and measures to control dispersion from source towards the worker				
Contributing scenario	PROC	Local exhaust ventilation / other RMM (Eff. Inhal: %)	General ventilation <i>*or operation undertaken outdoors</i>	
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (90 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	Good (3-5 air changes per hour)	
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	1. No (0 %) 2. Yes (90 %): <i>LEV or SOP (eg. drain down prior to maintenance)</i>	not applicable	
Bulk transfers (barge, rail and road). Transfers from drums and containers. Refuelling vehicles.	PROC 8b	No (0 %)	1. Good (3-5 air changes per hour) <i>indoor</i> 2. not applicable <i>outdoor</i>	
General use exposures as a fuel (closed equipment)	PROC 1	No (0 %)	Good (3-5 air changes per hour)*	
General use exposures as a fuel (closed, occasional exposure)	PROC 2	No (0 %)	Good (3-5 air changes per hour)*	
Use as a fuel additive diluent	PROC 3	No (0 %)	Good (3-5 air changes per hour)*	
Use as a fuel	PROC 16	No (0 %)	Good (3-5 air changes per hour)*	
Conditions and measures related to personal protection, hygiene and health evaluation				
Contributing scenario	PROC	Respiratory Protection (RPE) (Effectiveness Inhal: %)	Dermal protection (Effectiveness %)	Eye/face protection:
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	Yes (90 %)	Yes (95 %)	Eye protection: Goggles or safety glasses with side shields (EN166)
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	Yes (90 %)	Yes (95 %)	
Bulk transfers (barge, rail and road). Transfers from drums and containers. Refuelling vehicles.	PROC 8b	Yes (90 %) (or LEV)	Yes (95 %)	
General use exposures as a fuel (closed equipment)	PROC 1	no	Yes (80 %)	(PROC1, PROC16: good practice advice)
General use exposures as a fuel (closed, occasional exposure)	PROC 2	no	Yes (80 %)	
Use as a fuel additive diluent	PROC 3	Yes (90 %) (or LEV)	Yes (80 %)	
Use as a fuel	PROC 16	no	Yes (80 %)	

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Additional good practise advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH, Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Housekeeping: General good hygiene and housekeeping
 PROC1, PROC16: Eye protection: Goggles or safety glasses with side shields (EN166) *Eye protection where there is potential for exposure.*

3. Exposure estimation and reference to its source

Environment: PETRORISK v6.02 risk assessment tool. The model calculations are based on physicochemical and ecotoxicological properties of individual hydrocarbon structures, so that PEC and PNEC and the risk characterisation by RCR are derived for representative structures that are used to simulate the UVCB substance. The sum of all individual RCR values indicates the overall risk for the substance as the environmental effects of the individual components are considered additive. RCR = PEC/PNEC, RCR value below 1 indicates safe use. PNEC determined by the PETRORISK tool for each representative constituent, range of PNEC values: PNECwastewater= 8.4 µg/L to 12 000 µg/L, PNECaquatic= 0.56 µg/L to 770 µg/L, PNECsoil= 0.12 mg/kg ww to 29 000 mg/kg ww, PNECsediment= 0.29 mg/kg ww to 73 000 mg/kg ww. The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Worker: CHESAR v. 2.2 - ECETOC TRA v. 3. RCR = Exposure estimate/DMEL, RCR value below 1 indicates safe use. Quantitative assessment: long-term systemic effects (inhalation, dermal). Qualitative assessment: skin irritation and aspiration toxicity.

Environment

Local exposure estimation and risk characterisation

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

Protection target	Environmental Exposure	Protection target	Environmental Risk
PEC effluent (mg/L)	7.6E-03	RCR effluent	1.0E-02
PEC freshwater (mg/L)	7.5E-04	RCR freshwater	1.5E-02
PEC marine (mg/L)	7.5E-05	RCR marine	1.5E-03
PEC freshwater sediment (mg/kg ww)	2.8E-02	RCR freshwater sediment	1.7E-02
PEC marine sediment (mg/kg ww)	2.8E-03	RCR marine sediment	1.7E-03
PEC agricultural soil (mg/kg ww)	1.0E-05	RCR agricultural soil	3.2E-05

Risk characterisation for man via the environment

Exposure estimation and risk characterisation was conducted quantitatively with the PETRORISK tool for indirect human exposure (inhalation, oral). According to modelling results, the estimated exposure level is low (combined RCR < 0.001).

Worker exposure

Quantitative assessment (long-term, systemic effects, inhalation and dermal route)

Estimated exposure via inhalation and dermal route and the corresponding risk characterisation ratios (RCR) are reported in the below table. Combined RCR = inhalation + dermal. DNEL (inhalation) = 9.4 mg/m³, DNEL (dermal) = 1.3 mg/kg bw/day.

Contributing scenario	PROC	Inhalation		Dermal		Combined RCR
		Estimate (mg/m ³)	RCR	Estimate (mg/kg bw/day)	RCR	
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	1. PROC 8a (duration < 1 h, no LEV)	1.196	0.127	0.685	0.527	0.654
	2. PROC 8a (duration < 8 h, LEV)	0.597	0.063	0.685	0.527	0.590
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	1. PROC 8a (duration < 1 h, no LEV)	1.196	0.127	0.685	0.527	0.654
	2. PROC 8a (duration < 8 h, LEV)	0.597	0.063	0.685	0.527	0.590
Bulk transfers. Transfers from drums and containers. Refuelling vehicles.	1. PROC 8b (indoor)	1.794	0.190	0.685	0.527	0.718
	2. PROC 8b (outdoor)	1.794	0.190	0.685	0.527	0.718

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

General use exposures as a fuel (closed equipment)	PROC 1	0.06	0.001	0.007	0.001	0.01
General use exposures as a fuel (closed, occasional exposure)	PROC 2	5.979	0.636	0.274	0.210	0.846
Use as a fuel additive diluent	PROC 3	1.794	0.190	0.138	0.106	0.297
Use as a fuel	PROC 16	5.979	0.636	0.068	0.052	0.688

Qualitative assessment

When implementing the presented conditions of use the risk level for systemic long term inhalation and dermal effects is low (RCR < 1), and contact with the substance is prevented/reduced so that adverse effects are avoided regarding skin irritancy. Aspiration toxicity: Oral exposure is not anticipated to be related to any of the supported uses. RMM to avoid contact or incidents by workers: do not ingest, implementation of basic standard of occupational hygiene, ensure adequate training and supervision, good standard of personal hygiene.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**Environment**

The exposure assessment and risk characterization for environment was conducted by using PETRORISK v6.02 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. See the relevant SPERC for additional information.

Human health exposure

The exposure assessment and risk characterization for inhalation exposure of workers was conducted by using Tier 1 ECETOC TRA v.3 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. Scaling of worker exposure can be done by using ECETOC TRA v.3 model by modifying the operational conditions.

This exposure scenario does not address consumers or professional workers.

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016**5: Professional use of renewable diesel as a fuel**

1. Title of Exposure scenario	
Free text title: Professional use of renewable diesel as a fuel	CSR-ES 8
Market sector: Fuels	PC: 13
Description of process(es) covered in the Exposure Scenario:	
Environment: ESVOC SPERC 9.12b.v1 Use as a Fuel (wide dispersive use): solvent-borne	ESVOC SPERC 9.12b.v1
Worker contributing scenarios	SU 22
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a
Transfers from drums and containers - indoor	PROC 8b
Bulk transfers. Transfers from drums and containers. Refuelling vehicles. - outdoor	PROC 8b
General use exposures as a fuel (closed equipment)	PROC 1
General use exposures as a fuel (closed, occasional exposure)	PROC 2
Use as a fuel additive diluent	PROC 3
Use as a fuel	PROC 16
Description of activities covered in the Exposure Scenario:	
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.	
2. Conditions of use affecting exposure	
2.1 Control of environmental exposure	
Product characteristics	
<u>Properties of Renewable hydrocarbons (diesel type fraction):</u> As the substance is a UVCB substance, it was not possible to determine single definite values for the physico-chemical properties. Instead the assessment was based on the properties of representative individual structures as determined by the modelling tool (PETRORISK v6.02). Ranges for the representative structures are reported below.	
Water solubility	6.3E-10 - 510 mg/L (experimental test result for the substance: 1 mg/L)
Log Henry's Law Constants	-6.08 – 2.65 (atm·m ³ /mol)
Log Kow	2.55 – 13.23 (experimental test result for the substance: 6)
Log Koc	2.31 – 9.53
Half-life - Air	0.64 – 40 h
Half-life – Water	3.7 – 7300 d
Half-life – Soil	3.7 – 7300 d
Half-life – Sediment	15 – 29000 d
Half-life - Wastewater	0.46 – 2300 h
Amounts used	
Annual use - local:	≤ 5 tonnes/year
Daily use - local:	≤ 0.014 tonnes/day (SPERC default emission days 365 d/year)
Frequency and duration of use	
Continuous use/release (used > 12 times per year). Intermittent releases not evaluated.	
Environment factors not influenced by risk management	
Dilution factor - freshwater:	10

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Dilution factor – marine:	100					
Other given operational conditions affecting environmental exposure						
The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.						
Some disposal via wastewater assumed. As a default, wastewaters are treated off site (municipal STP) and sludge is applied to agricultural soil. Obligatory RMM are not assumed for wide dispersive uses.						
Technical conditions and measures at process level (source) to prevent release						
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil						
Containment	Professional product use leading to emission of volatiles to air. Professional product use leading to disposal via the wastewater. No obligatory onsite RMMs assumed.					
	Environmental compartment					
	Emission factor					
	<table border="1"> <tr> <td>water</td> <td>0.001 %</td> </tr> <tr> <td>air (final)</td> <td>0.01 %</td> </tr> <tr> <td>soil</td> <td>0.001 %</td> </tr> </table>	water	0.001 %	air (final)	0.01 %	soil
water	0.001 %					
air (final)	0.01 %					
soil	0.001 %					
Technical measures to reduce releases to air	None (Professional product use with limited or no technical control of emission).					
Technical measures to reduce releases to water	Off-site waste water treatment (municipal STP)					
Technical measures to reduce releases to soil	-					
Organizational measures to prevent/limit release from site						
General good hygiene and housekeeping.						
Conditions and measures related to municipal sewage treatment plant						
Municipal STP (off-site):	Yes (effectiveness 80 %).					
Discharge rate of effluent	2000 m ³ /d					
Application of sludge to soil	Yes					
Conditions and measures related to external treatment of waste for disposal						
<p>Suitable waste codes:</p> <p>13 05 02* Sludges from oil/water separators 13 05 06* Oil from oil/water separators 13 05 07* Oily water from oil/water separators 13 05 08* Mixtures of wastes from grit chambers and oil/water separators 13 07 01* Fuel oil and diesel 13 07 02* Petrol 13 07 03* Other fuels (including mixtures) 15 01 10* Packaging containing residues of or contaminated by dangerous substances 15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances</p>						
<p>Suitable disposal:</p> <p>All wastes containing residues of the substance or its hazardous degradation products should be disposed of as hazardous waste to authorized hazardous waste incineration plants, operated according to Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and Best Available Techniques for Waste Incineration as described in the respective BREF of August 2006. The mineral wastes (e.g. ash) might be disposed off to the hazardous waste landfill if the acceptance criteria of waste at landfills are fulfilled according to Council Decision 2003/33/EC.</p>						
Contaminated packaging: Contaminated packaging should be emptied as far as possible and disposed of as hazardous waste to incineration plants in accordance with Directive 2000/76/EC.						

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



Conditions and measures related to external recovery of waste

Not relevant.

2.2 Control of workers exposure

Product characteristic

Assessment approach:

Quantitative exposure assessment and risk characterisation was conducted for long-term systemic effects via inhalation route and via dermal route. Qualitative exposure assessment and risk characterisation is conducted for skin irritation effects and aspiration toxicity.

Physical form:	liquid
Molecular weight:	205 g/mol (average molecular weight based on analytical substance identification data)
Vapour pressure:	100 Pa at 37 °C (test result: Vp < 0.1 kPa) 10 001 Pa at > 40 °C (model default value for elevated temperature)
Concentration of substance in product:	As such (100 %)

Frequency and duration of use/exposure and other operational conditions affecting workers exposure

Contributing scenario	PROC	duration	place of use	temperature
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	1. < 1 h 2. < 8 h	Indoor	≤ 40 °C
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	1. < 1 h 2. < 8 h	Outdoor	≤ 40 °C
Transfers from drums and containers - indoor	PROC 8b	< 8 h	Indoor	≤ 40 °C
Bulk transfers. Transfers from drums and containers. Refuelling vehicles. - outdoor	PROC 8b	1. < 8 h 2. < 1 h	Outdoor	≤ 40 °C
General use exposures as a fuel (closed equipment)	PROC 1	< 8 h	Indoor	≤ 40 °C
General use exposures as a fuel (closed, occasional exposure)	PROC 2	< 8 h	Indoor	≤ 40 °C
Use as a fuel additive diluent	PROC 3	< 8 h	Indoor	≤ 40 °C
Use as a fuel	PROC 16	< 8 h	Indoor	≤ 40 °C

Technical conditions and measures at process level (source) to prevent release

Organisational measures to prevent /limit releases, dispersion and exposure

Occupational Health and Safety Management System: Basic

Contributing scenario	PROC	Level of containment
Cleaning and maintenance (vehicles, boilers, storage tanks) - indoor/outdoor	PROC 8a	No containment
Bulk transfers. Transfers from drums and containers. Refuelling vehicles.- indoor/outdoor	PROC 8b	Semi-closed process with occasional controlled exposure
General use exposures as a fuel (closed equipment)	PROC 1	Closed system (minimal contact during routine operations)
General use exposures as a fuel (closed, occasional exposure)	PROC 2	Closed continuous process with occasional controlled exposure
Use as a fuel additive diluent	PROC 3	Closed batch process with occasional controlled exposure
Use as a fuel	PROC 16	Closed system (minimal contact during routine operations)

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



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

Contributing scenario	PROC	Local exhaust ventilation (LEV) / other RMM (Eff. Inhal: %)	General ventilation *or operation outdoors
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (80 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	Good (3-5 air changes per hour)
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	1. No (0 %) <i>duration < 1 h</i> 2. Yes (80 %) <i>duration < 8 h: LEV or SOP (eg. drain down prior to maintenance)</i>	not applicable
Transfers from drums and containers - indoor	PROC 8b	Yes (90 %): <i>Material transfers under containment or extract ventilation</i>	Good (3-5 air changes per hour)
Bulk transfers. Transfers from drums and containers. Refuelling vehicles. - outdoor	PROC 8b	1. Yes (90 %) <i>duration < 8 h: Material transfers under containment or extract ventilation</i> 2. No (0 %) <i>duration < 1 h</i>	not applicable
General use exposures as a fuel (closed equipment)	PROC 1	No (0 %)	Good (3-5 air changes per hour)*
General use exposures as a fuel (closed, occasional exposure)	PROC 2	No (0 %)	Good (3-5 air changes per hour)*
Use as a fuel additive diluent	PROC 3	No (0 %)	Good (3-5 air changes per hour)*
Use as a fuel	PROC 16	No (0 %)	Good (3-5 air changes per hour)*

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

Contributing scenario	PROC	Respiratory Protection (RPE) (Effectiveness Inhal: %)	Eye/face protection:	Dermal protection (gloves conforming to EN374) [Eff. Dermal %]
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	PROC 8a	Yes (90 %)	Eye protection: Goggles or safety glasses with side shields (EN166) <i>Eye protection where there is potential for exposure.</i> (PROC1, PROC16: good practice advice, see below)	Yes (95 %)
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	PROC 8a	Yes (90 %)		Yes (95 %)
Transfers from drums and containers - indoor	PROC 8b	No (0 %)		Yes (95 %)
Bulk transfers. Transfers from drums and containers. Refuelling vehicles. - outdoor	PROC 8b	Yes (90 %)		Yes (95 %)
General use exposures as a fuel (closed equipment)	PROC 1	No (0 %)		Yes (80 %)
General use exposures as a fuel (closed, occasional exposure)	PROC 2	Yes (90 %) (Or LEV)		Yes (80 %)
Use as a fuel additive diluent	PROC 3	Yes (90 %) (Or LEV)		Yes (80 %)
Use as a fuel	PROC 16	No (0 %)		Yes (-) (<i>good practice advice, see below</i>)

Additional good practise advice beyond the REACH CSA

Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH, Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Housekeeping: General good hygiene and housekeeping

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017

Previous date: 3rd May 2016



PROC1, PROC16: Eye protection: Goggles or safety glasses with side shields (EN166) *Eye protection where there is potential for exposure.*

PROC16: Dermal Protection: Yes (chemically resistant gloves conforming to EN374)

3. Exposure estimation and reference to its source

Environment: PETRORISK v6.02 risk assessment tool. The model calculations are based on physicochemical and ecotoxicological properties of individual hydrocarbon structures, so that PEC and PNEC and the risk characterisation by RCR are derived for representative structures that are used to simulate the UVCB substance. The sum of all individual RCR values indicates the overall risk for the substance as the environmental effects of the individual components are considered additive. RCR = PEC/PNEC, RCR value below 1 indicates safe use. PNEC determined by the PETRORISK tool for each representative constituent, range of PNEC values: PNECwastewater= 8.4 µg/L to 12 000 µg/L, PNECaquatic= 0.56 µg/L to 770 µg/L, PNECsoil= 0.12 mg/kg ww to 29 000 mg/kg ww, PNECsediment= 0.29 mg/kg ww to 73 000 mg/kg ww. The environmental emission assessment is based on SPERC developed by ESIG/ESVOC.

Worker: CHESAR v. 2.2 - ECETOC TRA v. 3. RCR = Exposure estimate/DMEL, RCR value below 1 indicates safe use. Quantitative assessment: long-term systemic effects (inhalation, dermal). Qualitative assessment: skin irritation and aspiration toxicity.

Environment

Local exposure estimation and risk characterisation

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

Protection target	Environmental Exposure	Protection target	Environmental Risk
PEC effluent (mg/L)	3.1E-06	RCR effluent	4.2E-06
PEC freshwater (mg/L)	6.6E-07	RCR freshwater	1.5E-05
PEC marine (mg/L)	3.1E-08	RCR marine	6.2E-07
PEC freshwater sediment (mg/kg ww)	1.1E-05	RCR freshwater sediment	7.0E-06
PEC marine sediment (mg/kg ww)	1.1E-06	RCR marine sediment	7.0E-07
PEC agricultural soil (mg/kg ww)	3.5E-06	RCR agricultural soil	5.6E-06

Risk characterisation for man via the environment

Exposure estimation and risk characterisation was conducted quantitatively with the PETRORISK tool for indirect human exposure (inhalation, oral). According to modelling results, the estimated exposure level is low (combined RCR < 0.000001).

Worker exposure

Quantitative assessment (long-term, systemic effects, inhalation and dermal route)

Estimated exposure via inhalation and dermal route and the corresponding risk characterisation ratios (RCR) are reported in the below table. Combined RCR = inhalation + dermal. DNEL (inhalation) = 9.4 mg/m³, DNEL (dermal) = 1.3 mg/kg bw/day.

Contributing scenario	PROC	Inhalation		Dermal		Combine d RCR
		Estimate (mg/m ³)	RCR	Estimate (mg/kg bw/day)	RCR	
Cleaning and maintenance (vehicles, boilers, storage tanks)- indoor	1. PROC 8a (duration < 1 h, no LEV)	2.99	0.318	0.685	0.527	0.845
	2. PROC 8a (duration < 8 h, LEV/SOP)	1.49	0.318	0.685	0.527	0.686
Cleaning and maintenance (vehicles, boilers, storage tanks)- outdoor	1. PROC 8a (duration < 1 h, no LEV)	2.99	0.318	0.685	0.527	0.845
	2. PROC 8a (duration < 8 h, LEV/SOP)	1.495	0.159	0.685	0.527	0.686
Transfers from drums and containers - indoor	PROC 8b	0.597	0.063	0.685	0.527	0.590

SAFETY DATA SHEET

UPM BIOVERNO DIESEL

Date: 13th June 2017Previous date: 3rd May 2016

Bulk transfers. Transfers from drums and containers. Refuelling vehicles. - outdoor	1. PROC 8b (duration < 8 h, LEV)	0.597	0.063	0.685	0.527	0.590
	2. PROC 8b (duration < 1 h, no LEV)	1.196	0.127	0.685	0.527	0.654
General use exposures as a fuel (closed equipment)	PROC 1	0.06	0.001	0.007	0.001	0.01
General use exposures as a fuel (closed, occasional exposure)	PROC 2	2.99	2.99	0.274	0.210	0.528
Use as a fuel additive diluent	PROC 3	1.794	0.190	0.138	0.106	0.297
Use as a fuel	PROC 16	5.979	0.636	0.068	0.052	0.688

Qualitative assessment

When implementing the presented conditions of use the risk level for systemic long term inhalation and dermal effects is low (RCR < 1), and contact with the substance is prevented/reduced so that adverse effects are avoided regarding skin irritancy. Aspiration toxicity: Oral exposure is not anticipated to be related to any of the supported uses. RMM to avoid contact or incidents by workers: do not ingest, implementation of basic standard of occupational hygiene, ensure adequate training and supervision, good standard of personal hygiene.

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**Environment**

The exposure assessment and risk characterization for environment was conducted by using PETRORISK v6.02 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. See the relevant SPERC for additional information.

Human health exposure

The exposure assessment and risk characterization for inhalation exposure of workers was conducted by using Tier 1 ECETOC TRA v.3 model. The assessment indicates safe use when the recommended operational conditions and risk management measures are in use. Scaling of worker exposure can be done by using ECETOC TRA v.3 model by modifying the operational conditions.

This exposure scenario does not address consumers or industrial workers.