

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING**1.1. Product identifier**

- Trade name: **PYROLYSIS FUEL OIL**
- Chemical name: Residues (petroleum), steam-cracked
- Registration number REACH: 01-2119485585-24-0000
- UFI code: irrelevant for substances
- Index number: 649-018-00-6
- CAS number: 64742-90-1
- EC number: 265-193-8

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

- 1.2.1. Identified uses
Chemical intermediate for the production of chemical products, industrial fuel.
- 1.2.2. Non-recommended uses
There are no non-recommended uses stated in the registration. The product may not be used in any way other than that specified in point 1.2.1 or subsection 7.3.

1.3. Details of the supplier of the safety data sheet

manufacturer: ORLEN Unipetrol RPA s.r.o., Záluží 1, 436 70 Litvínov, Czech Republic

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Other contacts:

- Director of the Trade Unit Refinery: ☎: +420 225 001 675; e-mail: Jiri.Winkelhofer@unipetrol.cz
- Sales manager ORP: ☎: +420 476 166 458; e-mail: Vitezslav.Hobrlant@orlenunipetrol.cz
- Person professionally qualified to compile a SDS: e-mail: reach.unirpa@orlenunipetrol.cz

1.4. Emergency telephone number

- ORLEN Unipetrol RPA s.r.o. ☎: +420 476 163 111 (NON STOP)
- Toxicological Information Center (TIS) ☎: +420 224 919 293 (NON STOP)
Na bojišti 1, 120 00 Prague 2, Czech Republic ☎: +420 224 915 402 (NON STOP)
e-mail: tis@vfn.cz
- Transport Information & Accident System (TRINS) ☎: +420 476 163 111 (NON STOP)

*Note: Emergency telephone numbers for EU countries are listed in section 16.***SECTION 2: HAZARDS IDENTIFICATION****2.1. Classification of the substance or mixture**

The product is classified as hazardous pursuant to CLP Regulation (EC) No. 1272/2008 CLP:

CARCINOGENIC, CATEGORY 1B	Carc. 1B, H 350
MUTAGENIC, CATEGORY 1B	Muta 1B; H 340
SKIN CORROSION/IRRITATION, CATEGORY 2	Skin Irrit 2, H 315
HAZARDOUS TO THE AQUATIC ENVIRONMENT, CATEGORY CHRONIC 2	Aquatic Chronic 2, H 411

Note: The full text of the H-sentence and / or EUH-sentences is stated in Section 16.

2.2. Label elements

<i>Product identifiers</i>	<p align="center">PYROLYSIS FUEL OIL RESIDUES (PETROLEUM), STEAM-CRACKED index number: 649-018-00-6</p>	
<i>Warning hazard symbol</i>		
<i>Signal word</i>	<p align="center">DANGER</p>	
<i>H-phrases (standard hazard phrases)</i>	<p>H315 H340 H350 H411</p>	<p>Causes skin irritation. May cause genetic defects. May cause cancer. Toxic to aquatic life with long lasting effects.</p>
<i>P-statements (precautionary statements)</i>	<p>P202 P273 P280 P302+P352 P332+P313 P391</p>	<p>Do not handle until all safety precautions have been read and understood. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection. IF ON SKIN: Wash with plenty of water/soap. If skin irritation occurs: Get medical advice/ attention. Collect spillage.</p>
<i>Additional information</i>	<p>Only for professional users.</p>	
	<p align="center">ORLEN Unipetrol RPA s.r.o. Záluží 1, 436 70 Litvínov, Czech Republic ☎: +420 476 161 111, +420 476 163 111</p>	

2.3. Other hazards

The product is flammable. It can ignite if heated above the temperature of the ignition point. Its vapors are heavier than air and they therefore accumulate by the ground. Inhaling high concentrations of the vapors can irritate breathing airways, cause headaches, nausea, dizziness and sleepiness. Repeated skin exposition can cause the skin to dry and crack and increase therefore a chance of skin diseases. May cause eye irritation. This irritation can result in redness and swelling of the eyes. Touching a hot (heated) product can result in burns.

Produkt does not meet the criteria for PBT (P-persistent, B-bioaccumulative, T-toxic) or vPvB (vP-very persistent, vB-very bioaccumulative) substances. Product assessments for PBT / vPvB criteria see Subsection 12.5 ("Results of PBT and vPvB assessment").

The substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Name of the substance:	RESIDUES (PETROLEUM), STEAM-CRACKED
Index number (index):	649-018-00-6
CAS number:	64742-90-1
EC number:	265-193-8
Concentration [% hm.]:	100

<p><i>this UVCB substance contains the following components</i></p> <ul style="list-style-type: none"> <i>• in a concentration of $\geq 10\%$ or</i> <i>• influencing the classification of this substance:</i> 	NAME :	IDENTIFIER :
	naphthalene	naphthalene (index 601-052-00-2, CAS 91-20-3, EC 202-049-5)
	biphenyl	biphenyl; diphenyl (index 601-042-00-8, CAS 92-52-4, EC 202-163-5) M faktor: Aquatic Acute 1, H400: M = 1 Aquatic chronic 1, H410: M = 1
	methylnaphthalenes	methylnaphthalenes (CAS 1321-94-4, EC 215-329-7) 2- methylnaphthalenes (CAS: 91-57-6) 1- methylnaphthalenes (CAS: 90-12-0)
	polycyclic aromatic hydrocarbons	phenanthrene (CAS 85-01-8, EC 201-581-5) anthracene (CAS 120-12-7, EC 204-371-1) fluoranthene (CAS 206-44-0, EC 205-912-4) pyrene (CAS 129-00-0, EC 204-927-3)

Note: The UVCB substance does not contain a nanoform.

Note: Specific concentration limits (SCL), M-factor (M-) and Acute toxicity estimate (ATE) were not determined for this UVCB substance (harmonized classification).

3.2. Mixtures

Not applicable, the product is a substance.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

4.1.1. General instructions

When providing first aid pay attention to self-protection.

Call emergency medical services (☎ 155 ČR, ☎ 120 EU) and follow their instructions until their arrival. First aid must be always administered with the objective to preserve the basic bodily functions - should the victim become unconscious or should he/she stop breathing, start resuscitation immediately (chest compression and mouth-to-mouth resuscitation with the 30:2 ratio). When the victim is unconscious but is breathing NORMALLY, put him/her in the recovery position. The condition of the patient can change very quickly, so you need to watch him/her constantly and continuously monitor his/her consciousness status and breathing. Keep patient warm and at rest.

If the person is in unconscious or if he/she has spasms, do not put anything in his/her mouth, just put him/her into a stabilised position.

4.1.2. When inhaled

Transport the victim to fresh air, do not let them get cold and secure professional medical help.

4.1.3. Skin contact

Remove contaminated clothing and shoes. Thoroughly wash the affected areas with water (ideally tepid) and soap, and keep rinsing for at least 15 minutes. If symptoms persist, secure professional medical help.

Shall there be any burns, do not remove the product, cover the affected area using a sterilized bandage (or a clean piece of fabric) and immediately secure professional medical help.

4.1.4. Contact with eyes

Immediately start washing wide open eyes under flowing tepid water and continue for at least 15 minutes. If the patient has contact lenses, remove them before washing his/her eyes. Protect unharmed eye. Secure professional medical help.

4.1.5. When ingested

Secure professional medical help as soon as possible. Clean mouth with water. Do not give milk or

alcoholic beverages. Never give anything by mouth to an unconscious person. Consider use of charcoal as a slurry (240mL water/30 g charcoal). Usual dose: 25 to 100 g in adults.

DO NOT INDUCE VOMITING! If the patient is vomiting on his/her own, keep his/her head below his/her hips to prevent him/her from inhaling his/her own vomit. Secure professional medical help as soon as possible.

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

Based on the exposure dose, the substance may cause headaches, sore throat, coughing, breathing difficulties, chest pressure, disruptions of the central nervous system, nausea, sleepiness and dizziness. Consumption may lead to abdomen spasms, spontaneous vomiting and diarrhea. Direct contact with eyes or skin may cause irritation and the affected area can turn red; swelling and tearing can also occur. Prolonged skin exposure to the substance may dry the skin and cause its cracking.

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

In case of consumption or burns, immediate medical assistance is necessary. If gastric lavage is necessary, it may be performed only by a qualified doctor via endotracheal intubation and, after the procedure, the victim has to be continuously monitored for 48-72 hours.

We recommend the workplace to be equipped with a safety shower and a device for washing eyes.

SECTION 5: FIREFIGHTING MEASURES**5.1. Extinguishing media**

Suitable extinguishing media: heavy foam, water spray or mist.

Inappropriate extinguishing media: direct water stream.

Extinguishing small fires: powder or foam extinguishers, dry sand or extinguishing foam.

5.2. Special hazards arising from the substance or mixture

The vapors are heavier than air. They accumulate and spread near the ground to significant distances and in contact with a source of ignition may cause back-up with subsequent explosion and / or fire. This danger is imminent especially in places below the ground or in enclosed areas. Toxic or irritating vapors containing carbon monoxide, carbon dioxide or unburned hydrocarbons (smoke) might be produced during burning.

5.3. Advice for firefighters

Minimize the penetration of extinguishing medium contaminated by the substance into the sewage, surface or underground waters or into the soil.

Do not allow run-off from fire fighting to enter drains or water courses – may cause explosion hazard in drains and may reignite on surface water.

Use water spray to keep the containers with the substance cool in order to prevent an explosion caused by the heat.

Do not use foam and water at the same time because water dissolves the foam.

Protective equipment for fire fighters: full protective gear and self-contained close-circuit breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES**6.1. Personal precautions, protective equipment and emergency procedures**

Seal off the place and prevent access to the endangered area. Remain on the windward side. There is a danger of fire in case of accidental leaks of this substance, therefore remove all possible ignition sources, do not smoke and do not manipulate with open fire. If possible, ensure a sufficient ventilation of enclosed spaces. Prevent contact with the substance and its vapors. Use all recommended personal protective equipment (as indicated in Subsection 8.2) when removing the effects of the emergency event/accident. In the case of large-scale accidents, evacuate people from the entire endangered area. There is a danger of vapors explosion in case of substance initiation in places below the ground or in enclosed places (including sewage).

6.2. Environmental precautions

Prevent further leaking and seal off the leaking place. Prevent leakage of the substance into the sewage, basement or confined areas, surface and underground waters by covering sewage inlets. Inform the relevant

authorities if rivers, lakes or sewage systems have been contaminated during the leak. Do not allow the substance to enter into soil/subsoil.

If the spillage to environmental (surface or underground water, soil) inform respective authorities.

6.3. Methods and material for containment and cleaning up

In the case of a leak of this product, there is a danger of fire; therefore only explosion-proof lights and electrical equipment and non-sparking tools must be used. Absorb the remains into a suitable non-flammable porous/absorbent material (e.g. sand, dirt, siliceous earth, vermiculite) and transport them for disposal in sealed containers. Dispose the substance in accordance with valid legal regulations related to waste (see Section 13). For large leaks into water, use floating barrage and collect the substance from surface using surface skimmers (separators) or cover the leaked substance with sorbent and remove saturated sorbent from the surface by scraping or exhausting. Consult experts prior to using any dispersing agents.

6.4. Reference to other

For recommended personal protective aids – see Subsection 8.2. (“Exposure controls”).

For recommended manner of removing waste – see Section 13 (“Disposal considerations”).

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Adhere to all fire safety precautions (no smoking, no open fire, removal of all possible combustion sources, avoid contact with oxidizing agents) and stay in well-ventilated areas when handling the substance as well as empty containers (may contain residue). Do not perform activities such as welding, cutting, grinding etc. near containers (even empty ones). Do not use compressed air for emptying, filling or any other handling. Prevent bolts of static electricity. The vapour is heavier than air, beware of accumulation in pits and confined spaces. General sanitary precautions: Please keep the rules of personal hygiene. Take off contaminated pieces of clothing. Do not eat, drink or smoke during work! Wash your hands and exposed parts of body thoroughly with soap and water after work and before meal and possibly treat with suitable repair lotion. Do not wear contaminated clothing, shoes or protective equipment in the catering area.

Provide specific activity training to operators to minimise exposures.

7.2. Conditions for safe storage, including any incompatibilities

Storage must comply with the fire safety requirements related to buildings. Electric equipment must comply with the valid legal regulations. Store in cool, well-ventilated places with an efficient exhaust system, away from all heat and combustion sources. Storage containers must be closed, properly labeled and grounded. Recommended material suitable for containers is soft or stainless steel. Do not store near incompatible materials, such as oxidizers (oxygen, air etc.) or other flammable materials.

Cleaning, inspection and maintenance of the internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulation. Dispose of rinse water in accordance with local and national regulations.

7.3. Specific end use(s)

The substance is intended for specific use as industrial fuel and chemical intermediate covered by the recommendations in annexed exposure scenario ES 3 "Use of fuel oil as an intermediate in industry" and ES 4 "Use of fuel oil as industrial fuel", which are included in the annex to this Safety Data sheet.

Only for professional users.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

8.1.1. Occupational exposure limit values

The following Permissible Exposure Limits (PELs) and Maximum Allowable Concentrations (NPK-P) of Chemicals in the Atmosphere of Workplaces within the Czech Republic are set by the Government Regulation No. 361/2007 Coll., determining conditions of occupational health protection, as amended:

Name	CAS number	PEL [mg.m ⁻³]	NPK-P [mg.m ⁻³]	Note
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PYROLYSIS FUEL OIL

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006 (REACH), as amended

Valid Issue: 30/08/2024 – version 12

Revision: 30/08/2024 – 12th issue
replaces: 30/09/2021 – 11th issue
issued on: 07/16/2004

Residues (petroleum), steam-cracked	64742-90-1	Limit values for the substance have not been determine <i>It is recommended to comply with the limits specified for individual components, present in this substance:</i>	
Substance components:	NAME / CAS NUMBER:	PEL [mg.m ⁻³]	NPK-P [mg.m ⁻³]
	biphenyl / 92-52-4	1	3
	naphthalene / 91-20-3	50	100
Decomposition products:	NAME / CAS NUMBER:	PEL [mg.m ⁻³]	NPK-P [mg.m ⁻³]
	Carbon monoxide / 630-08-0	23	117
	Carbon dioxide / 124-38-9	9 000	45 000

Note 1: An explanation of the meaning of the PEL and NPK-P abbreviations is in section 16.

Note 2: Occupational exposure limit values for EU countries are listed in section 16.

8.1.2. DNEL/DMEL values

EXPOSURE OF WORKERS / EMPLOYEES			
EXPOSURE	IMPACTS	POINT OF ENTRY	DNEL/DMEL
acute	system	skin	non-threshold effect and/or no data on reaction to a dose
acute	system	inhaling	
/	/	/	/
acute	local	skin	non-threshold effect and/or no data on reaction to a dose
acute	local	inhaling	
long-term	system	skin	23.4 mg/kg.bw/d
long-term	system	inhaling	other tox. threshold 0.8 mg.m ⁻³
/	/	/	/
long-term	local	skin	non-threshold effect and/or no data on reaction to a dose
long-term	local	inhaling	

Note 1: There isn't insufficient information to determine the dermal, inhalation (or oral) DNEL / DMEL value for acute systemic and local effects and long-term local effects of substance. The risk characterization focused on the possibility of causing serious long-term systemic effects.

Note 2: An explanation of the meaning of the DNEL/DMEL abbreviations is in section 16.

8.1.3. PNEC values

Determination of concrete PNEC values based on experimental data obtained by testing modified water fractions containing dissolved/emulsified/suspended shares of the tested substance (WAF – “Water accommodated Fraction”) is not suitable for UVCB substances of the hydrocarbon type. The risk characterization of the product for the environment was thus determined statistically, using the hydrocarbon block method of extrapolating HC5 with the PETROTOX model, v.3.05.

	PNEC values	Note
Freshwater	PNEC aqua (freshwater): 80µg/L	Extrapolation method: Assessment factor: 10
Marine water	PNEC aqua (marine water): 8µg/L	Extrapolation method: Assessment factor: 100
Sediment (freshwater)	PNEC sediment (freshwater): 0.852 mg/kg sediment dw	Extrapolation method: equilibrium partitioning method
	PNEC sediment (marine water): 85.2 µg/kg sediment dw	Extrapolation method: equilibrium partitioning method
Sewage treatment plant	PNEC STP: 39 mg/L	Extrapolation method: sensitivity distribution, Assessment factor: 1
Soil	PNEC soil: 0.123 mg/kg soil dw	Extrapolation method: equilibrium partitioning method

- 8.1.4. Recommended monitoring of the concentration in the workplace
Gas chromatography (GC) with a flame ionizing detector (FID) or a mass spectrometer (MS) in accordance with technical norms ČSN EN 689 and ČSN EN 482.

8.2. Exposure control

- 8.2.1. Technical protective measures for limiting the exposure of people and the environment
Exposure control of unwanted exposure of humans and the environment must be ensured by strictly keeping the substance under control by using process and control technologies, which reduce emissions and subsequent exposure with the goal of preventing the substance from entering the air and water systems as well as the soil, and of preventing possible human exposure. The areas where the substance is stored and handled must be equipped with impermeable floors and retaining tanks in case of emergency leaks. It is necessary to ensure global as well as local ventilation and efficient exhaustion.

8.2.2. Individual protective measures

If an accident or extraordinary event causes increased exposure, employees must have access to personal protective measures (PPM) for the protection of airways, eyes, hands and skin, depending on the nature of the performed activities. Suitable protection for airways must also be available where it is not technically possible to ensure the adherence of exposition limits identified for the work environment or ensure that exposure via airways will not affect the health of people. During non-stop use of these measures during permanent work, it is necessary to include safety breaks if the nature of the PPM requires them. All PPM need to be kept in usable condition and damaged or contaminated ones need to be immediately replaced.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

(the specific type of protective equipment must be chosen according to the type of activity being carried out and the quantity and concentration of the dangerous substance / mixture at the workplace)

- *Respiratory protection:* Protective mask compliant with EN 140 with a filter that is suitable against organic gases, insulation breathing apparatus (use the mask in case of insufficient ventilation and / or local exhaustion and product leakage);
- *Eye/face protection:* Protective chemical goggles compliant with EN 166;
- *Hand protection:* chemically resistant gloves tested according to EN 374, e.g. the following materials are suitable:

	<i>Glove material</i>	<i>Material thickness</i>	<i>Penetration time</i>
Regular work activities (staining risk)	natural latex	1 mm	120 minutes
Leak / accident liquidation	nitrile	0.4 mm	480 minutes

- *Protection of other body parts:* Antistatic, inflammable protective clothes, antistatic shoes;
- *Thermal risk:* Not relevant for the given manner of the use.
- *Other measures:* We recommend that the workplace is equipped with a safety shower and eye rinse facilities.

8.2.3. Environmental exposure controls

Avoid product leakage to the environment with all available means. See section 6.2.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

The information is taken from the registration dossier of substance (CSR) unless otherwise stated.

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Physical state		Viscid liquid		at 20°C; 101,3 kPa
Colour		Dark brown to black		
Odour		Characteristic, aromatic		

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Odour threshold	[mg.m ⁻³]	<i>data for the components:</i> 0.084 (naphthalene) 0.0062-0.3 (biphenyl)	search data	CSR does not specify
Melting point/freezing point	[°C]	-63 až +53		effect of variable UVCB composition
Boiling point or Initial boiling point / boiling range	[°C]	72-390		effect of variable UVCB composition
Flammability (solid, gas, liquid)		Flammable liquid		Own tests (more in 9.2.1)
Upper flammability / explosive limits	[g.m ⁻³]	Not specified	own tests	CSR does not specify Own tests at 130°C For technical reasons, the measurements of the characteristics at the upper explosion limit could not be finished (due to the content of high boiling components, the sample was not completely evaporated).
Lower flammability / explosive limits	[g.m ⁻³]	400	own tests	CSR does not specify Own tests at 130°C (ČSN ISO 6184-3)
Flash point	[°C]	min. 101 85-101	own tests	ČSN EN ISO 2592 (OK) ČSN EN ISO 2719(UK)
Auto-ignition temperature	[°C]	453-480		
Decomposition temperature	[°C]	Does not decompose at normal usage temperatures.		CSR does not specify
pH value		Irrelevant		CSR does not specify
Kinematic viscosity	[mm ² /s]	> 3820	own tests	at 40°C ČSN EN ISO 3104
Solubility in water	[mg.l ⁻¹]	25 - 41		at 20°C
Partition coefficient: n-octanol/water	[log Kow]	2,4 – 6,5		at 23-25°C; effect of variable UVCB composition
Vapour pressure	[kPa]	0,071 – 2,592 0,4 – 5,150		at 19,9 - 25°C at 35,4 - 50°C
Relative density		0,964 – 1,11		at 20°C
Vapour density	Air=1	<i>data for the components:</i> 5,31 (biphenyl) 4,42 (naphthalene)	search data	CSR does not specify
Particle characteristics		Irrelevant		Not applicable - this is a liquid.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosivity - Classification: data conclusive but not sufficient for classification.

Flammable liquid - Based on flash point, does not meet the criteria for CLP classification. It is classified into IV. hazard class according to ČSN 65 0201.

Oxidising potential - Classification (liquid): data conclusive but not sufficient for classification.

9.2.2. Other safety characteristics

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Evaporation rate	butylacetate=1	<i>data for the components: < 1 (naphthalene)</i>	search data	CSR does not specify
Dynamic viscosity	[mm ² .s ⁻¹]	> 3820	own tests	at 40°C ČSN EN ISO 3104
Calorific value	MJ/kg	39,0-40,0	own tests	

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

No threat of reactivity during storage and handling under the conditions listed in Section 7.

10.2. Chemical stability

The product is chemically stable when handled and stored under the conditions listed in Section 7.

Does not decompose at normal usage temperatures.

10.3. Possibility of hazardous reactions

No threat of dangerous reactions during storage and handling under the conditions listed in Section 7.

10.4. Conditions to avoid

Ignition sources (including static electricity), high temperature, creation of explosive mixtures with air.

10.5. Incompatible materials

Oxidizers.

10.6. Hazardous decomposition products

Heat decomposition at high temperatures, e.g. during fires, may create carbon monoxide, carbon dioxide.

SECTION 11: TOXIKOLOGICAL INFORMATION

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

11.1.1. Toxicological effects of the substance

HAZARD CLASS	DATA FROM REGISTRATION DOCUMENTATION		EVALUATION
	DESCRIPTION	RESULT	
Acute toxicity	Oral (OECD 401): Inhalation 7h (OECD 403): Dermal (OECD 402):	LD ₅₀ > 2000 mg/kg bw LC50 > 1 600 mg/m ³ LD ₅₀ > 2000 mg/kg bw Product with a naphthalene content below 25% has no acute toxic effects	Based on available data, does not meet the classification criteria.
Skin corrosion/irritation	Tests of the product and the components contained within the category (OECD 404, rabbit)	Product irritates skin	Meets the classification criteria (H315)
Serious eye damage/irritation	Tests of the product and the components contained within the category (OECD 405, rabbit)	Product does not irritate eyes	Based on available data, does not meet the classification criteria.

HAZARD CLASS	DATA FROM REGISTRATION DOCUMENTATION		EVALUATION
	DESCRIPTION	RESULT	
Sensitisation	Mineral oils tests	Product does not sensitisation. / Product, or its components do not cause allergic reactions.	Based on available data, does not meet the classification criteria.
Germ cell mutagenicity	Tests of the product and the components contained within the category (OECD 471; OECD 476)	Positive mutagenic effects were reported in the in vitro CHO/HGPRT test for point mutations. A significant increase in mutation frequency was seen at concentrations of 500 µg/mL and above when tested with metabolic activation. OECD 476: genotoxicity: positive - >= 500 µg/mL (Chinese hamster Ovary) cytotoxicity - 32-750 µg/mL (Chinese hamster Ovary).	Meets the classification criteria (H340)
Carcinogenicity	Tests oral, inhalation, dermal (mouse, rat)	Harmful effects are observed. oral: LOAEL(rat) = 25mg/kg bw/day (chronic); inhalation: LOAEC (mouse) = 960mg/m ³ (chronic); dermal: (mouse) carcinogenic effects observed after skin paiting (chronic)	Meets the classification criteria (H350)
Reproductive toxicity	1/ Fertility tests (OECD 416; 415) 2/ Developmental toxicity tests (OECD 414)	The specific stream marker constituents: benzene, toluene, ethylbenzene, styrene, naphthalene and anthracene do not reveal reproductive toxicity of a severity that would warrant classification. In addition, controls to protect against carcinogenicity will further mitigate any risk to reproduction or to foetal development.	Based on available data, does not meet the classification criteria.
STOT-single exposure	Acute toxicity tests (oral, dermal, inhalation)	No toxic effects in the tests	Based on available data, does not meet the classification criteria.
STOT-repeated exposure	Tests of the product and the components contained within the category.	Oral: LOAEL (krysa) = 25 mg/kg bw/day (subchronic) Inhalation: NOAEC (human) =11,2 mg/m ³ (chronic) Product containing less than 1% benzene and / or toluene does not show any harmful effects.	Based on available data, does not meet the classification criteria.

HAZARD CLASS	DATA FROM REGISTRATION DOCUMENTATION		EVALUATION
	DESCRIPTION	RESULT	
Aspiration hazard		Hydrocarbons with kinematic viscosity > 20.5 mm ² .s ⁻¹ at 40°C. The individual components of the substance do not meet the criteria for classification.	Based on available data, does not meet the classification criteria.

11.1.2. Information on likely routes of exposure

Exposure may occur via inhalation, random consumption or by penetrating through skin.

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

Based on the exposure dose, the substance may cause headaches, sore throat, coughing, breathing difficulties, chest pressure, disruptions of the central nervous system, nausea, sleepiness and dizziness. Consumption may lead to abdomen spasms, spontaneous vomiting and diarrhea. Direct contact with eyes or skin may cause irritation and the affected area can turn red; swelling and tearing can also occur. Prolonged skin exposure to the substance may dry the skin and cause its cracking.

The substance may induce heritable genetic changes and cause or support the onset of human cancer.

Handling hot (heated) product can result in burns, causing aching skin that turns red and, in more serious cases, blisters can develop.

11.1.4. Interactive effects

There are no interactions for identified use.

11.2. Information on other hazards

The substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive (due to the characteristics that can compromise endocrine activities or due to any other reason).

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Water environment	Fish	LL ₅₀ (96 h) = 1,1-48 mg/l
	Invertebrates	EL ₅₀ (48 h) = 1,2-13 mg/l
	Algae	ErL ₅₀ (72 h) = 2,1-12,2 mg/l
Evaluation: Streams are not rapidly degradable and have a Log Kow range >2.4 and <6.5. Under classification and labelling regulations this would lead to a classification of Aquatic Chronic Category 2. Classification will be based on WAF data.		
Soil macro-organisms	Eisenia fetida	LL ₅₀ (28d): 158 mg/kg soil dw QSAR EL ₁₀ (56d): 30.2 mg/kg soil dw QSAR
	Folsomia candida	LL ₅₀ (28d): 88.6 mg/kg soil dw QSAR EL ₁₀ (28d): 17 mg/kg soil dw QSAR
Terrestrial plants	Avena sativa	LL ₅₀ (14d): 405 mg/kg soil dw QSAR EL ₁₀ (21d): 77.6 mg/kg soil dw QSAR
	Brassica rapa	EL ₁₀ (21d): 50.1 mg/kg soil dw QSAR
Terrestrial organisms	Folsomia candida	LL ₅₀ (14d): 88,6 mg/kg soil dw QSAR EL ₁₀ (21d): 17 mg/kg soil dw QSAR
Microbiological activity (STP)	Activated sludge	LL ₅₀ (72h): 17.6 mg/L QSAR EL ₁₀ (72h): 0.824 mg/L QSAR

Note: An explanation of the meaning abbreviations is in section 16.

12.2. Persistence and degradability

Biological decomposability: The product is not easily biologically decomposable.

Abiotic degradability:

- Hydrolysis as a function of pH: It is not expected that the product is affected by hydrolysis;

- Photolysis: It is not expected that the product is affected by photolysis;
- Atmospheric oxidation: Fast decomposition through indirect photolysis in the air is expected.

12.3. Bioaccumulative potential

Because the value of distribution coefficient n-octane/water (log Kow) determined for individual components is within the range 1-6 and the calculated bioconcentrations BCF factor is between 39 and 18 220, the product's potential for bioaccumulation cannot be exactly confirmed. It is only possible to conclude that some of the included components are not bioaccumulative, while others have a smaller or greater potential for bioaccumulation.

12.4. Mobility in soil

A log Koc values have been calculated for the eight components contained in the product. This value is between 2.44 and 4.55. It means that we can expect medium to strong sorption of individual components in the soil.

12.5. Results of PBT and vPvB assessment

Based on an assessment of available data the UVCB substance on its own is not a PBT / vPvB substance according Appendix XIII of EC Regulation No 1907/2006 REACH. The information available on the constituents indicates that some constituents in the category streams fulfil the criteria for persistence and bioaccumulation. Such constituents are Anthracene, Benzo(k)fluoranthene phenanthren a benzo (a) pyren (which are SVHC substances included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive due to PBT/vPvB properties).

The substance on its own is inter alia classified as Carc. 1B, H350 and Muta 1B, H340. Compliance with the conditions set out in the exposure scenarios and industrial and professional uses only ensure the minimization of the emission of all constituents including PBT/vPvB constituents.

12.6. Endocrine disrupting properties

The substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive due to the characteristics that can compromise endocrine activities.

12.7. Other adverse effects

Pursuant to Appendix 1 of Act No. 254/2001 Coll. (the Water Act), the product is considered a hazardous harmful substance.

SECTION 13: DISPOSAL CONSIDERATIONS**13.1. Waste treatment methods**

In the event that it is necessary to dispose of the rest of the product (eg unused or leaked product), the applicable European Union legislation as well as applicable national and local regulations must be observed. Dispose of waste at a waste disposal facility.

Recommended waste classification according to Decree No. 8/2021 Coll., On the Waste Catalog and assessment of waste properties.

13.1.1. Catalogue number

Catalogue number for products that have become waste:

07 01 04* Other organic solvents, washing liquids and mother liquors.

16 03 05* Organic waste containing dangerous substances.

Catalogue number for leaked product absorbed into an absorption agent (e.g. vapex):

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

Catalogue number for soil contaminated by leaked product:

17 05 03* Soil and stones containing dangerous substances.

13.1.2. Recommended waste removal method

Deliver the unusable remainder of the product for disposal to a professionally qualified person with the appropriate authorization.

Recommended removal method: Energy utilization (burning)

13.1.3. Recommended methods of contaminated containers disposal

Not relevant. Product is not packed, it is transported through railroad cisterns.

13.1.4. Measures for limiting exposure when handling waste

Do not flush leaked product during an emergency event or accident into sewage. Proceed in accordance with instructions provided in Section 6 („Accidental release measures“) and in Subsection 8.2. („Limiting exposure“) and adhere to all valid legal regulations for the protection of people, air and water.

WARNING: The stated information is of a recommendation character. It is related to the delivered, still unused material. Pursuant to the Waste Act all responsibilities for managing the waste, including its assignment based on its type and category, are responsibilities of the waste originator.

SECTION 14: TRANSPORT INFORMATION

The listed information applies to road transport (ADR) and rail (RID) transport of dangerous goods:

- 14.1. UN number or ID number:** 3082
- 14.2. UN proper shipping name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (pyrolysis fuel oil)
- 14.3. Transport hazard class(es):** 9
- 14.4. Packing group:** III
- 14.5. Environmental hazards:** based on the criteria of the UN sample regulations, the product is harmful to the environment
- 14.6. Special precautions for user:** none
- 14.7. Maritime transport in bulk according to IMO instruments:** the product is not designated for bulk transport pursuant to the International Maritime Organization (IMO) documents
- 14.8. Other information**
- Hazard identification number: 90
- Classification code: M6
- Labels: 9 + symbol for environmental hazard (symbol: fish and tree)

**SECTION 15: REGULATORY INFORMATION****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****15.1.1. European Union**

Regulation of the European Parliament and Council (EC) No. 1907/2006 (REACH), as amended

REGISTRATION (TITLE II OF THE REACH REGULATION)

the product was fully registered as a substance

AUTORISATION (TITLE VII OF THE REACH REGULATION)

the product is not listed in the list of substances in Annex XIV of EC Regulation No 1907/2006 REACH, and so no licensing obligation applies

RESTRICTION (TITLE VIII OF THE REACH REGULATION)

annex XVII – point 3., point 28. - restrictions are met by determining identified uses

Regulation of the European Parliament and Council (EC) No. 1272/2008 (CLP), as amended

the product has been classified in compliance with the stated regulation, packaging and labeling obligations of dangerous chemicals only apply to the product if it is marketed in packaging subject to its labelling according to CLP regulation

Regulation of the European Parliament and Council (EC) No. 649/2012 on the export and import of dangerous chemicals, as amended

the product is not subject to special import or export restrictions

Commission decision 2014/955/EU of 18 December 2014, amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

EP and Council Regulation (EC) No. 2019/1148 (explosives precursors), as amended

Annex I - EXPLOSIVES PRECURSORS SUBJECT TO RESTRICTIONS - *Substance not contained.*

Annex II - EXPLOSIVE PRECURSORS SUBJECT TO NOTIFICATION - *Substance not contained.*

The Seveso III Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances – product listed

15.1.2. Czech Republic

Act No. 350/2011 Coll. on Chemical Substances and Chemical Mixtures, as amended

the product is not subject to the obligation of notification to the information system PCN (Poison centres notification)

Act No. 258/2000 Coll. on the Protection of Public Health, as amended

Act No. 254/2001 Coll., on Water, as amended

Act No. 201/2012 Coll., on Air Protection, as amended

Act No. 541/2020 Coll., on Waste, as amended

Regulation No. 8/2021 Coll., on the Waste Catalogue and on Assessing Waste Characteristics, as amended

Governmental decree no. 361/2007 Coll., laying down occupational health and safety conditions

product components have exposure limits; the product is subject to the obligation to establish a controlled zone

Act no. 224/2015 Coll., on prevention of serious accidents caused by selected dangerous chemical substances or mixtures

15.2. Chemical safety assessment

Chemical safety assessment was performed when the substance was registered. The substance fulfils the criteria for being classified as dangerous in accordance with EC Regulation No. 1272/2008 CLP. Exposure assessment and following risk characterization have been performed.

Exposure scenarios according to Article 31 of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council (REACH) are attached to the safety data sheet.

SECTION 16: OTHER INFORMATION

Changes adopted as a part of the revision process

02/07/2005: Revision (2): Editing information in the sections 9, 12.5 and 15.2

12/01/2006: Revision (3): Editing information in the sections 1, 2, 4, 8, 13 and 16

03/01/2007: Revision (4): Editing information in the sections 1 and 16

06/01/2007: Revision (5): Complete revision of the document in relation to the Regulation (EC) No 1907/2006 of the European Parliament and of the Council

12/01/2009: Revision (6): Editing information in the sections 1, 2.1, 3, 8.1, 15, 16 and the „Declaration“

12/01/2010: Revision (7): Editing information in the sections 1 (registration number), 2 (classification and labeling according to CLP), and 16

08/01/2011: Revision (8): Complete revision of the document in relation to the updating of Annex II of Regulation (EC) No 1907/2006 REACH in accordance with Annex I of Commission Regulation (EU) No 453/2010

01/01/2012 / 8(1): Section 15.1.2 – updating legislation

01/06/2012 / 8(2): Section 1.1 - identifiers, Section 1.3 – update contact and Section 16 – abbreviations

05/31/2015 / 8(3): Section 1 (contact information), Section 2, Section 15.1 (update of legal regulations) and 16 (text deletion)

11/01/2016 / 8(4): Section 1 (contact information), Section 14 and 15 (editing in accordance with Regulation (EC) no. 830/2015), Section 15 (legislation update)

02/01/2018: Revision (9) Unification of SDS format after the Čer merger into UNIPETROL RPA, including the editing of data in sections 1, 8, 9, 11, 12, 13, 15 and 16, classification update

01/01/2020 / 9(1): Editing information in the sections 14

06/01/2020: Revision (10) New annex - Exposure scenarios

- 30/09/2021: Revision (11) – Overall modification of the document in relation to the update of Appendix II of Directive (EC) No. 1907/2006 REACH, by Directive of the Council (EC) No. 2020/878;
Editing data in dept. 2.3, 4, 5, 6, 7, 8, 9, 11, 12 and the exposure scenarios in the Annex in connection with the CSR update;
Data modification in Sections 13 and 15 - update of the legal regulations;
Data modification in Section 1 – change of the company name;
- 30/08/2024: Revision (12): Editing data in dept. 3, 8, 9 and the exposure scenarios in the Annex in connection with the CSR update;

Acronyms and abbreviations used in the text

ADR	Agreement concerning the International Carriage of Dangerous Goods by Road
CAS	Registration number assigned to the substance by the Chemical Abstracts Service of the American Chemical Society
CLP	EU Directive No. 1272/2008 on Classification, Labeling and Packaging of chemical substances and mixtures, which is implemented into the European legislature by the means of GHS (United Nations' Globally harmonized System) for classifying and labeling chemical substances
CMR	Carcinogenic, mutagenic or toxic for reproduction
ČSN EN (ISO)	European standard incorporated into the Czech technical standards
CSR	Chemical Safety Report
DMEL	Derived minimal effect level - an exposure level that corresponds to a low and possibly theoretical risk, which should be considered as an acceptable risk (for thresholdless effects, i.e. there is no exposure level without effect)
DNEL	Derived no-effect level - level of exposure derived from toxicological data that does not produce any adverse effects on human health
DW	Data waiving
EC ₅₀	Effective concentration EC ₅₀ is the concentration of substance that causes immobilization of 50% of individuals
EL ₁₀	Load intensity in response of 10% of individuals (effect level for 10%)
ErC ₅₀	Effective concentration EC ₅₀ is the concentration of substance that causes 50 % decrease of Algea growth
ECHA	European Chemicals Agency
ES	Official number of the chemical substance in the European Union: EINECS from the European Inventory of Existing Commercial Substances, or ELINCS from the European List of Notified Chemical Substances, or NLP from the No Longer Polymer list
HSDB	Hazardous Substances Data Bank
IATA	International Air Transport Association
IBC	Intermediate Bulk Container
IC ₅₀	Inhibition concentration IC ₅₀ that causes inhibition of 50% of individuals
ICAO	International Civil Aviation Organization
ICE	"Intervention in Chemical Transport Emergencies" system providing both professional and practical assistance in dealing with emergency situations related to the transport and storage of hazardous chemicals
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
ISO	International Organization for Standardization
LC ₅₀ /LD ₅₀	Lethal concentration/level is the concentration/level of substance that causes mortality of 50 % individuals
LL ₅₀	Fatal load for 50% of individuals (lethal load for 50%)
LOEC/LOEL	Lowest Observed Effect Concentration/Level
log K _{ow}	Logarithm of distribution coefficient n-octanol/water
nf	Not feasible
NOAEC/NOAEL	No Observed Adverse Effect Concentration/No Observed Adverse Effect Level
NOEC/NOEL	No Observed Effect Concentration/No Observed Effect Level



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NPK-P	The highest permitted concentration of the chemical substance in the air (the concentration of the substance that a worker may be exposed to for a maximum of 15 minutes but which must never be exceeded)
OECD	Organization for Economic Co-operation and Development
OOP	Recommended personal protective aids
OSN	United Nations
(Q)SAR	Quantitative Structure-Activity Relationship
PBT, vPvB	Persistent, bioaccumulative and toxic; high persistent and high bioaccumulative
PCN	Poison Centres Notification – international system for the notification of dangerous mixtures
PEL	Permitted exposure limit of the chemical substance in the air (the exposure value that an employee may be exposed to during the entire working shift (8 hours), without endangering his health during lifetime occupational exposure)
PNEC	Predicted No Effect Concentration
REACH	EU Directive No. 1907/2006 on Registration, Evaluation and Authorization of Chemicals
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
STOT	Specific Target Organ Toxicity
STP	Sewage treatment plant
su	Scientifically Unjustified
TRINS	Transport Information and Accident System of the Czech Republic, providing professional and practical assistance in dealing with emergency situations related to transport and storage of hazardous chemical substances, included in ICE
UACRON	Chemical database (The University of Akron).
UFI code	Unique identifier of the composition of the product containing the dangerous mixture (s).
UN	The four-digit identification number of the substance or object identifying hazardous material in international transport
UVCB	Substances of Unknown or Variable composition, Complex reaction products or Biological materials

Data sources used for preparing the material safety sheet

Annexes I, IV, VI and VII to Regulation (EC) No. 1272/2008 CLP, as amended;
Principles for providing first aid upon being exposed to chemical substances;
Substance registration documentation pursuant to Regulation (EC) No. 1907/2006 REACH;
Decision of ECHA No. SUB-D-2114147706-45-01/F on registration in accordance with EC Regulation No. 1907/2006, REACH;
Certificate No. 2003005/ÚPM - Institute of Fuels and Lubricants, Prague;
Protocol No. 5040 – Prague Fire Protection Technical Institute;
Test protocol No. 04366-RP VVUÚ, a.s. Ostrava-Radvanice;
Research data sources (Hazardous Substances Data Bank HSDB, Sicherheitstechnische Kenndaten chemischer Stoffe SORBE, MedisAlarm, University of Akron Chemical UAKRON, Portail Substances Chimiques INERIS, Gestis sanitary limits);

Full text of H-/ EUH-sentences and abbreviations of hazard classes stated in Section 2 and/or 3

H 315	Causes skin irritation.
H 340	May cause genetic defects.
H 350	May cause cancer.
H 411	Toxic to aquatic life with long lasting effects.
Aquatic Chronic	Hazardous to the aquatic environment, category Chronic toxicity
Carc.	Carcinogenicity
Muta	Germ cell mutagenicity
Skin Irrit.	Skin irritation

Training instructions

Persons handling the product must be advised of the risks involved in handling the product and the health and environmental protection requirements (see applicable provisions of the Labor Code).

Access to information

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Pursuant to Article 35 of Directive (EC) No. 1907/2006 REACH, every employer is obliged to allow access to the information stated on the given material safety sheet to all workers who use this product or are exposed to its impacts while working, and also to representatives of these workers.

Occupational exposure limit values for EU countries (see point 8.1.1)

data for Residues (petroleum), steam-cracked (number CAS 64742-90-1)

Name	Country	8-hour limit [mg.m ⁻³]	Short-term limit [mg.m ⁻³]
Residues (petroleum), steam-cracked	European Union (Regulation No. 2000/39/EC)	Limit values for the substance itself have not been determine <i>it is recommended to adhere to the limits determined for the components contained in the substance:</i>	
	Hungary		
	Germany		
	Poland		
biphenyl / CAS 92-52-4	European Union	not specified	not specified
	Hungary	1 (skin)	not specified
	Austria	1 (skin)	not specified
	Poland	1 (skin)	2 (skin)
naphthalene / CAS 91-20-3	European Union	not specified	not specified
	Hungary	50	not specified
	Germany (AGS)	2 ¹⁾	8 ¹⁾
	Austria	50 (skin)	not specified
	Poland	20 (skin)	50 (skin)

8-hour limit: Measured or calculated in relation to the 8-hour reference period as a timely weighted average
Short-term limit: Exposure limit value, which shall not be exceeded and which corresponds to a 15-minute period

1) Inhalable fraction and vapour; Skin

Emergency telephone number for EU countries (see subsection 1.4)

National Centers	TELEPHONE	LANGUAGE	Institution / website / email
Belgium	 +070245245	German	http://www.poissoncentre.be Centre Antipoisons, c/o Hôpital Militaire Reine Astrid Rue Bruyn 1, 1120 Bruxelles
Czech Republic	 +420/224-919293; 915402	Czech	http://www.tis-cz.cz Toxikologické informační středisko (TIS) Na bojišti 1, 120 00 Praha 2 e-mail: tis@vfn.cz
France – Orfila (INRS)	 +33/0145425959	French	"Centres Antipoison et de Toxicovigilance (CapTv) Hôpital Fernand Widal" 200 rue du Faubourg Saint Denis 75010 PARIS viviane.damboise@lrp.aphp.fr
France - Angers	 +33/241482121	French	http://www.centres-antipoison.net/angers/index.html
France - Bordeaux	 +33/556964080	French	http://www.centres-antipoison.net/bordeaux/index.html
France - Lille	 +33/0800595959	French	http://www.centres-antipoison.net/lille/index.html
France - Lyon	 +33/472116911	French	http://www.centres-antipoison.net/lyon/index.html
France - Marseille	 +33/491752525	French	http://www.centres-antipoison.net/marseille/index.html
France - Nancy	 +33/383225050	French	http://www.centres-antipoison.net/nancy/index.html
France - Paris	 +33/140054848	French	http://www.centres-antipoison.net/paris/index.html
France - Strasbourg	 +33/388373737	French	http://www.centres-antipoison.net/strasbourg/index.html
France - Toulouse	 +33/561777447	French	http://www.centres-antipoison.net/toulouse/index.html
Ireland	 +353/18092166	English	http://www.poisons.ie/Public
Italy - Bergamo	 +39/800883300	Italian	Istituto Superiore di sanità – Preparati Pericolosi
Italy - Firenze	 +39/0557947819	Italian	
Italy - Milano	 +39/02-66101029	Italian	
Italy - Pavia	 +39/0382-24444	Italian	
Italy - Napoli	 +39/081-5453333	Italian	
Italy - Foggia	 +39/800183459	Italian	
Italy - Verona	 +39/800011858	Italian	
Italy - Roma	 +39/06-49978000,	Italian	



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National Centers		TELEPHONE	LANGUAGE	Institution / website / email
		+39/06-3054343		
Hungary		+36/680201199, 36/0614766464	Hungarian	http://www.okbi.hu/page.php?trid=1&dz=103
Germany		+49/112, +49/116117	German	
Germany - Berlin		+49/3019240	German	https://giftnotruf.charite.de
Germany - Bonn		+49/22819240	German	http://www.gizbonn.de/index.php?id=272
Germany - Erfurt		+49/361730730	German	https://www.ggiz-erfurt.de/home.html
Germany - Freiburg		+49/076119240	German	https://www.uniklinik-freiburg.de/giftberatung.html
Germany - Göttingen		+49/55119240	German	https://www.giz-nord.de/cms/index.php
Germany – Homburg/Saar		+49/684119240	German	http://www.uniklinikum-saarland.de/de/einrichtungen/kliniken_institute/kinder_und_jugendmedizin/informations_und_behandlungszentrum_fuer_vergiftungen_des_saarlandes
Germany – Mainz		+49/613119240	German	http://www.giftinfo.uni-mainz.de/index.php?id=24807
Germany - München		+49/8919240	German	http://www.toxinfo.med.tum.de
Netherlands		+31/302748888	Dutch	http://www.productnotification.nl/
Poland - Kraków		+48/124119999	Polish	http://www.oit.cm.uj.edu.pl
Poland – Gdansk		+48/586820404	Polish	http://www.pctox.pl/news.php
Poland – Poznań		+48/618476946	Polish	http://www.raszeja.poznan.pl/oddzialy/oddzialtoksykologiczny
Poland - Warszawa		+48/607218174	Polish	okzit@burdpi.pol.pl
Austria		+43/14064343	German	Austrian Poison Information Centre (Vergiftungsinformationszentrale-VIZ)
Slovakia		+421/254652307	Slovak	http://www.ntic.sk
Spain		+34/915620420	Spanish	Servicio de Información Toxicológica (SIT) Instituto Nacional de Toxicología y Ciencias Forenses (INTCF) C/José Echegaray nº4, 28232 Las Rozas de Madrid Madrid sit@mju.es / intcf@justicia.es

Declaration: The material safety sheet has been prepared in compliance with Directive (EC) No. 1907/2006 REACH. It includes data that are necessary for securing occupational health and safety and the protection of the environment. These data have been provided in good faith, correspond to the current state of knowledge and experience and are in accordance with our valid legal regulations. The data provided does not replace the quality specification and can not be considered as a guarantee of the suitability and usability of this product for a specific application. It is the responsibility of the product user to assess the accuracy of the information in a particular application where the product's properties can influence different factors. The consumer is responsible for compliance with the appropriate, regionally valid legal regulations.

ANNEX OF MATERIAL SAFETY DATA SHEET

EXPOSURE SCENARIOS ACCORDING TO ARTICLE 31 OF REGULATION (EC) NO 1907/2006 (REACH) OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

The Annex contains exposure scenarios contained in **Chapter 9 of the chemical safety report dated 14/03/2024. (numbering from it is maintained here below)** for identified uses of the substance processed by Chesar v3.7.

Exposure scenario	Title	pages
ES1 (M)	Manufacture of substance - Manufacture of the substance (ECR 1)	26 - 35
ES2 (F)	Formulation & (re)packing of substances and mixtures - Formulation into mixture (ECR 2)	36 - 45
ES3 (IS)	Use as an intermediate - Use as an intermediate (ECR 6a)	46 - 52
ES4 (IS)	Use in fuel - Use of functional fluid at industrial site (ECR 7)	53 - 55

M - Manufacture, F - Formulation, IS - Industrial end use at site

data for Residues (petroleum), steam-cracked (number CAS 64742-90-1)

9.0.3. Introduction to the assessment for the environment

Table 9.2. Tonnage for assessment

Exposure scenario	Title	
ES1 (M)	Manufacture of substance - Manufacture of the substance (ECR 1)	8.38E5
ES2 (F)	Formulation & (re)packing of substances and mixtures - Formulation into mixture (ECR 2)	9.94E4
ES3 (IS)	Use as an intermediate - Use as an intermediate (ECR 6a)	7.46E5
ES4 (IS)	Use in fuel - Use of functional fluid at industrial site (ECR 7)	7.3E5

M - Manufacture, F - Formulation, IS - Industrial end use at site

General section for environmental contributing scenarios ENV CS (for ES 1-4)

CATEGORY G Assessment entity group was assessed using the Petrorisk model based on the composition of the substance.

Local Exposure and Risk Characterisation Results from PETRORISK

Local Exposure and Risk Characterisation Results from PETRORISK / Use Name	Manufacture of substance	Formulation & (re)packing of substances and mixtures	Use as an intermediate	Use in fuel; Industrial
Sector of Use	Industrial	Industrial	Industrial	Industrial
Specific Environmental Release Category	ESVOC SPERC 1.1.v2	ESVOC SPERC 2.2.v2	ESVOC SPERC 6.1.v2	ESVOC SPERC 7.12a.v3
(Generic) Environmental Release Category	ERC 1	ERC 2	ERC 6a	ERC 7
Regional Fraction (%)	100.0	100.0	100.0	100.0
Annual Continental Tonnage (T/y)	0.0	0.0	0.0	0.0
Annual Regional Tonnage (T/y)	838300.0	99420.0	746400.0	730100.0
Local Fraction (%)	71.58	30.17	2.01	100.0
Release Days	300.0	300.0	300.0	300.0
Daily Site Tonnage (T/d)	2000.0	100.0	50.0	2434.0
Release to Air, before RMMs (%)	1.0	1.0	0.1	0.5



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Release to Water, before RMMs (%)	0.3	0.2	0.3	0.001
Release to Soil (%)	0.01	0.01	0.01	0.0
Release to Waste, before RMMs (%)	0.2	4.0	5.0	2.0
Default Onsite Air Treatment	None	None	None	None
Default Onsite Air Treatment Efficiency (%)	90.0	90.0	90.0	90.0
Applied Onsite Air Treatment Efficiency (%)	0.0	0.0	0.0	0.0
Wastewater Flow (L/d)	2000000.0	2000000.0	2000000.0	2000000.0
Default Onsite Wastewater Treatment	Biological treatment with primary oil-water separation			
Default Onsite Wastewater Treatment Efficiency (%)	96.24	96.24	96.24	96.24
Applied Onsite Wastewater Treatment Efficiency (%)	99.99	99.65	99.52	96.24
Release to Air, after RMMs (%)	1.04	1.03	0.14	0.50
Release to Water, after RMMs (%)	0.00	0.00	0.00	0.00
Release to Waste, after RMMs (%)	0.22	4.02	5.02	2.00
Municipal Sewage Treatment	None	None	None	None
Offsite Sewage Treatment Plant Efficiency (%)	0	0	0	0
Riverine Dilution Factor (unitless)	10	10	10	10
Marine Dilution Factor (unitless)	100	100	100	100
PREDICTED LOCAL CONCENTRATIONS				
Site Effluent Concentration (mg/L)	0.346	0.355	0.358	0.457
Concentration in Municipal STP (mg/L)	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Dissolved Concentration in Freshwater (mg/L)	3,5E-02	3,5E-02	3,6E-02	4,6E-02
Concentration in Sediment (mg/kg dry weight)	1,0E+00	9,6E-01	9,5E-01	1,0E+00
Dissolved Concentration in Seawater (mg/L)	3,5E-03	3,5E-03	3,6E-03	4,6E-03
Concentration in Marine Sediment (mg/kg dry weight)	1,0E-01	9,6E-02	9,5E-02	1,0E-01
Concentration in Air (mg/m ³)	5,8E+00	2,9E-01	2,0E-02	3,4E+00
Concentration in Agricultural Soil, 30-day average(mg/kg dry weight)	6,0E-02	2,9E-03	2,5E-04	3,4E-02
Concentration in Agricultural Soil, 180-day average (mg/kg dry weight)	6,0E-02	2,9E-03	2,5E-04	3,4E-02
Concentration in Freshwater Fish (mg/kg wet weight)	1,0E-01	8,7E-02	8,5E-02	8,3E-02
Concentration in Marine Fish (mg/kg wet weight)	1,0E-02	8,7E-03	8,5E-03	8,3E-03
Concentration in Marine Predators (mg/kg wet weight)	1,1E-04	9,6E-05	9,3E-05	8,6E-05
Concentration in Terrestrial Worms (mg/kg wet weight)	8,6E-02	4,3E-03	2,8E-04	5,1E-02
PREDICTED ENVIRONMENTAL CONCENTRATIONS				
PEC Freshwater, dissolved (mg/L)	3,5E-02	3,5E-02	3,6E-02	4,6E-02
PEC Sediment (mg/kg dry weight)	1,0E+00	9,6E-01	9,5E-01	1,0E+00
PEC Seawater, dissolved (mg/L)	3,5E-03	3,5E-03	3,6E-03	4,6E-03
PEC Marine Sediment (mg/kg dry weight)	1,0E-01	9,6E-02	9,5E-02	1,0E-01
PEC Air (mg/m ³)	5,8E+00	2,9E-01	2,0E-02	3,4E+00
PEC Agricultural Soil, 30-day average (mg/kg dry weight)	6,0E-02	2,9E-03	2,6E-04	3,4E-02
PEC Agricultural Soil, 180-day average (mg/kg dry weight)	6,0E-02	2,9E-03	2,6E-04	3,4E-02
PEC Freshwater Fish (mg/kg wet weight)	1,0E-01	8,7E-02	8,5E-02	8,3E-02
PEC Marine Fish (mg/kg wet weight)	1,0E-02	8,7E-03	8,5E-03	8,3E-03



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PEC Marine Predators (mg/kg wet weight)	1,1E-04	9,7E-05	9,4E-05	8,6E-05
PEC Terrestrial Worms (mg/kg wet weight)	8,6E-02	4,3E-03	3,2E-04	5,1E-02

INDIRECT HUMAN EXPOSURE (MAN VIA ENVIRONMENT)				
Local Concentration in Fish (mg/kg ww)	5,1E+00	4,4E+00	4,3E+00	4,5E+00
Local Concentration in Root Crops (mg/kg ww)	5,3E-02	2,6E-03	2,1E-04	3,0E-02
Local Concentration in Potato (mg/kg ww)	2,3E-02	1,1E-03	9,0E-05	1,3E-02
Local Concentration in (Other) Leafy vegetables (mg/kg ww)	7,7E-01	3,7E-02	3,5E-03	4,2E-01
Local Concentration in Lettuce (mg/kg ww)	1,2E+00	5,8E-02	5,5E-03	6,6E-01
Local Concentration in Fruit (mg/kg ww)	6,9E-02	3,4E-03	2,8E-04	3,9E-02
Local Concentration in Cereals (mg/kg ww)	1,1E+00	5,1E-02	4,8E-03	5,8E-01
Local Concentration in Meat (mg/kg ww)	2,0E-01	9,7E-03	7,6E-04	1,1E-01
Local Concentration in Milk (mg/kg ww)	6,0E-02	3,0E-03	2,4E-04	3,5E-02
Local Concentration in Drinking Water (mg/L)	2,7E-02	2,3E-02	2,3E-02	2,7E-02
Local Concentration in Air, annual (mg/m ³)	4,8E+00	2,4E-01	1,6E-02	2,8E+00
PEC Fish (mg/kg ww)	5,1E+00	4,4E+00	4,3E+00	4,5E+00
PEC Root (mg/kg ww)	5,3E-02	2,6E-03	2,1E-04	3,0E-02
PEC Potato (mg/kg ww)	2,3E-02	1,1E-03	9,1E-05	1,3E-02
PEC Leaf (mg/kg ww)	7,7E-01	3,7E-02	3,6E-03	4,2E-01
PEC Lettuce (mg/kg ww)	1,2E+00	5,8E-02	5,5E-03	6,6E-01
PEC Fruit (mg/kg ww)	6,9E-02	3,4E-03	2,8E-04	3,9E-02
PEC Cereal (mg/kg ww)	1,1E+00	5,1E-02	4,8E-03	5,8E-01
PEC Meat (mg/kg ww)	2,0E-01	9,7E-03	8,0E-04	1,1E-01
PEC Milk (mg/kg ww)	6,0E-02	3,0E-03	2,5E-04	3,5E-02
PEC Drinking Water (mg/L)	2,7E-02	2,3E-02	2,3E-02	2,7E-02
PEC Air, annual (mg/m ³)	4,8E+00	2,4E-01	1,7E-02	2,8E+00
Intake Dose via Ingestion (mg/kg bw/d)	1,7E-02	8,2E-03	7,8E-03	1,2E-02
Ingestion Dose resulting from Local Air Emissions (mg/kg bw/d)	7,0E-03	3,5E-04	1,7E-05	4,3E-03
Ingestion Dose resulting from Local Wastewater Emissions (mg/kg bw/d)	9,7E-03	7,9E-03	7,8E-03	8,1E-03
Intake Dose via Inhalation (mg/kg bw/d)	2,6E+00	1,3E-01	9,1E-03	1,5E+00
RISK CHARACTERIZATION RATIOS				
RCR STP Micro-organisms (unitless)	0	0	0	0
RCR Freshwater Organisms (unitless)	8,5E-01	7,8E-01	7,7E-01	8,1E-01
RCR Sediment Organisms (unitless)	9,6E-01	8,9E-01	8,8E-01	9,2E-01
RCR Seawater Organisms (unitless)	8,5E-02	7,8E-02	7,7E-02	8,1E-02
RCR Marine Sediment Organisms (unitless)	9,6E-02	8,9E-02	8,8E-02	9,2E-02
RCR Agricultural Soil Organisms (unitless)	1,6E-01	8,0E-03	5,9E-04	9,5E-02
RCR Freshwater (Fish-eating) Predators (unitless)	1,2E-02	9,9E-03	9,7E-03	9,5E-03
RCR Marine (Fish-eating) Predators (unitless)	1,2E-03	9,9E-04	9,7E-04	9,5E-04
RCR Marine Top Predators (unitless)	1,3E-05	1,1E-05	1,1E-05	9,9E-06
RCR Terrestrial (Worm-eating) Predators (unitless)	9,8E-03	4,9E-04	3,6E-05	5,8E-03
RCR Human Ingestion (unitless)	1,1E-04	5,5E-05	5,2E-05	8,2E-05
RCR Human Inhalation (unitless)	6,5E-02	3,2E-03	2,3E-04	3,8E-02



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RCR Human Exposure (unitless)	6,6E-02	3,3E-03	2,8E-04	3,8E-02
MSafe (kg/d)	2,1E+06	1,1E+05	5,7E+04	2,7E+06

Regional Exposure and Risk Characterisation Results from PETRORISK

Compartment	Value
Environmental Exposure	
PEC Air (mg/m ³)	1.65E-04
PEC Freshwater, dissolved (mg/L)	1.23E-05
PEC Sediment (mg/kg dw)	2.34E-03
PEC Seawater, dissolved (mg/L)	1.13E-06
PEC Marine Sediment (mg/kg dry weight)	3.35E-04
PEC Natural Soil (mg/kg dry weight)	9.77E-06
PEC Freshwater Fish (mg/kg wet weight)	2.32E-04
PEC Marine Fish (mg/kg wet weight)	2.18E-05
PEC Marine Predator (mg/kg wet weight)	8.20E-07
PEC Terrestrial Worms (mg/kg wet weight)	3.92E-05
Indirect Human Exposure	
PEC Fish (mg/kg wet weight)	7.91E-03
PEC Root (mg/kg wet weight)	2.86E-06
PEC Potato (mg/kg wet weight)	8.33E-07
PEC Leaf (mg/kg wet weight)	4.97E-05
PEC Lettuce (mg/kg wet weight)	6.23E-05
PEC Fruit (mg/kg wet weight)	3.04E-06
PEC Cereal (mg/kg wet weight)	4.13E-05
PEC Meat (mg/kg wet weight)	4.05E-05
PEC Milk (mg/kg wet weight)	1.10E-05
PEC Drinking Water (mg/kg wet weight)	9.81E-06
Human Daily Intake Dose via Ingestion (mg/kg body weight/d)	1.38E-05
Human Daily Intake Dose via Inhalation (mg/kg body weight/d)	9.02E-05
Environmental Risk Characterisation	
RCR Freshwater Organisms	1.34E-03
RCR Sediment Organisms	1.05E-03
RCR Marine Organisms	1.30E-04
RCR Marine Sediment Organisms	1.25E-04
RCR Natural Soil Organisms	2.42E-05
RCR Fresh Water (Fish-eating) Predators	2.64E-05
RCR Marine (Fish-eating) Predators	2.48E-06
RCR Marine Top Predators	9.35E-08
RCR Terrestrial (Worm-Eating) Predators	4.47E-06
Indirect Human Risk	
RCR Human Ingestion (unitless)	9.20E-08
RCR Human Inhalation (unitless)	2.26E-06

RMM Risk Management Measure
PEC Predicted Environmental Concentration
PNEC Predicted no-effect concentrations
DNEL Derived No-Effect Level
DMEL Derived Minimal Effect Level
RCR Risk Characterization Ratio (*RCR <1 safe use*)

9.0.4. Introduction to the assessment for workers

9.0.4.1. Scope and type of assessment for workers

The scope of exposure assessment and type of risk characterisation required for workers are described in the following table based on the hazard conclusions presented in CSR section 5.11.

Table 9.3. Type of risk characterisation required for workers

Route	Type of effect	Assessment entity	Risk characterisation type	Hazard conclusion (see section 5.11)
Inhalation	Systemic effects - long term	Benzene	Semi-quantitative	Other toxicological threshold = 0.8 mg/m ³
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 1.06E3 mg/m ³
	Systemic effects - acute	Benzene	Qualitative	High hazard (no threshold derived)
		DCPD	Not needed	No hazard identified
	Local effects - long term	Benzene	Not needed	No hazard identified
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 2.31 mg/m ³
Local effects - acute	Benzene	Not needed	No hazard identified	
	DCPD	Quantitative	DNEL (Derived No Effect Level) = 160.2 mg/m ³	
Dermal	Systemic effects - long term	Benzene	Qualitative	High hazard (no threshold derived)
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 0.3 mg/kg bw/day
	Systemic effects - acute	Benzene	Qualitative	High hazard (no threshold derived)
		DCPD	Not needed	No hazard identified
	Local effects - long term	Benzene	Qualitative	Low hazard (no threshold derived)
		DCPD	Not needed	No hazard identified
	Local effects - acute	Benzene	Qualitative	Low hazard (no threshold derived)
		DCPD	Not needed	No hazard identified
Eye	Local effects	Benzene	Qualitative	Low hazard (no threshold derived)
		DCPD	Qualitative	Low hazard (no threshold derived)

General section for worker contributing scenarios Worker CS (for ES 1-4)

CATEGORY G Assessment entity group

Remarks on exposure dataset obtained with ECETOC TRA

Percentage (w/w) of Benzene in mixture/article: 19 %

Percentage (w/w) of DCPD in mixture/article: 2 %

The vapour pressure at operating temperature (20°C) used for the calculation is 9.95E3 Pa for Benzene.

The vapour pressure at operating temperature (20°C) used for the calculation is 186 Pa for DCPD.

Risk characterisation

Qualitative risk characterisation (Inhalation, systemic, long term, Inhalation, systemic, acute, Dermal, systemic, long term, Dermal, systemic, acute, Dermal, local, long-term, Dermal, local, acute, Eye, local): See CSR section 9.0.4.2.

If conditions of use stipulated for each activity are adhered to, then safe use has been achieved.

Operational conditions and Risk Management measures (conditions of use) common for all contribution scenarios CS	Method
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100.0 %	TRA Workers 3.0
• Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <i>see specific 'Conditions of use' for a particular CS</i>	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General (room) ventilation: <i>see specific 'Conditions of use' for a particular CS</i>	TRA Workers 3.0
• Local exhaust ventilation: <i>see specific 'Conditions of use' for a particular CS</i>	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: <i>see specific 'Conditions of use' for a particular CS</i>	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness ≥ 95%)	TRA Workers 3.0
• Face/eye protection: Eye protection	
• General measures (eye irritants) <i>Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.</i>	
• General measures (skin irritants) <i>Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].</i>	
Other conditions affecting workers exposure	
• Operating temperature: ≤ 20.0 °C <i>Assumes use at not more than 20°C above ambient temperature.</i>	TRA Workers 3.0
• Place of use: <i>see specific 'Conditions of use' for a particular CS</i>	TRA Workers 3.0
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• General measures (carcinogens) [G18]: <i>Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance.</i> <i>Where there is potential for exposure: Restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.</i> <i>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</i> <i>Consider the need for risk based health surveillance. [G20].</i>	

CS Contribution scenario



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The risk and exposure assessment was performed on the basis of the content of selected components benzene and DCPD (so-called hazard drivers) and their maximum possible content in the registered substance to cover the composition of all registrants of the substance. The content of benzene in the substance produced by ORLEN Unipetrol RPA is <0.1% w/w, which is 10 times less than the assessed concentration of benzene in the registered substance. The content of DCPD in the substance produced by ORLEN Unipetrol RPA is <0.1% w/w.

INSTRUCTIONS FOR COMPLIANCE CHECK WITH THE EXPOSURE SCENARIO

Exposure estimates were conducted using the ECETOC TRA assessment method. If complying with the recommended risk management measures under the listed operating conditions, it is not expected that exposure could exceed the established DNEL/DMEL values.

Manufacturing processes do not present an unacceptable risk to the health of industrial workers if the exposures are controlled by appropriate operating conditions (eg task duration, use of ventilation) and risk management measures (eg personal protective equipment) of such a type, that the exposures do not exceed the established DNELs / DMELs. Where risk management measures / operational conditions have been modified, users must make sure that risks are controlled at least at equivalent levels.

Exposure assessment

9.1. Exposure scenario 1: Manufacture - Manufacture of substance

Environment contributing scenario(s):		SPERC
CS 1	Manufacture of the substance	ERC 1 ESVOC SPERC 1.1.v2
Worker contributing scenario(s):		SWED
CS 2	General exposures (closed systems)	PROC 1
CS 3	General exposures (closed systems); With sample collection	PROC 2
CS 4	General exposures (closed systems); Batch process	PROC 3
CS 5	General exposures	PROC 4
CS 6	Process sampling	PROC 9
CS 7	Laboratory activities	PROC 15
CS 8	Bulk transfers; Closed systems	PROC 8b
CS 9	Bulk transfers	PROC 8b
CS 10	Bulk transfers	PROC 8b
CS 11	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 12	Storage	PROC 1
CS 13	Storage	PROC 2

CS Contribution scenario

Further description of the use:

Manufacture of the substance. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities [GES1_I].

9.1.1. Environmental contributing scenario ENV CS 1: Manufacture of the substance (ERC1)

See Petrorisk modelling for the environmental compartment stated from page 19.

9.1.2. Worker CS 2: General exposures (closed systems) (PROC 1)

9.1.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.2.2. Exposure and risks for workers

Table 9.4. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.014 mg/m ³ (TRA Workers) Exposure/DMEL = 0.017	Final RCR/ Exposure/DMEL = 0.017
	DCPD	7.71E-3 mg/m ³ (TRA Workers) RCR = 7.29E-6	
Inhalation, systemic, acute	Benzene	0.055 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	7.71E-3 mg/m ³ (TRA Workers) RCR = 3.34E-6	Final RCR < 0.01
Inhalation, local, acute	DCPD	0.031 mg/m ³ (TRA Workers) RCR = 1.93E-4	Final RCR < 0.01
Dermal, systemic, long term	Benzene	1.02E-3 mg/kg bw/day (TRA Workers)	Final RCR < 0.01 Qualitative risk
	DCPD	3.4E-4 mg/kg bw/day (TRA Workers) RCR = 1.13E-3	
Dermal, local, long term	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR < 0.01

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.3. Worker CS 3: General exposures (closed systems); With sample collection (PROC 2)

9.1.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.3.2. Exposure and risks for workers

Table 9.6. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.683 mg/m ³ (TRA Workers) Exposure/DMEL = 0.854	Final RCR/ Exposure/DMEL = 0.854
	DCPD	0.077 mg/m ³ (TRA Workers) RCR = 7.29E-5	
Inhalation, systemic, acute	Benzene	2.734 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.077 mg/m ³ (TRA Workers) RCR = 0.033	Final RCR = 0.033
Inhalation, local, acute	DCPD	0.308 mg/m ³ (TRA Workers) RCR = 1.93E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.041 mg/kg bw/day (TRA Workers)	Final RCR = 0.046 Qualitative risk
	DCPD	0.014 mg/kg bw/day (TRA Workers) RCR = 0.046	
Dermal, local, long term	Benzene	5.99E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	5.99E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.046

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.1.4. Worker CS 4: General exposures (closed systems); Batch process (PROC 3)

9.1.4.1. Conditions of use

	Method
• Duration of activity: ≤ 4.0 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.4.2. Exposure and risks for workers

Table 9.8. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.352 mg/m ³ (TRA Workers) Exposure/DMEL = 0.439	Final RCR/ Exposure/DMEL = 0.439
	DCPD	0.059 mg/m ³ (TRA Workers) RCR = 5.62E-5	
Inhalation, systemic, acute	Benzene	2.343 mg/m ³ (TRA Workers)	Qualitative risk

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, local, long term	DCPD	0.059 mg/m ³ (TRA Workers) RCR = 0.026	Final RCR = 0.026
Inhalation, local, acute	DCPD	0.397 mg/m ³ (TRA Workers) RCR = 2.48E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.012 mg/kg bw/day (TRA Workers)	Final RCR = 0.023 Qualitative risk
	DCPD	6.9E-3 mg/kg bw/day (TRA Workers) RCR = 0.023	
Dermal, local, long term	Benzene	3.62E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	3.62E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.023

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.1.5. Worker CS 5: General exposures (PROC 4)

9.1.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4.0 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.5.2. Exposure and risks for workers

Table 9.10. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.703 mg/m ³ (TRA Workers) Exposure/DMEL = 0.879	Final RCR/ Exposure/DMEL = 0.879
	DCPD	0.099 mg/m ³ (TRA Workers) RCR = 9.37E-5	
Inhalation, systemic, acute	Benzene	4.687 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.099 mg/m ³ (TRA Workers) RCR = 0.043	Final RCR = 0.043
Inhalation, local, acute	DCPD	0.661 mg/m ³ (TRA Workers) RCR = 4.13E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.123 mg/kg bw/day (TRA Workers)	Final RCR = 0.229 Qualitative risk

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
Dermal, local, long term	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.229

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.6. Worker CS 6: Process sampling (PROC 9)

9.1.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 0.25 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.6.2. Exposure and risks for workers

Table 9.12. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.683 mg/m ³ (TRA Workers) Exposure/DMEL = 0.854	Final RCR/ Exposure/DMEL = 0.854
	DCPD	0.039 mg/m ³ (TRA Workers) RCR = 3.64E-5	
Inhalation, systemic, acute	Benzene	27.33 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.039 mg/m ³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
Inhalation, local, acute	DCPD	1.542 mg/m ³ (TRA Workers) RCR = 9.63E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.021 mg/kg bw/day (TRA Workers)	Final RCR = 0.229 Qualitative risk
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
Dermal, local, long term	Benzene	3E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	3E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.229

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.7. Worker CS 7: Laboratory activities (PROC 15)

9.1.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.7.2. Exposure and risks for workers

Table 9.14. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.352 mg/m ³ (TRA Workers) Exposure/DMEL = 0.439	Final RCR/ Exposure/DMEL = 0.439
	DCPD	0.099 mg/m ³ (TRA Workers) RCR = 9.37E-5	
Inhalation, systemic, acute	Benzene	2.343 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.099 mg/m ³ (TRA Workers) RCR = 0.043	Final RCR = 0.043
Inhalation, local, acute	DCPD	0.661 mg/m ³ (TRA Workers) RCR = 4.13E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	6.12E-3 mg/kg bw/day (TRA Workers)	Final RCR = 0.011 Qualitative risk
	DCPD	3.4E-3 mg/kg bw/day (TRA Workers) RCR = 0.011	
Dermal, local, long term	Benzene	1.78E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	1.78E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.011

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.8. Worker CS 8: Bulk transfers; Closed systems (PROC 8)

9.1.8.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%) <i>Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.8.2. Exposure and risks for workers

Table 9.16. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.439 mg/m ³ (TRA Workers) Exposure/DMEL = 0.549	Final RCR/ Exposure/DMEL = 0.549
	DCPD	0.05 mg/m ³ (TRA Workers) RCR = 4.69E-5	
Inhalation, systemic, acute	Benzene	2.929 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.05 mg/m ³ (TRA Workers) RCR = 0.021	Final RCR = 0.021
Inhalation, local, acute	DCPD	0.331 mg/m ³ (TRA Workers) RCR = 2.06E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.247 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.9. Worker CS 9: Bulk transfers (PROC 8b)

9.1.9.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤1 h/day	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness ≥ 95%) <i>Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.9.2. Exposure and risks for workers

Table 9.18. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.146 mg/m ³ (TRA Workers) Exposure/DMEL = 0.183	Final RCR/ Exposure/DMEL = 0.183
	DCPD	0.017 mg/m ³ (TRA Workers) RCR = 1.56E-5	
Inhalation, systemic, acute	Benzene	2.929 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.017 mg/m ³ (TRA Workers) RCR = 7.15E-3	Final RCR < 0.01
Inhalation, local, acute	DCPD	0.331 mg/m ³ (TRA Workers)	Final RCR < 0.01

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 2.06E-3	
Dermal, systemic, long term	Benzene	0.082 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.10. Worker CS 10: Bulk transfers (PROC 8b)

9.1.10.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=1 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.10.2. Exposure and risks for workers

Table 9.20. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.293 mg/m ³ (TRA Workers) Exposure/DMEL = 0.366	Final RCR/ Exposure/DMEL = 0.366
	DCPD	0.033 mg/m ³ (TRA Workers) RCR = 3.12E-5	
Inhalation, systemic, acute	Benzene	5.858 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.033 mg/m ³ (TRA Workers) RCR = 0.014	Final RCR = 0.014
Inhalation, local, acute	DCPD	0.661 mg/m ³ (TRA Workers) RCR = 4.13E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.082 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.11. Worker CS 11: Equipment cleaning and maintenance (**PROC 8a**, PROC 28)

9.1.11.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) <i>Drain down and flush system prior to equipment break-in or maintenance.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.11.2. Exposure and risks for workers

Table 9.22. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.586 mg/m ³ (TRA Workers) Exposure/DMEL = 0.732	Final RCR/ Exposure/DMEL = 0.732
	DCPD	0.066 mg/m ³ (TRA Workers) RCR = 6.25E-5	
Inhalation, systemic, acute	Benzene	3.906 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.066 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.029
Inhalation, local, acute	DCPD	0.441 mg/m ³ (TRA Workers) RCR = 2.75E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.247 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.1.12. Worker CS 12: Storage (PROC 1)

9.1.12.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure. <i>Store substance within a closed system.</i>	
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Outdoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.12.2. Exposure and risks for workers

Table 9.24. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.014 mg/m ³ (TRA Workers) Exposure/DMEL = 0.017	Final RCR/ Exposure/DMEL = 0.017
	DCPD	7.71E-3 mg/m ³ (TRA Workers) RCR = 7.29E-6	
Inhalation, systemic, acute	Benzene	0.055 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	7.71E-3 mg/m ³ (TRA Workers) RCR = 3.34E-3	Final RCR < 0.01
Inhalation, local, acute	DCPD	0.031 mg/m ³ (TRA Workers) RCR = 1.93E-4	Final RCR < 0.01
Dermal, systemic, long term	Benzene	1.02E-3 mg/kg bw/day (TRA Workers)	Final RCR < 0.01 Qualitative risk
	DCPD	3.4E-4 mg/kg bw/day (TRA Workers) RCR = 1.13E-3	
Dermal, local, long term	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR < 0.01

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.1.13. Worker CS 13: Storage (PROC 2)

9.1.13.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure <i>Store substance within a closed system.</i>	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.1.13.2. Exposure and risks for workers

see Table 9.6. Exposure concentrations and risks for workers in Section 9.1.3.2.

9.2. Exposure scenario 2: Formulation or re-packing - Formulation & (re)packing of substances and mixtures

Environment contributing scenario(s):		SPERC
CS 1	Formulation into mixture	ERC 2 ESVOC SPERC 2.2.v2
Worker contributing scenario(s):		SWED
CS 2	General exposures (closed systems)	PROC 1
CS 3	General exposures (closed systems); With sample collection	PROC 2
CS 4	General exposures (closed systems); Batch process	PROC 3
CS 5	General exposures	PROC 4
CS 6	Batch process; Elevated temperature; Use in contained systems	PROC 3
CS 7	Process sampling	PROC 9
CS 8	Laboratory activities	PROC 15
CS 9	Bulk transfers; Dedicated facility	PROC 8b
CS 10	Mixing operations	PROC 5
CS 11	Manual; Transfer from/pouring from containers; Non-dedicated facility	PROC 8a
CS 12	Drum/batch transfers; Dedicated facility	PROC 8b
CS 13	Tabletting, compression, extrusion or pelletisation	PROC 14
CS 14	Drum and small package filling	PROC 9
CS 15	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 16	Storage	PROC 1
CS 17	Storage	PROC 2

CS Contribution scenario

Further description of the use:

Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities [GES2_I]

9.2.1. Environmental contributing scenario ENV CS 1: Formulation into mixture (ERC 2)

See Petrorisk modelling for the environmental compartment stated from page 19.

9.2.2. Worker CS 2: General exposures (closed systems) (PROC 1)

9.2.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.2.2. Exposure and risks for workers

see Table 9.24. Exposure concentrations and risks for workers in Section 9.1.12.2.

9.2.3. Worker CS 3: General exposures (closed systems) With sample collection (PROC 2)

9.2.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.3.2. Exposure and risks for workers

see Table 9.6. Exposure concentrations and risks for workers in Section 9.1.3.2.

9.2.4. Worker CS 4: General exposures (closed systems); Batch process (PROC 3)

9.2.4.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4.0 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.4.2. Exposure and risks for workers

see Table 9.8. Exposure concentrations and risks for workers in Section 9.1.4.2.

9.2.5. Worker CS 5: General exposures (PROC 4)

9.2.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤4.0 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%) <i>Provide extract ventilation to points where emissions occur.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.5.2. Exposure and risks for workers

see Table 9.10. Exposure concentrations and risks for workers in Section 9.1.5.2.

9.2.6. Worker CS 6: Batch process; Elevated temperature; Use in contained systems (PROC 3)

9.2.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤4.0 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%) <i>Formulate in enclosed or ventilated mixing vessels. Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF ≥ 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 60 °C; <i>Elevated temperature</i>	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.6.2. Exposure and risks for workers

Table 9.36. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.586 mg/m ³ (TRA Workers) Exposure/DMEL = 0.732	Final RCR/ Exposure/DMEL = 0.732
	DCPD	0.331 mg/m ³ (TRA Workers) RCR = 3.12E-4	
Inhalation, systemic, acute	Benzene	3.906 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.331 mg/m ³ (TRA Workers) RCR = 0.143	Final RCR = 0.143
Inhalation, local, acute	DCPD	2.203 mg/m ³ (TRA Workers) RCR = 0.014	Final RCR = 0.014

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Dermal, systemic, long term	Benzene	0.012 mg/kg bw/day (TRA Workers)	Final RCR = 0.014 Qualitative risk
	DCPD	4.14E-3 mg/kg bw/day (TRA Workers) RCR = 0.014	
Dermal, local, long term	Benzene	3.62E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	3.62E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.014

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.7. Worker CS 7: Process sampling (PROC 9)

9.2.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 1 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.7.2. Exposure and risks for workers

Table 9.38. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.586 mg/m ³ (TRA Workers) Exposure/DMEL = 0.732	Final RCR/ Exposure/DMEL = 0.732
	DCPD	0.033 mg/m ³ (TRA Workers) RCR = 3.12E-5	
Inhalation, systemic, acute	Benzene	11.71 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.033 mg/m ³ (TRA Workers) RCR = 0.014	Final RCR = 0.014
Inhalation, local, acute	DCPD	0.661 mg/m ³ (TRA Workers) RCR = 4.13E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.041 mg/kg bw/day (TRA Workers)	Final RCR = 0.229 Qualitative risk
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
Dermal, local, long term	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.229

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.8. Worker CS 8: Laboratory activities (PROC 15)

9.2.8.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.8.2. Exposure and risks for workers

see Table 9.14. Exposure concentrations and risks for workers in Section 9.1.7.2.

9.2.9. Worker CS 9: Bulk transfers; Dedicated facility (PROC 8b)

9.2.9.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%) <i>Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.9.2. Exposure and risks for workers

see Table 9.16. Exposure concentrations and risks for workers in Section 9.1.8.2.

9.2.10. Worker CS 10: Mixing operations (PROC 5)

9.2.10.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) <i>Provide extract ventilation to points where emissions occur.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.10.2. Exposure and risks for workers

Table 9.44. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.41 mg/m ³ (TRA Workers) Exposure/DMEL = 0.513	Final RCR/ Exposure/DMEL = 0.513
	DCPD	0.023 mg/m ³ (TRA Workers) RCR = 2.19E-5	
Inhalation, systemic, acute	Benzene	2.734 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.023 mg/m ³ (TRA Workers) RCR = 0.01	Final RCR = 0.01
Inhalation, local, acute	DCPD	0.154 mg/m ³ (TRA Workers) RCR = 9.63E-4	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.247 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	0.036 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	0.036 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.2.11. Worker CS 11: Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)

9.2.11.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) <i>Provide extract ventilation to points where emissions occur.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.11.2. Exposure and risks for workers

Table 9.46. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.41 mg/m ³ (TRA Workers) Exposure/DMEL = 0.513	Final RCR/ Exposure/DMEL = 0.513
	DCPD	0.046 mg/m ³ (TRA Workers) RCR = 4.37E-5	
Inhalation, systemic, acute	Benzene	2.734 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.046 mg/m ³ (TRA Workers) RCR = 0.02	Final RCR = 0.02

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, local, acute	DCPD	0.308 mg/m ³ (TRA Workers) RCR = 1.93E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.247 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	0.018 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.2.12. Worker CS 12: Drum/batch transfers; Dedicated facility (PROC 8b)

9.2.12.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness ≥ 95%) <i>Provide extract ventilation to points where emissions occur.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.12.2. Exposure and risks for workers

Table 9.48. Exposure concentrations and risks for workers

see Table 9.16. Exposure concentrations and risks for workers in Section 9.1.8.2.

9.2.13. Worker CS 13: Tableting, compression, extrusion or pelletisation (PROC 14)

9.2.13.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 8 h /day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%) <i>Handle substance within a predominantly closed system provided with extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF ≥ 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.13.2. Exposure and risks for workers

Table 9.50. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.114 mg/m ³ (TRA Workers) Exposure/DMEL = 0.142	Final RCR/ Exposure/DMEL = 0.142
	DCPD	0.019 mg/m ³ (TRA Workers) RCR = 1.82E-5	
Inhalation, systemic, acute	Benzene	0.456 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.019 mg/m ³ (TRA Workers) RCR = 8.35E-3	Final RCR < 0.01
Inhalation, local, acute	DCPD	0.077 mg/m ³ (TRA Workers) RCR = 4.81E-4	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.017 mg/kg bw/day (TRA Workers)	Final RCR = 0.057 Qualitative risk
	DCPD	0.017 mg/kg bw/day (TRA Workers) RCR = 0.057	
Dermal, local, long term	Benzene	2.5E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	2.5E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.057

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.2.14. Worker CS 14: Drum and small package filling (PROC 9)

9.2.14.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 1 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%) <i>Fill containers/cans at dedicated fill points supplied with local extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.14.2. Exposure and risks for workers

see Table 9.38. Exposure concentrations and risks for workers in Section 9.2.7.2.

9.2.15. Worker CS 15: Equipment cleaning and maintenance (PROC 8a, PROC 28)

9.2.15.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness ≥ 90-95%) <i>Drain down and flush system prior to equipment break-in or maintenance</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF ≥ 10)	TRA Workers 3.0

	Method
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.15.2. Exposure and risks for workers

see Table 9.46. Exposure concentrations and risks for workers in Section 9.2.11.2.

9.2.16. Worker CS 16: Storage (PROC 1)

9.2.16.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤ 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure <i>Store substance within a closed system.</i>	
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.16.2. Exposure and risks for workers

Table 9.56. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.02 mg/m ³ (TRA Workers) Exposure/DMEL = 0.024	Final RCR/ Exposure/DMEL = 0.024
	DCPD	0.011 mg/m ³ (TRA Workers) RCR = 1.04E-5	
Inhalation, systemic, acute	Benzene	0.078 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.011 mg/m ³ (TRA Workers) RCR = 4.77E-3	Final RCR < 0.01
Inhalation, local, acute	DCPD	0.044 mg/m ³ (TRA Workers) RCR = 2.75E-4	Final RCR < 0.01
Dermal, systemic, long term	Benzene	1.02E-3 mg/kg bw/day (TRA Workers)	Final RCR < 0.01 Qualitative risk
	DCPD	3.4E-4 mg/kg bw/day (TRA Workers) RCR = 1.13E-3	
Dermal, local, long term	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	2.98E-4 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR < 0.01

RCR = Risk Characterization Ratio (RCR < 1 safe use)

9.2.17. Worker CS 17: Storage (PROC 2)

9.2.17.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure <i>Store substance within a closed system.</i>	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.2.17.2. Exposure and risks for workers

see Table 9.6. Exposure concentrations and risks for workers in Section 9.1.3.2.

9.3. Exposure scenario 3: Use at industrial sites - Use as an intermediate

Environment contributing scenario(s):		SPERC
CS 1	Use as an intermediate	ERC 6a ESVOC SPERC 6.1a.v2
Worker contributing scenario(s):		SWED
CS 2	General exposures (closed systems)	PROC 1
CS 3	General exposures (closed systems); With sample collection	PROC 2
CS 4	General exposures (closed systems); Batch process	PROC 3
CS 5	General exposures	PROC 4
CS 6	Process sampling	PROC 9
CS 7	Laboratory activities	PROC 15
CS 8	Bulk transfers; Closed systems	PROC 8b
CS 9	Bulk transfers	PROC 8b
CS 10	Bulk transfers	PROC 8b
CS 11	Equipment cleaning and maintenance	PROC 8a, PROC 28
CS 12	Storage	PROC 1
CS 13	Storage	PROC 2

CS Contribution scenario

Further description of the use:

This exposure scenario is for the use of the substance as an intermediate (not related to Strictly Controlled Conditions). It includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). [GES1B_I]

9.3.1. Environmental contributing scenario ENV CS 1: Use as an intermediate (ERC 6a)

See Petrorisk modelling for the environmental compartment stated from page 19.

9.3.2. Worker CS 2: General exposures (closed systems) (PROC 1)

9.3.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.2.2. Exposure and risks for workers

see Table 9.24. Exposure concentrations and risks for workers in Section 9.1.12.2.

9.3.3. Worker CS 3: General exposures (closed systems); With sample collection (PROC 2)

9.3.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.3.2. Exposure and risks for workers

see Table 9.6. Exposure concentrations and risks for workers in Section 9.1.3.2.

9.3.4. Worker CS 4: General exposures (closed systems); Batch process (PROC 3)

9.3.4.1. Conditions of use

	Method
• Duration of activity: <=4.0 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.4.2. Exposure and risks for workers

see Table 9.8. Exposure concentrations and risks for workers in Section 9.1.4.2.

9.3.5. Worker CS 5: General exposures (PROC 4)

9.3.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4.0 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.5.2. Exposure and risks for workers

see Table 9.10. Exposure concentrations and risks for workers in Section 9.1.5.2.

9.3.6. Worker CS 6: Process sampling (PROC 9)

9.3.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=1 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.6.2. Exposure and risks for workers

see Table 9.38. Exposure concentrations and risks for workers in Section 9.2.7.2.

9.3.7. Worker CS 7: Laboratory activities (PROC 15)

9.3.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.7.2. Exposure and risks for workers

see Table 9.14. Exposure concentrations and risks for workers in Section 9.1.7.2.

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

9.3.8.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness ≥ 95%) <i>Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.8.2. Exposure and risks for workers

see Table 9.16. Exposure concentrations and risks for workers in Section 9.1.8.2.

9.3.9. Worker CS 9: Bulk transfers (PROC 8b)

9.3.9.1. Conditions of use – specific to CS

	Method
• Duration of activity: ≤1 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness ≥ 95%) <i>Ensure material transfers are under containment or extract ventilation.</i>	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.9.2. Exposure and risks for workers

Table 9.74. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.342 mg/m ³ (TRA Workers) Exposure/DMEL = 0.427	Final RCR/ Exposure/DMEL = 0.427
	DCPD	0.039 mg/m ³ (TRA Workers) RCR = 3.64E-5	
Inhalation, systemic, acute	Benzene	6.835 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.039 mg/m ³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
Inhalation, local, acute	DCPD	0.771 mg/m ³ (TRA Workers) RCR = 4.81E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.082 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-			Final RCR = 0.457

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

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.3.10. Worker CS 10: Bulk transfers (PROC 8b)

9.3.10.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=1 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.10.2. Exposure and risks for workers

Table 9.76. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.683 mg/m ³ (TRA Workers) Exposure/DMEL = 0.854	Final RCR/ Exposure/DMEL = 0.854
	DCPD	0.077 mg/m ³ (TRA Workers) RCR = 7.29E-5	
Inhalation, systemic, acute	Benzene	13.67 mg/m ³ (TRA Workers)	Qualitative risk
Inhalation, local, long term	DCPD	0.077 mg/m ³ (TRA Workers) RCR = 0.033	Final RCR = 0.033
Inhalation, local, acute	DCPD	1.542 mg/m ³ (TRA Workers) RCR = 9.63E-3	Final RCR < 0.01
Dermal, systemic, long term	Benzene	0.082 mg/kg bw/day (TRA Workers)	Final RCR = 0.457 Qualitative risk
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
Dermal, local, long term	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Dermal, local, acute	Benzene	6E-3 mg/cm ² (TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.3.11. Worker CS 11: Equipment cleaning and maintenance (PROC 8a, PROC 28)

9.3.11.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool	TRA Workers 3.0

	Method
extraction or enclosing hoods (assumed effectiveness >= 90-95%) <i>Drain down and flush system prior to equipment break-in or maintenance.</i>	
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.11.2. Exposure and risks for workers

see Table 9.22. Exposure concentrations and risks for workers in Section 9.1.11.2.

9.3.12. Worker CS 12: Storage (PROC 1)

9.3.12.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure <i>Store substance within a closed system.</i>	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.12.2. Exposure and risks for workers

see Table 9.24. Exposure concentrations and risks for workers in Section 9.1.12.2.

9.3.13. Worker CS 13: Storage (PROC 2)

9.3.13.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure <i>Store substance within a closed system.</i>	
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.3.13.2. Exposure and risks for workers

see Table 9.6. Exposure concentrations and risks for workers in Section 9.1.3.2.

9.4. Exposure scenario 4: Use at industrial sites - Use as a fuel

Product category used: PC 13: Fuels

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

CS Contribution scenario

Further description of the use:

Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste [GES12_I].

9.4.1. Environmental contributing scenario ENV CS 1: Use of functional fluid at industrial site (ERC 7)

See Petrorisk modelling for the environmental compartment stated from page 19.

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

9.4.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 22.

9.4.2.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

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

9.4.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.3.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

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

9.4.4.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.4.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

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

9.4.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.5.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

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

9.4.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3 to 5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.6.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

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

9.4.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=4 h/day	TRA Workers 3.0
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) <i>Drain down and flush system prior to equipment break-in or maintenance.</i>	TRA Workers 3.0
• Respiratory protection: Yes (APF >= 10)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.7.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

9.4.8. Worker CS 8: Storage (PROC 1)

9.4.8.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure <i>Store substance within a closed system.</i>	
• General ventilation: Basic (up to 3 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Outdoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.8.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

9.4.9. Worker CS 9: Storage (PROC 2)

9.4.9.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure <i>Store substance within a closed system.</i>	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Respiratory protection: No	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ECs apply at the same time, see General part... (for ECs 1-4) from page 23.

9.4.9.2. Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.