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

1.1. Product identifier

Product form : Substance
Trade name : STRAIGHT RUN GASOLINE
Chemical name : Gasoline, straight-run, topping-plant
EC Index : 649-270-00-7
EC-No. : 271-727-0
CAS-No. : 68606-11-1
REACH registration No. : 01-2119494191-38-0010
Product group : Trade product

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

1.2.1. Relevant identified uses

Main use category : Industrial use,Professional use
Use of the substance/mixture : Fuels
see attached exposure scenario.

Title	Use descriptors
Use as an intermediate (ES Ref.: 02e (Benz 20%-79%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Use as an intermediate (ES Ref.: 02e (Benz 20%-79%))	SU3, SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03e (Benz 20%-79%))	SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Use as an intermediate (ES Ref.: 02b (Benz 0%-1%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28, ERC6a, ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%. (ES Ref.: 02c (Benz 1%-5%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28, ERC6a, ESVOC SPERC 6.1a.v1
Use as an intermediate (ES Ref.: 02d (Benz 5%-20%))	SU8, SU9, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC6a, ESVOC SPERC 6.1a.v1
Distribution (ES Ref.: 03b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution of substance Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%. (ES Ref.: 03c (Benz 1%-5%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Distribution (ES Ref.: 03d (Benz 5%-20%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1
Uses in coatings (ES Ref.: 05b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC4, ESVOC SPERC 4.3a.v1
Use in cleaning agents (ES Ref.: 07b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, ERC4, ESVOC SPERC 4.4a.v1

Title	Use descriptors
Use as a fuel (ES Ref.: 10b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC7, ESVOC SPERC 7.12a.v1
Use in rubber production and processing (ES Ref.: 13b (Benz 0%-1%))	SU10, SU11, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15, ERC4, ERC6d, ESVOC SPERC 4.19.v1
Use as a fuel (ES Ref.: 11b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC9a, ERC9b, ESVOC SPERC 9.12b.v1
Use as a fuel (ES Ref.: 12b (Benz 0%-1%))	PC13, ERC9a, ERC9b, ESVOC SPERC 9.12c.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04 (Benz 20%-79%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04 (Benz 20%-79%))	SU3, SU10, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04b (Benz 0%-1%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04c (Benz 1%-5%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures (ES Ref.: 04d (Benz 5%-20%))	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1

Full text of use descriptors: see section 16

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier
NIS a.d. Novi Sad
Narodnog Fronta 12
21000 Novi Sad - Serbia
T + 381 (0) 21 481 1111
Dragana.Cvetkov@nis.eu (REACH)

Only Representative
BENS Consulting d.o.o.
Špruha 19
1236 Trzin - Slovenija
T +386 41 979 800
info@bens-consulting.eu

1.4. Emergency telephone number

Emergency number : + 381 (0) 21 481 1111
Only available during office hours.

Country	Official advisory body	Address	Emergency number
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9 Dublin	+353 1 809 2566 (Healthcare professionals-24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Flam. Liq. 1 H224

Skin Irrit. 2	H315
Muta. 1B	H340
Carc. 1B	H350
Repr. 2	H361fd
STOT SE 3	H336
Asp. Tox. 1	H304
Aquatic Chronic 2	H411

Full text of H- and EUH-statements: see section 16

2.2. Label elements

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

Hazard pictograms (CLP) :

GHS02 GHS07 GHS08 GHS09

Signal word : Danger

Hazard statements (CLP) :
H224 - Extremely flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H336 - May cause drowsiness or dizziness.
H340 - May cause genetic defects.
H350 - May cause cancer.
H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child.
H411 - Toxic to aquatic life with long lasting effects.

Precautionary statements (CLP) :
P201 - Obtain special instructions before use.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 - Wear protective gloves, protective clothing, eye protection, face protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER, a doctor.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P501 - Dispose of contents and container to an approved waste disposal plant.

Listed on CLP Annex VI : EC Index-No.: 649-270-00-7

2.3. Other hazards

Other hazards : Vapours can form explosive mixtures with air. Results of PBT and vPvB assessment : Not applicable. as appropriate : Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance name : Gasoline, straight-run, topping-plant
CAS-No. : 68606-11-1
EC-No. : 271-727-0
EC Index : 649-270-00-7

Substance name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Gasoline, straight run, topping plant	(CAS-No.) 68606-11-1 (EC-No.) 271-727-0 (EC Index) 649-270-00-7	≤ 100	Flam. Liq. 1, H224 Skin Irrit. 2, H315 Muta. 1B, H340 Carc. 1B, H350 Repr. 2, H361f STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 2, H411
Toluene	(CAS-No.) 108-88-3 (EC-No.) 203-625-9 (EC Index) 601-021-00-3	≥ 3	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Repr. 2, H361d STOT SE 3, H336 STOT RE 2, H373 Asp. Tox. 1, H304
n-Hexane	(CAS-No.) 110-54-3 (EC-No.) 203-777-6 (EC Index) 601-037-00-0	≥ 3	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Repr. 2, H361f STOT SE 3, H336 STOT RE 2, H373 Asp. Tox. 1, H304 Aquatic Chronic 2, H411
benzene	(CAS-No.) 71-43-2 (EC-No.) 200-753-7 (EC Index) 601-020-00-8	≥ 1	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Muta. 1B, H340 Carc. 1A, H350 STOT RE 1, H372 Asp. Tox. 1, H304

Specific concentration limits:

Substance name	Product identifier	Specific concentration limits
n-Hexane	(CAS-No.) 110-54-3 (EC-No.) 203-777-6 (EC Index) 601-037-00-0	(5 ≤ C < 100) STOT RE 2, H373

Full text of H- and EUH-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

Additional advice : First aider: Pay attention to self-protection!. Concerning personal protective equipment to use, see section 8. Never give anything by mouth to an unconscious person. In case of doubt or persistent symptoms, consult always a physician. Show this safety data sheet to the doctor in attendance.

Inhalation : Remove casualty to fresh air and keep warm and at rest. Give oxygen or artificial respiration if necessary. In case of doubt or persistent symptoms, consult always a physician.

Skin contact	:	Remove contaminated clothing and shoes. Gently wash with plenty of soap and water. Wash contaminated clothing before reuse. In case of doubt or persistent symptoms, consult always a physician.
Eyes contact	:	Rinse immediately carefully and thoroughly with eye-bath or water. Remove contact lenses, if present and easy to do. Continue rinsing. In case of doubt or persistent symptoms, consult always a physician.
Ingestion	:	Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Get immediate medical advice/attention.

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

Inhalation	:	May cause drowsiness or dizziness. The following symptoms may occur: Mental confusion. Cough. Headache.
Skin contact	:	Causes skin irritation. The following symptoms may occur: Redness, pain. Repeated exposure may cause skin dryness or cracking.
Eyes contact	:	Contact with eyes may cause irritation. The following symptoms may occur: Redness, pain.
Ingestion	:	May be fatal if swallowed and enters airways.
Chronic symptoms	:	May cause genetic defects. May cause cancer. Suspected of damaging fertility. Suspected of damaging the unborn child.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	carbon dioxide (CO2), powder, alcohol-resistant foam, water spray.
Unsuitable extinguishing media	:	Strong water jet.

5.2. Special hazards arising from the substance or mixture

Specific hazards	:	Extremely flammable liquid and vapour. Vapours may form explosive mixture with air. Vapours are heavier than air and may spread along floors. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours. Heating will cause a rise in pressure with a risk of bursting.
Hazardous decomposition products in case of fire	:	Carbon oxides (CO, CO2). Sulphur oxides. sulphuric acid. Hydrogen sulfide.

5.3. Advice for firefighters

Firefighting instructions	:	Evacuate area. Use water spray or fog for cooling exposed containers. Contain the extinguishing fluids by bunding. Prevent fire fighting water from entering the environment.
Protection during firefighting	:	Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus.
Other information	:	Do not allow run-off from fire-fighting to enter drains or water courses. Dispose of waste in accordance with environmental legislation.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

For non-emergency personnel : Evacuate unnecessary personnel. Keep upwind. Provide adequate ventilation. Wear recommended personal protective equipment. Concerning personal protective equipment to use, see section 8. Do not breathe vapours. Avoid contact with skin, eyes and clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ensure equipment is adequately earthed. Use explosion-proof equipment. Use only non-sparking tools. Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

6.1.2. For emergency responders

For emergency responders : Ensure procedures and training for emergency decontamination and disposal are in place. Concerning personal protective equipment to use, see section 8.

6.2. Environmental precautions

Do not allow to enter into surface water or drains. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Stop leak if safe to do so. Dam up the liquid spill. Small quantities of liquid spill: take up in non-combustible absorbent material and shovel into container for disposal. Recover large spills by pumping (use an explosion proof or hand pump). Place in a suitable container for disposal in accordance with the waste regulations (see Section 13). This material and its container must be disposed of in a safe way, and as per local legislation. Cover the spilled liquid product with foam to slow down evaporation.

6.4. Reference to other sections

Concerning personal protective equipment to use, see section 8 . Concerning disposal elimination after cleaning, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Provide adequate ventilation. Use personal protective equipment as required. Concerning personal protective equipment to use, see section 8. Do not breathe vapours. Avoid contact with skin, eyes and clothing. Take any precaution to avoid mixing with Incompatible materials, Refer to Section 10 on Incompatible Materials. Ensure proper process control to avoid excess waste discharge (temperature, concentration, pH, time). Avoid release to the environment. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use explosion-proof equipment. Use only non-sparking tools. Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

Hygiene measures : Keep good industrial hygiene. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product. Keep away from food, drink and animal feedingstuffs. Remove contaminated clothes. Separate working clothes from town clothes. Launder separately. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Storage of flammable liquids. Store in a dry, cool and well-ventilated place. Do not store near or with any of the incompatible materials listed in section 10. Bund storage facilities to prevent soil and water pollution in the event of spillage.

Incompatible materials : Strong acids and oxidizing agents. Strong bases. Halogenated compounds.

Heat and ignition sources : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from sunlight.

Special rules on packaging : Containers which are opened should be properly resealed and kept upright to prevent leakage. Keep container tight closed. Keep in properly labelled containers.

Packaging materials : Keep only in the original container. Suitable material: Mild steel, Stainless steel. Unsuitable material: Synthetic material.

7.3. Specific end use(s)

see attached exposure scenario.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

benzene (71-43-2)		
Denmark	OEL STEL	3,2 mg/m³
Denmark	OEL STEL [ppm]	1 ppm
Netherlands	TGG-8u (OEL TWA) [ppm]	0,2 ppm

Toluene (108-88-3)		
Denmark	OEL STEL	384 mg/m³
Denmark	OEL STEL [ppm]	100 ppm
Netherlands	TGG-8u (OEL TWA) [ppm]	39 ppm
Netherlands	TGG-15min (OEL STEL) [ppm]	100 ppm

n-Hexane (110-54-3)		
Denmark	OEL STEL	144 mg/m³
Denmark	OEL STEL [ppm]	40 ppm
Netherlands	TGG-8u (OEL TWA) [ppm]	20 ppm
Netherlands	TGG-15min (OEL STEL) [ppm]	40 ppm

STRAIGHT RUN GASOLINE (68606-11-1)	
DNEL/DMEL (workers)	
Acute - systemic effects, inhalation	(15min) 1300 mg/m³
Acute - local effects, inhalation	(15min) 1100 mg/m³
Long-term - local effects, inhalation	(8h) 840 mg/m³
DNEL/DMEL (general population)	
Acute - systemic effects, inhalation	(15min) 1200 mg/m³
Acute - local effects, inhalation	(15min) 640 mg/m³

STRAIGHT RUN GASOLINE (68606-11-1)	
Long-term - local effects, inhalation	(24h) 180 mg/m³

Additional information : Occupational Exposure Limits :. Not applicable. Recommended monitoring procedures :. Personal air monitoring. Room air monitoring

8.2. Exposure controls

Engineering measure(s) : Provide adequate ventilation. Organisational measures to prevent/limit releases, dispersion and exposure. See Section 7 for information on safe handling. Use only outdoors or in a well-ventilated area. Handle substance within a closed system. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Take precautionary measures against static discharges. Ensure equipment is adequately earthed. Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.

Personal protective equipment : The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hand protection : Wear chemically resistant gloves (tested to EN374) . Suitable material: rubber gloves. NBR (Nitrile rubber). Breakthrough time : > 360 min. The quality of the protective gloves resistant to chemicals must be chosen as a function of the specific working place concentration and quantity of hazardous substances.

Eye protection : Use suitable eye protection (EN166): goggles

Body protection : Wear suitable coveralls to prevent exposure to the skin

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment. Self-contained open-circuit compressed air breathing apparatus (EN 137). Employees of the Processing Block full face mask with ABEK2 P3 filters; Other employees and contractors half mask with filters ABEK1 P2 . The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used.

Thermal hazard protection : Not required for normal conditions of use. Use dedicated equipment.

Environmental exposure controls : Do not allow to enter into surface water or drains. Comply with applicable Community environmental protection legislation. Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Liquid.
Colour	: Colourless.
Odour	: petroleum hydrocarbon odour.
Odour threshold	: No data available
pH	: Not applicable
Relative evaporation rate (butylacetate=1)	: < 1
Melting / freezing point	: No data available
Freezing point	: No data available
Initial boiling point and boiling range	: 30 – 180 °C
Flash point	: < -40 °C Literature data

Auto-ignition temperature	:	280 – 450 °C
Decomposition temperature	:	No data available
Flammability	:	Extremely flammable,liquid
Vapour pressure	:	80 kPa
Vapour density	:	3 – 5 (Air=1)
Relative density	:	0,640 – 0,745 g/cm³ (15°C)
Solubility	:	No additional information available.
Partition coefficient n-octanol/water	:	UVCB No data available
Kinematic viscosity	:	< 20,5 mm²/s (40 °C)
Dynamic viscosity	:	Not applicable
Explosive properties	:	Not applicable. The study does not need to be conducted because there are no chemical groups associated with explosive properties present in the molecule.
Oxidising properties	:	Not applicable. The classification procedure needs not to be applied because there are no chemical groups present in the molecule which are associated with oxidising properties.
Explosive limits	:	1 – 7,6 vol %
Particle size	:	Not applicable
Particle size distribution	:	Not applicable
Particle shape	:	Not applicable
Particle aspect ratio	:	Not applicable
Particle aggregation state	:	Not applicable
Particle agglomeration state	:	Not applicable
Particle specific surface area	:	Not applicable
Particle dustiness	:	Not applicable

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

Relative evaporation rate (butylacetate=1) : < 1

SECTION 10: Stability and reactivity

10.1. Reactivity

Extremely flammable liquid and vapour. Reference to other sections: 10.4 & 10.5.

10.2. Chemical stability

The product is stable under storage at normal ambient temperatures.

10.3. Possibility of hazardous reactions

Vapours may form explosive mixture with air.

10.4. Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from sunlight. See Section 7 for information on safe handling.

10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizing agents. Halogenated compounds. See Section 7 for information on safe handling.

10.6. Hazardous decomposition products

Does not decompose when used for intended uses. Thermal decomposition can lead to the escape of irritating gases and vapours. Reference to other sections 5.2.

SECTION 11: Toxicological information

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

Acute toxicity : Not classified (Based on available data, the classification criteria are not met)

benzene (71-43-2)	
LD50/oral/rat	> 2000 mg/kg
LD50/dermal/rabbit	> 8200 mg/kg
LC50/inhalation/4h/rat	44,66 mg/l/4h

Toluene (108-88-3)	
LD50/oral/rat	2600 mg/kg (Source: JAPAN_GHS)
LD50/dermal/rabbit	12000 mg/kg (Source: JAPAN_GHS)
LC50/inhalation/4h/rat	12,5 mg/l/4h

n-Hexane (110-54-3)	
LD50/oral/rat	25 g/kg (Source: NLM_CIP)
LD50/dermal/rabbit	3000 mg/kg (Source: NLM_CIP)
LC50/inhalation/4h/rat (ppm)	48000 ppm/4h

Gasoline, straight run, topping plant (68606-11-1)	
LD50/oral/rat	> 5000 mg/kg
LD50/dermal/rat	> 2000 mg/kg
LD50/dermal/rabbit	> 6000 mg/kg (Source: ECHA_API)
LC50/inhalation/4h/rat	> 5610 mg/m³

Skin corrosion/irritation : Causes skin irritation.
pH: Not applicable

Serious eye damage/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: Not applicable

Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)

Germ cell mutagenicity : May cause genetic defects.

Carcinogenicity : May cause cancer.

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

STOT-single exposure : May cause drowsiness or dizziness.

Gasoline, straight run, topping plant (68606-11-1)	
LOAEL, male, acute, Inhalation, Rat, systemic	4320 mg/m³ (1 hours)

STOT-repeated exposure : Not classified (Based on available data, the classification criteria are not met)

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

STRAIGHT RUN GASOLINE (68606-11-1)	
Kinematic viscosity	< 20,5 mm²/s (40 °C)

Other adverse effects : Suspected of damaging fertility. Suspected of damaging the unborn child. May cause cancer. May cause genetic defects.

Other information : Symptoms related to the physical, chemical and toxicological characteristics. For further information see section 4.

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties : The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

11.2.2 Other information

Other adverse effects : Suspected of damaging fertility. Suspected of damaging the unborn child,May cause cancer,May cause genetic defects.

Other information : Symptoms related to the physical, chemical and toxicological characteristics,For further information see section 4

SECTION 12: Ecological information

12.1. Toxicity

Environmental properties : Toxic to aquatic life with long lasting effects.

Hazardous to the aquatic environment, short–term (acute) : Not classified

Hazardous to the aquatic environment, long–term (chronic) : Toxic to aquatic life with long lasting effects.

benzene (71-43-2)	
LC50 - Fish [1]	10,7 – 14,7 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
LC50 - Fish [2]	5,3 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])
EC50 - Crustacea [1]	8,76 – 15,6 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 - Crustacea [2]	10 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 72h - Algae [1]	29 mg/l (Species: Pseudokirchneriella subcapitata)

Toluene (108-88-3)	
LC50 - Fish [1]	15,22 – 19,05 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through] Source: EPA)
LC50 - Fish [2]	12,6 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static] Source: EPA)
EC50 - Crustacea [1]	5,46 – 9,83 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 - Crustacea [2]	11,5 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 72h - Algae [1]	12,5 mg/l (Species: Pseudokirchneriella subcapitata [static])
EC50 96h - Algae [1]	> 433 mg/l (Species: Pseudokirchneriella subcapitata)

n-Hexane (110-54-3)	
LC50 - Fish [1]	2,1 – 2,98 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through] Source: EPA)

Gasoline, straight run, topping plant (68606-11-1)	
EC50 72h - Algae [1]	4700 mg/l (Species: Pseudokirchneriella subcapitata)
LL50, fish, acute, Freshwater, Pimephales promelas (fathead minnow)	8.2 mg/l (96 hours, equivalent or similar to EPA 66013-75-009)
NOELR, fish, Chronic, Freshwater, Pimephales promelas (fathead minnow)	2.6 mg/l (14 days, OECD 204)
EL50, daphnia, acute, Freshwater, daphnia	4.5 mg/l (48 hours, OECD Test Guideline 202)
NOELR, daphnia, Chronic, Freshwater, daphnia	2.6 mg/l (21 days, OECD 211)
EL50, algae, Freshwater, Pseudokirchneriella subcapitata	3.1 mg/l (72 hours, OECD Test Guideline 201)
LL50, microorganisms, Freshwater, Tetrahymena pyrifomis	15.41 mg/l (72 hours, Quantitative structure-activity relationship (QSAR))

12.2. Persistence and degradability

STRAIGHT RUN GASOLINE (68606-11-1)	
Persistence and degradability	Not applicable.

12.3. Bioaccumulative potential

STRAIGHT RUN GASOLINE (68606-11-1)	
Partition coefficient n-octanol/water	UVCB No data available
Bioaccumulative potential	No additional information available.

benzene (71-43-2)	
BCF - Fish [1]	3,5 – 4,4
Partition coefficient n-octanol/water	2,1

Toluene (108-88-3)	
Partition coefficient n-octanol/water	2,73 (at 20 °C (at pH 7)

n-Hexane (110-54-3)	
Partition coefficient n-octanol/water	4 (at 20 °C (at pH 7)

12.4. Mobility in soil

STRAIGHT RUN GASOLINE (68606-11-1)	
Mobility in soil	No data available
Ecology - soil	No data available.

12.5. Results of PBT and vPvB assessment

STRAIGHT RUN GASOLINE (68606-11-1)	
Results of PBT assessment	Contains no PBT/vPvB substances ≥ 0.1% assessed in accordance with REACH Annex XIII

12.6. Endocrine disrupting properties

Adverse effects on the environment caused by endocrine disrupting properties : The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

12.7. Other adverse effects

Other adverse effects : No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

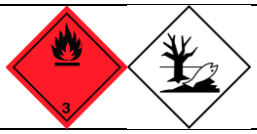
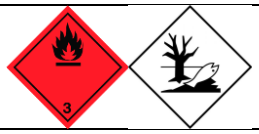
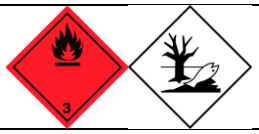
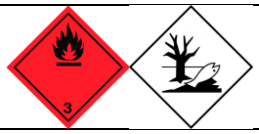
Product/Packaging disposal recommendations : Avoid release to the environment. Dispose of empty containers and wastes safely. See Section 7 for information on safe handling. Refer to manufacturer/supplier for information on recovery/recycling. Recycling is preferred to disposal or incineration. If recycling is not possible, eliminate in accordance with local valid waste disposal regulations. Handle contaminated packages in the same way as the substance itself. Dispose of contaminated materials in accordance with current regulations. Packaging contaminated by the product : Do not pierce or burn, even after use. Never use pressure to empty container.

European waste catalogue (2001/573/EC, 75/442/EEC, 91/689/EEC) : This material and its container must be disposed of as hazardous waste
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities
The following Waste Codes are only suggestions:
130702 - petrol
150110 - packaging containing residues of or contaminated by dangerous substances

SECTION 14: Transport information

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

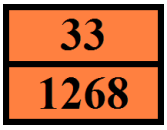
ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
1268	1268	1268	1268	1268
14.2. UN proper shipping name				
PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant)	PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant)	Petroleum distillates, n.o.s. (Gasoline, straight run, topping plant)	PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant)	PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant)
Transport document description				
UN 1268 PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant), 3, II, (D/E), ENVIRONMENTALLY	UN 1268 PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant), 3, II, MARINE POLLUTANT/ENVIRONMENTALLY	UN 1268 Petroleum distillates, n.o.s. (Gasoline, straight run, topping plant), 3, II, ENVIRONMENTALLY	UN 1268 PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant), 3, II, ENVIRONMENTALLY	UN 1268 PETROLEUM DISTILLATES, N.O.S. (Gasoline, straight run, topping plant), 3, II, ENVIRONMENTALLY

ADR	IMDG	IATA	ADN	RID
HAZARDOUS	HAZARDOUS	HAZARDOUS	HAZARDOUS	HAZARDOUS
14.3. Transport hazard class(es)				
3	3	3	3	3
				
14.4. Packing group				
II	II	II	II	II
14.5. Environmental hazards				
Dangerous for the environment : Yes	Dangerous for the environment : Yes Marine pollutant : Yes	Dangerous for the environment : Yes	Dangerous for the environment : Yes	Dangerous for the environment : Yes
No supplementary information available				

14.6. Special precautions for user

Special precautions for user : No data available

- Overland transport

Classification code (ADR)	:	F1
Special provisions	:	640C, 664
Limited quantities (ADR)	:	1l
Excepted quantities (ADR)	:	E2
Packing instructions (ADR)	:	P001
Mixed packing provisions (ADR)	:	MP19
Portable tank and bulk container instructions (ADR)	:	T7
Portable tank and bulk container special provisions (ADR)	:	TP1, TP8, TP28
Tank code (ADR)	:	L1.5BN
Vehicle for tank carriage	:	FL
Transport category (ADR)	:	2
Special provisions for carriage - Operation (ADR)	:	S2, S20
Hazard identification number (Kemler No.)	:	33
Orange plates	:	
Tunnel restriction code	:	D/E
EAC code	:	3YE

- Transport by sea

Limited quantities (IMDG)	:	1 L
Excepted quantities (IMDG)	:	E2
Packing instructions (IMDG)	:	P001
IBC packing instructions (IMDG)	:	IBC02

Tank instructions (IMDG)	:	T7
Tank special provisions (IMDG)	:	TP1, TP8, TP28
EmS-No. (Fire)	:	F-E
EmS-No. (Spillage)	:	S-E
Stowage category (IMDG)	:	B
Properties and observations (IMDG)	:	Immiscible with water.

- Air transport

PCA Excepted quantities (IATA)	:	E2
PCA Limited quantities (IATA)	:	Y341
PCA limited quantity max net quantity (IATA)	:	1L
PCA packing instructions (IATA)	:	353
PCA max net quantity (IATA)	:	5L
CAO packing instructions (IATA)	:	364
CAO max net quantity (IATA)	:	60L
Special provisions (IATA)	:	A3
ERG code (IATA)	:	3H

- Inland waterway transport

Classification code (ADN)	:	F1
Special provisions (ADN)	:	640C
Limited quantities (ADN)	:	1 L
Excepted quantities (ADN)	:	E2
Carriage permitted (ADN)	:	T
Equipment required (ADN)	:	PP, EX, A
Ventilation (ADN)	:	VE01
Number of blue cones/lights (ADN)	:	1

- Rail transport

Classification code (RID)	:	F1
Special provisions (RID)	:	640C
Limited quantities (RID)	:	1L
Excepted quantities (RID)	:	E2
Packing instructions (RID)	:	P001
Mixed packing provisions (RID)	:	MP19
Portable tank and bulk container instructions (RID)	:	T7
Portable tank and bulk container special provisions (RID)	:	TP1, TP8, TP28
Tank codes for RID tanks (RID)	:	L1.5BN
Transport category (RID)	:	2
Colis express (express parcels) (RID)	:	CE7
Hazard identification number (RID)	:	33

14.7. Maritime transport in bulk according to IMO instruments

Code: IBC	:	No data available.

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

Listed on REACH Annex XVII (Restriction Conditions). The following restrictions are applicable:

5. Benzene	benzene
28. Substances which are classified as carcinogen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 1 or Appendix 2, respectively.	STRAIGHT RUN GASOLINE ; benzene ; Gasoline, straight run, topping plant
29. Substances which are classified as germ cell mutagen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 3 or Appendix 4, respectively.	STRAIGHT RUN GASOLINE ; benzene ; Gasoline, straight run, topping plant
3(a) Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F	STRAIGHT RUN GASOLINE ; benzene ; Toluene ; n-Hexane ; Gasoline, straight run, topping plant
3(b) Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10	STRAIGHT RUN GASOLINE ; benzene ; Toluene ; n-Hexane ; Gasoline, straight run, topping plant
3(c) Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1	STRAIGHT RUN GASOLINE ; n-Hexane ; Gasoline, straight run, topping plant
40. Substances classified as flammable gases category 1 or 2, flammable liquids categories 1, 2 or 3, flammable solids category 1 or 2, substances and mixtures which, in contact with water, emit flammable gases, category 1, 2 or 3, pyrophoric liquids category 1 or pyrophoric solids category 1, regardless of whether they appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 or not.	STRAIGHT RUN GASOLINE ; benzene ; Toluene ; n-Hexane ; Gasoline, straight run, topping plant
48. Toluene	Toluene
72. The substances listed in column 1 of the Table in Appendix 12	benzene

Not listed on the REACH Candidate List

Not listed on REACH Annex XIV (Authorisation List)

15.1.2. National regulations

France

No ICPE	Installations classées Désignation de la rubrique	Code Régime	Rayon
4330.text	Liquides inflammables de catégorie 1, liquides inflammables maintenus à une température supérieure à leur point d'ébullition, autres liquides de point éclair inférieur ou égal à 60° C maintenus à une température supérieure à leur température d'ébullition ou dans des conditions particulières de traitement, telles qu'une pression ou une température élevée (1).		

4330.1	La quantité totale susceptible d'être présente dans les installations y compris dans les cavités souterraines étant : 1. Supérieure ou égale à 10 t (1) Conformément à la section 2.6.4.5 de l'annexe I du règlement (CE) n° 1272/2008, il n'est pas nécessaire de classer les liquides ayant un point d'éclair supérieur à 35° C dans la catégorie 3 si l'épreuve de combustion entretenue du point L 2, partie III, section 32, du Manuel d'épreuves et de critères des Nations unies a donné des résultats négatifs. Toutefois, cette remarque n'est pas valable en cas de température ou de pression élevée, et ces liquides doivent alors être classés dans cette catégorie. Quantité seuil bas au sens de l'article R. 511-10 : 10 t. Quantité seuil haut au sens de l'article R. 511-10 : 50 t.	A	2
4330.2	La quantité totale susceptible d'être présente dans les installations y compris dans les cavités souterraines étant : 2. Supérieure ou égale à 1 t mais inférieure à 10 t (1) Conformément à la section 2.6.4.5 de l'annexe I du règlement (CE) n° 1272/2008, il n'est pas nécessaire de classer les liquides ayant un point d'éclair supérieur à 35° C dans la catégorie 3 si l'épreuve de combustion entretenue du point L 2, partie III, section 32, du Manuel d'épreuves et de critères des Nations unies a donné des résultats négatifs. Toutefois, cette remarque n'est pas valable en cas de température ou de pression élevée, et ces liquides doivent alors être classés dans cette catégorie. Quantité seuil bas au sens de l'article R. 511-10 : 10 t. Quantité seuil haut au sens de l'article R. 511-10 : 50 t.	DC	
4511.text	Dangereux pour l'environnement aquatique de catégorie chronique 2.		
4511.1	La quantité totale susceptible d'être présente dans l'installation étant : 1. Supérieure ou égale à 200 t Quantité seuil bas au sens de l'article R. 511-10 : 200 t. Quantité seuil haut au sens de l'article R. 511-10 : 500 t.	A	1
4511.2	La quantité totale susceptible d'être présente dans l'installation étant : 2. Supérieure ou égale à 100 t mais inférieure à 200 t Quantité seuil bas au sens de l'article R. 511-10 : 200 t. Quantité seuil haut au sens de l'article R. 511-10 : 500 t.	DC	

Germany

Regulatory reference : WGK 3, Highly hazardous to water (Classification according to AwSV)

German storage class (LGK) : LGK 3 - Flammable liquids

Hazardous Incident Ordinance (12. BImSchV) : Listed in the 12. BImSchV (Annex I) under: 2.3.3 Gasöle

Quantity threshold for operational area under § 1 para. 1

- Sentence 1: 2500000 kg
- Sentence 2: 25000000 kg

Netherlands

Waterbezwaarlijkheid : categorie Z(1) - niet-afbreekbare stoffen met gevaarlijke eigenschappen voor mens en milieu (carcinogeniteit/ mutageniteit/ reprotoxiciteit/ bioacumulerend vermogen/ toxiciteit of persistentie)

SZW-lijst van kankerverwekkende stoffen : Gasoline, straight-run, topping-plant is listed

SZW-lijst van mutagene stoffen : Gasoline, straight-run, topping-plant is listed

SZW-lijst van reprotoxische stoffen – Borstvoeding : The substance is not listed

SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : The substance is not listed

SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed

Recommendations Danish Regulation : Young people below the age of 18 years are not allowed to use the product

Pregnant/breastfeeding women working with the product must not be in direct contact with the product

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes:

2.1	Classification	Modified	
5.2	Special hazards arising from the substance or mixture	Modified	
8	Respiratory protection	Modified	
9	Physical and chemical properties	Modified	
15	Regulatory information	Modified	

Abbreviations and acronyms:

	DNEL = Derived No Effect Level
	DMEL = Derived Minimal Effect level
	PNEC = Predicted No Effect Concentration
	OEL-STEL = Occupational Exposure Limits - Short Term Exposure Limits (STELs)
	TWA = time weighted average
	LC50 = Median lethal concentration
	LD50 = Median lethal dose
	LL50 = Median lethal level
	EC50 = Median Effective Concentration
	EL50 = Median effective level
	ErC50 = EC50 in terms of reduction of growth rate
	ErL50 = EL50 in terms of reduction of growth rate
	NOEL = no-observed-effect level
	NOEC = No observed effect concentration
	NOELR = No observed effect loading rate
	NOAEC = No observed adverse effect concentration
	NOAEL = No observed adverse effect level
	EWC = European waste catalogue
	NA = Not applicable
	N.O.S. = Not Otherwise Specified
	VOC = Volatile organic compounds
	mg/kg BW = mg/kg bodyweight
	QSAR = Quantitative structure-activity relationship (QSAR)

	ADN = Accord Européen relatif au Transport International des Marchandises Dangereuses par voie de Navigation du Rhin ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route CLP = Classification, Labelling and Packaging Regulation according to 1272/2008/EC IATA = International Air Transport Association IMDG = International Maritime Dangerous Goods Code LEL = Lower Explosive Limit/Lower Explosion Limit UEL = Upper Explosion Limit/Upper Explosive Limit REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals
	WGK = Wassergefährdungsklasse (Water Hazard Class under German Federal Water Management Act)
	ABM = Algemene beoordelingsmethodiek
	BTT = Breakthrough time (maximum wearing time)
	NOEL: no-observed-effect level
	STOT = Specific Target Organ Toxicity

Sources of key data used to compile the datasheet : European Chemicals Bureau CSR, SDS supplier. LOLI. ECHA (European Chemicals Agency).

Training advice : Training staff on good practice. Manipulations are to be done only by qualified and authorised persons.

Full text of H- and EUH-statements:

Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2
Asp. Tox. 1	Aspiration hazard, Category 1
Carc. 1A	Carcinogenicity, Category 1A
Carc. 1B	Carcinogenicity, Category 1B
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2
Flam. Liq. 1	Flammable liquids, Category 1
Flam. Liq. 2	Flammable liquids, Category 2
H224	Extremely flammable liquid and vapour.
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H350	May cause cancer.
H361d	Suspected of damaging the unborn child.
H361f	Suspected of damaging fertility.
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.
Muta. 1B	Germ cell mutagenicity, Category 1B
Repr. 2	Reproductive toxicity, Category 2
Skin Irrit. 2	Skin corrosion/irritation, Category 2
STOT RE 1	Specific target organ toxicity – Repeated exposure, Category 1

STOT RE 2	Specific target organ toxicity – Repeated exposure, Category 2
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis

Full text of use descriptors

ERC1	Manufacture of the substance
ERC2	Formulation into mixture
ERC3	Formulation into solid matrix
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)
ESVOC SPERC 4.19.v1	Rubber production and processing: Industrial (SU10)
ESVOC SPERC 4.3a.v1	Uses in coatings: Industrial (Su3)
ESVOC SPERC 4.4a.v1	Use in cleaning agents: Industrial (SU3)
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)
ESVOC SPERC 9.12b.v1	Use as a fuel: Professional (SU22)
ESVOC SPERC 9.12c.v1	Use as a fuel: Consumer (SU21)
PC13	Fuels
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC15	Use as laboratory reagent
PROC16	Use of fuels
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC28	Manual maintenance (cleaning and repair) of machinery
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
SU10	Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU11	Manufacture of rubber products

SU3	Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8	Manufacture of bulk, large scale chemicals (including petroleum products)
SU9	Manufacture of fine chemicals

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Classification according to Regulation (EC) No. 1272/2008 [CLP]
Labelling according to Regulation (EC) No. 1272/2008 [CLP]

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Annex to the safety data sheet

Annex : Identified uses

Title	Sector of use	Product category	Process category	Article category	Environmental release	SPERC
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3, SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Distribution Classified as (H350, H340,			PROC1, PROC2, PROC3,		ERC4, ERC5, ERC6a, ERC6b,	ESVOC SPERC

H361f and/or H361d) Benzene content : 20% - 79%			PROC8a, PROC8b, PROC15		ERC6c, ERC6d, ERC7	1.1b.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 20% - 79%	SU3, SU10		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28		ERC6a	ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%.	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28		ERC6a	ESVOC SPERC 6.1a.v1
Use as an intermediate Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%	SU8, SU9		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC6a	ESVOC SPERC 6.1a.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content			PROC1, PROC2, PROC3, PROC8a, PROC8b,		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1

: 0% - 1%			PROC15			
Distribution of substance Classified as: (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%.			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Distribution Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7	ESVOC SPERC 1.1b.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 1% - 5%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Formulation & (re)packing of substances and mixtures Classified as (H350, H340, H361f and/or H361d) Benzene content : 5% - 20%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15		ERC2	ESVOC SPERC 2.2.v1
Uses in coatings Classified as (H350, H340, H361f and/or H361d)			PROC1, PROC2, PROC3, PROC8a, PROC8b,		ERC4	ESVOC SPERC 4.3a.v1

Benzene content : 0% - 1%			PROC15			
Use in cleaning agents Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b		ERC4	ESVOC SPERC 4.4a.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16		ERC7	ESVOC SPERC 7.12a.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%			PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16		ERC9a, ERC9b	ESVOC SPERC 9.12b.v1
Use as a fuel Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%		PC13			ERC9a, ERC9b	ESVOC SPERC 9.12c.v1
Use in rubber production and processing Classified as (H350, H340, H361f and/or H361d) Benzene content : 0% - 1%	SU10, SU11		PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		ERC4, ERC6d	ESVOC SPERC 4.19.v1

1. Exposure scenario 02e (Benz 20%-79%)

Use as an intermediate

ES Ref.: 02e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15

	SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements	

	are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out operation for more than 1 hour.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours,E47 - Handle substance within a closed system.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Avoid carrying out activities involving exposure for more than 1 hour.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors,Provide a good standard of controlled ventilation (10 to 15 air changes per hour).	
Storage	E84 - Store substance within a closed system,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release	

	prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	57,4
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04 (Benz 20%-79%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04 (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02e (Benz 20%-79%)

Use as an intermediate

ES Ref.: 02e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3, SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out operation for more than 1 hour.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours,E47 - Handle substance within a closed system.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Avoid carrying out activities involving exposure for more than 1 hour.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors,Provide a good standard of controlled ventilation (10 to 15 air changes per hour).	
Storage	E84 - Store substance within a closed system,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	2210000
	Fraction of regional tonnage used locally:	0,0068
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300

Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	92,9
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,5
	Maximum allowable site tonnage (MSafe)	78000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus,

	scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03e (Benz 20%-79%)

Distribution

ES Ref.: 03e (Benz 20%-79%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3 ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Physical form	Substance is complex UVCB.
Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	18700000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	37500

	Maximum daily site tonnage (kg/day)	120000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	12
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,5
	Maximum allowable site tonnage (MSafe)	1100000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04 (Benz 20%-79%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04 (Benz 20%-79%)	
ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU3, SU10 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	16500000
	Fraction of regional tonnage used locally:	0,0018
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release	

environmental exposure	prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	56,5
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,5
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,58
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone

	or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02b (Benz 0%-1%)

Use as an intermediate
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 02b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented,Assumes activities are at ambient temperature (unless stated differently).	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems)	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems),Batch process	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Put lids on containers immediately after use.	
CS14 - Bulk transfers,Closed systems,Loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Wear suitable coveralls to prevent exposure to the skin,Clear spills immediately	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	160000
	Fraction of regional tonnage used locally:	0,091
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or	Risk from environmental exposure is driven by freshwater sediment,Prevent discharge of	

limit discharges, air emissions and releases to soil	undissolved substance to or recover from onsite wastewater,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	95
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95
	Maximum allowable site tonnage (MSafe)	59000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 02c (Benz 1%-5%)

Use as an intermediate
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 1% - 5%.

ES Ref.: 02c (Benz 1%-5%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC28)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented,Assumes activities are at ambient temperature (unless stated differently).	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
General exposures (closed systems),Batch process	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Put lids on containers immediately after use.	
CS14 - Bulk transfers,Closed systems,Loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Avoid carrying out operation for more than 4 hours,Drain down and flush system prior to equipment break-in or maintenance,Wear a respirator conforming to EN140,Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply,Wear suitable coveralls to prevent exposure to the skin,Clear spills immediately	
Storage	E84 - Store substance within a closed system.	
Storage	Provide extract ventilation to points where emissions occur,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	580000
	Fraction of regional tonnage used locally:	0,026
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	94,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	95
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95
	Maximum allowable site tonnage (MSafe)	58000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html),Maximum Risk Characterization Ratios for air emissions :0,08,Maximum Risk Characterization Ratios for wastewater emissions :0,91

1. Exposure scenario 02d (Benz 5%-20%)

Use as an intermediate

ES Ref.: 02d (Benz 5%-20%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 SU8, SU9 ERC6a ESVOC SPERC 6.1a.v1
Processes, tasks activities covered	Use as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Ensure operation is undertaken outdoors,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC6a, ESVOC SPERC 6.1a.v1)

ERC6a	Use of intermediate
ESVOC SPERC 6.1a.v1	Manufacture of substances: Industrial (SU8, SU9)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by freshwater sediment,If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	80
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,2
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	57,4
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03b (Benz 0%-1%)

Distribution
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 03b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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. 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. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,Wear suitable gloves tested to EN374	
General exposures (closed systems),outdoor	Handle substance within a closed system	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	Ensure operation is undertaken outdoors,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	22000
	Maximum daily site tonnage (kg/day)	72000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	2600000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 03c (Benz 1%-5%)

Distribution of substance
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 1% - 5%.

ES Ref.: 03c (Benz 1%-5%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Storage	Ensure operation is undertaken outdoors,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	11000000
	Fraction of regional tonnage used locally:	0,002
	Annual site tonnage (tons/year):	22000
	Maximum daily site tonnage (kg/day)	72000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001

	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	2600000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html),Maximum Risk Characterization Ratios for air emissions :0,00033,Maximum Risk Characterization Ratios for wastewater emissions :0,0031

1. Exposure scenario 03d (Benz 5%-20%)

Distribution

ES Ref.: 03d (Benz 5%-20%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 ESVOC SPERC 1.1b.v1
Processes, tasks activities covered	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
Bulk closed loading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
Bulk closed loading and unloading	Ensure material transfers are under containment or extract ventilation,PPE17 - Wear chemically resistant gloves (tested to EN374) in combination with specific activity training,Avoid carrying out activities involving exposure for more than 1 hour.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC5	Use at industrial site leading to inclusion into/onto article
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7	Use of functional fluid at industrial site
ESVOC SPERC 1.1b.v1	Distribution: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	25000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	51000
	Maximum daily site tonnage (kg/day)	170000
Frequency and duration of use	Continuous use/release.	

	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,001
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	83,3
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	670000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04b (Benz 0%-1%)

Formulation & (re)packing of substances and mixtures
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 04b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems),outdoor	E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	10000000
	Fraction of regional tonnage used locally:	0,003
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by the freshwater,If	

	discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	95,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	110000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04c (Benz 1%-5%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04c (Benz 1%-5%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system.	
CS2 - Process sampling	Sample via a closed loop or other system to avoid exposure.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Storage	E84 - Store substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	
	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite	

	wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 04d (Benz 5%-20%)

Formulation & (re)packing of substances and mixtures

ES Ref.: 04d (Benz 5%-20%)	
ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC2 ESVOC SPERC 2.2.v1
Processes, tasks activities covered	Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),CS56 - with sample collection	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
General exposures (closed systems)	Provide extract ventilation to points where emissions occur,E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours,Ensure operation is undertaken outdoors.	
Storage	PPE15 - Wear suitable gloves tested to EN374,E84 - Store substance within a closed system,Avoid carrying out activities involving exposure for more than 4 hours.	
CS2 - Process sampling	E47 - Handle substance within a closed system,Sample via a closed loop or other system to avoid exposure,PPE15 - Wear suitable gloves tested to EN374,Avoid carrying out activities involving exposure for more than 4 hours.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation,PPE15 - Wear suitable gloves tested to EN374.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE18 - Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls,Avoid carrying out activities involving exposure for more than 1 hour,or,Wear a respirator conforming to EN140 with Type A filter or better,Ensure operation is undertaken outdoors.	

2.2 Contributing scenario controlling environmental exposure (ERC2, ESVOC SPERC 2.2.v1)

ERC2	Formulation into mixture
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	14000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	30000
	Maximum daily site tonnage (kg/day)	100000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting	Release fraction to air from process (initial release prior to RMM):	

environmental exposure	Release fraction to wastewater from process (initial release prior to RMM):	
	Release fraction to soil from process (initial release prior to RMM):	

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	98,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	68
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	98,7
	Maximum allowable site tonnage (MSafe)	100000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet

	(http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 05b (Benz 0%-1%)

Uses in coatings

ES Ref.: 05b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 ERC4 ESVOC SPERC 4.3a.v1
Processes, tasks activities covered	Covers the use in coatings (paints, inks, adhesives, etc) within closed or contained systems including incidental exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application activities and film formation) and equipment cleaning, maintenance and associated laboratory activities. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
Film formation - force drying, stoving and other technologies	Provide extract ventilation to points where emissions occur	
General exposures (closed systems)	E47 - Handle substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
CS3 - Material transfers	Ensure material transfers are under containment or extract ventilation.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ESVOC SPERC 4.3a.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 4.3a.v1	Uses in coatings: Industrial (Su3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	210000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	15000
	Maximum daily site tonnage (kg/day)	50000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,98
	Release fraction to wastewater from process (initial release prior to RMM):	0,007
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	90
	Treat onsite wastewater (prior to receiving water	99,2

	discharge) to provide the required removal efficiency of ≥ (%):	
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	81,7
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	99,2
	Maximum allowable site tonnage (MSafe)	50000
	Assumed domestic sewage treatment plant flow (m³/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 07b (Benz 0%-1%)

Use in cleaning agents

ES Ref.: 07b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b ERC4 ESVOC SPERC 4.4a.v1
Processes, tasks activities covered	Covers the use as a component of cleaning products within closed or contained systems including incidental exposures during transfer from storage, mixing/diluting in the preparatory phase and cleaning activities, related equipment cleaning and maintenance. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop,Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
CS14 - Bulk transfers	Ensure material transfers are under containment or extract ventilation.	
CS38 - Use in contained systems,CS93 - Automated process with (semi) closed systems.	E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	
CS45 - Filling/ preparation of equipment from drums or containers.	Ensure material transfers are under containment or extract ventilation.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment break-in or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ESVOC SPERC 4.4a.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ESVOC SPERC 4.4a.v1	Use in cleaning agents: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	410000
	Fraction of regional tonnage used locally:	0,2
	Annual site tonnage (tons/year):	100
	Maximum daily site tonnage (kg/day)	5000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	20
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	1
	Release fraction to wastewater from process (initial release prior to RMM):	0,00003
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	70
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	82

	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	95,8
	Maximum allowable site tonnage (MSafe)	21000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 10b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 10b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 ERC7 ESVOC SPERC 7.12a.v1
Processes, tasks activities covered	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC16	Use of fuels

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
Bulk closed unloading	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
refuelling	Ensure material transfers are under containment or extract ventilation.	
refuelling aircraft	Ensure material transfers are under containment or extract ventilation.	
General exposures (closed systems)	E47 - Handle substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
Use as a fuel,CS107 - (closed systems)	E47 - Handle substance within a closed system.	
CS39 - Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan,PPE16 - Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Storage	E84 - Store substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	

2.2 Contributing scenario controlling environmental exposure (ERC7, ESVOC SPERC 7.12a.v1)

ERC7	Use of functional fluid at industrial site
ESVOC SPERC 7.12a.v1	Use as a fuel: Industrial (SU3)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	1000000
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	1000000
	Maximum daily site tonnage (kg/day)	3300000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	300
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,05
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	95
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	91,7
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	5300000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 11b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 11b (Benz 0%-1%) ES Type: Worker Version: 2	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 ERC9a, ERC9b ESVOC SPERC 9.12b.v1
Processes, tasks activities covered	Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. Widespread use by professional workers (PW)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC16	Use of fuels

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature,Unless otherwise stated,Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
General exposures (closed systems),outdoor	E47 - Handle substance within a closed system.	
Bulk closed unloading	Ensure material transfers are under containment or extract ventilation.	
CS8 - Drum/batch transfers	Ensure material transfers are under containment or extract ventilation.	
refuelling	Ensure material transfers are under containment or extract ventilation.	
Use as a fuel,CS107 - (closed systems)	E47 - Handle substance within a closed system.	
CS5 - Equipment maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan,EI19 - Ensure operatives are trained to minimise exposures.	
Storage	E84 - Store substance within a closed system,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	

2.2 Contributing scenario controlling environmental exposure (ERC9a, ERC9b, ESVOC SPERC 9.12b.v1)

ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 9.12b.v1	Use as a fuel: Professional (SU22)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	950000
	Fraction of regional tonnage used locally:	0,0005
	Annual site tonnage (tons/year):	480
	Maximum daily site tonnage (kg/day)	1300
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	365
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or	Risk from environmental exposure is driven by the freshwater,No wastewater treatment required.	

limit discharges, air emissions and releases to soil	Treat air emission to provide a typical removal efficiency of (%):	Not applicable
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	0
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	0
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1
	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%):	96,1
	Maximum allowable site tonnage (MSafe)	64000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 12b (Benz 0%-1%)

Use as a fuel
Classified as: (H350, H340, H361f and/or H361d)
Benzene content : 0% - 1%

ES Ref.: 12b (Benz 0%-1%) ES Type: Consumer Version: 2	

Use descriptors	PC13 ERC9a, ERC9b ESVOC SPERC 9.12c.v1
Processes, tasks activities covered	Covers consumer uses in liquid fuels. Consumer use (C)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario consumer end-use (PC13)

PC13	Fuels

Product characteristics

Physical form	Liquid
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently)
Vapour pressure	Liquid, vapour pressure > 10 kPa at STP

Operational conditions

Amount used	unless stated differently,Covers use up to 37500 g	37500 g
Frequency and duration of use	unless stated differently,Covers use up to	Uses per day
	Covers exposure up to	2 Hours/event
Human factors not influenced by risk management	Covers skin contact area up to	420 cm²
Other given operational conditions affecting consumers exposure	Covers use at ambient temperatures,Unless otherwise stated	
	Covers use in room size of 20 m3	
	Covers use under typical household ventilation.	
	Fuels,Liquid: Automotive Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 52. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 210 cm2. For each use event, covers use amounts up to: 37500 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 0,05. Hours/event
	Fuels,Liquid Scooter Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 52. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 210 cm2. For each use event, covers use amounts up to: 3750 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 0,03. Hours/event
	Fuels,Liquid, Garden equipment - Use	Unless otherwise stated.

		Covers concentrations up to 1%. Covers use up to 26. days/year. covers use up to 1 time/on day of use. For each use event, covers use amounts up to: 750 g. Covers outdoor use. Covers use in room size of 100 m3. Covers exposure up to 2,00. Hours/event
	Fuels,Liquid: Garden equipment - Refuelling	Unless otherwise stated. Covers concentrations up to 1%. Covers use up to 26. days/year. covers use up to 1 time/on day of use. Covers skin contact area up to 420 cm2. For each use event, covers use amounts up to: 750 g. Covers use in a one car garage (34m³) under typical ventilation. Covers use in room size of 34 m3. Covers exposure up to 0,03. Hours/event

Risk management measures

Other risk management measures:

Fuels,Liquid: Automotive Refuelling	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid Scooter Refuelling	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid, Garden equipment - Use	No specific risk management measure identified beyond those operational conditions stated.	
Fuels,Liquid: Garden equipment - Refuelling	No specific risk management measure identified beyond those operational conditions stated.	

2.2 Contributing scenario controlling environmental exposure (ERC9a, ERC9b, ESVOC SPERC 9.12c.v1)

ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
ESVOC SPERC 9.12c.v1	Use as a fuel: Consumer (SU21)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	8200000
	Fraction of regional tonnage used locally:	0,0005
	Annual site tonnage (tons/year):	4100
	Maximum daily site tonnage (kg/day)	11000
Frequency and duration of use	Continuous use/release.	
	Number of emission days per year	365
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,00001
	Release fraction to soil from process (initial release prior to RMM):	0,00001

Risk management measures

Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater	
	Estimated substance removal from wastewater via domestic sewage treatment (%):	96,1

	Maximum allowable site tonnage (MSafe)	530000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Combustion emissions limited by required exhaust emission controls,Combustion emissions considered in regional exposure assessment,External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	This substance is consumed during use and no waste of the substance is generated.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC report #107 and the Chapter R15 of the IR&CSA TGD. Where exposure determinants differ to these source, then they are indicated.

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the applicable consumer reference values when the operational conditions/risk management measures given in section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

1. Exposure scenario 13b (Benz 0%-1%)

Use in rubber production and processing

ES Ref.: 13b (Benz 0%-1%) ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15 SU10, SU11 ERC4, ERC6d ESVOC SPERC 4.19.v1
Processes, tasks activities covered	Manufacture of tyres and general rubber articles within closed or contained systems, including incidental exposures during processing of raw (uncured) rubber, handling and mixing of rubber additives, calendaring, vulcanising, cooling and finishing as well as maintenance. Use at industrial sites (IS)
Assessment method	see section 3 of this exposure scenario.

2. Operational conditions and risk management measures

2.1 Contributing scenario controlling worker exposure (PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15)

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15	Use as laboratory reagent

Product characteristics

Physical form	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).

Operational conditions

Amount used	Not applicable	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient temperature),Assumes a good basic standard of occupational hygiene is implemented.	

Risk management measures

Other risk management measures:

General measures (skin irritants)	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop	
General measures (carcinogens)	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 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 scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.	
CS3 - Material transfers	E84 - Store substance within a closed system,Ensure material transfers are under containment or extract ventilation.	
General exposures (closed systems)	E47 - Handle substance within a closed system.	
CS3 - Material transfers	Ensure material transfers are under containment or extract ventilation.	
Bulk weighing	E47 - Handle substance within a closed system,PPE15 - Wear suitable gloves tested to EN374.	
CS36 - Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	
CS5 - Equipment maintenance	Drain down and flush system prior to equipment opening or maintenance,Retain drain downs in sealed storage pending disposal or for subsequent recycle,Clear spills immediately,E1 - Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.	
Small scale weighing	E57 - Carry out in a vented booth or extracted enclosure.	
Storage,outdoor	E84 - Store substance within a closed system.	

2.2 Contributing scenario controlling environmental exposure (ERC4, ERC6d, ESVOC SPERC 4.19.v1)

ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC6d	Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ESVOC SPERC 4.19.v1	Rubber production and processing: Industrial (SU10)

Product characteristics

Other product characteristics	Substance is complex UVCB, Predominantly hydrophobic

Operational conditions

Amount used	Fraction of EU tonnage used in region:	0,1
	Regional use tonnage (tons/year):	680
	Fraction of regional tonnage used locally:	1
	Annual site tonnage (tons/year):	680
	Maximum daily site tonnage (kg/day)	34000
Frequency and duration of use	Continuous use/release.	
	Emission days (days/year):	20
Environmental factors not influenced by risk management	Local freshwater dilution factor:	10
	Local marine water dilution factor:	100
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0,01
	Release fraction to wastewater from process (initial release prior to RMM):	0,003
	Release fraction to soil from process (initial release prior to RMM):	0,0001

Risk management measures

Technical conditions and measures at process level to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Prevent discharge of undissolved substance to or recover from onsite wastewater,Risk from environmental exposure is driven by humans via	

	indirect exposure (primarily inhalation),If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
	Treat air emission to provide a typical removal efficiency of (%):	0
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%):	97,4
	If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%):	37,1
Organizational measures to prevent/limit release from the site	Do not apply industrial sludge to natural soils,Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to sewage treatment plant	Estimated substance removal from wastewater via domestic sewage treatment (%):	95,8
	Estimated substance removal from wastewater via domestic sewage treatment (%):	97,4
	Maximum allowable site tonnage (MSafe)	34000
	Assumed domestic sewage treatment plant flow (m^3/d):	2000
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

3. Exposure estimation and reference to its source

3.1. Health

Information for contributing exposure scenario	
2.1	The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated

3.2. Environment

Information for contributing exposure scenario	
2.2	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels,Available hazard data do not enable the derivation of a DNEL for dermal irritant effects,Available hazard data do not support the need for a DNEL to be established for other health effects,Risk Management Measures are based on qualitative risk characterisation.

4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures,Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination,Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination,Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).