SAFETY DATA SHEET

ISOOCTANE 100

INEOS Oligomers

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

1.1 Product identifier

Product name : ISOOCTANE 100

Index number : 601-009-00-8

EC number : 208-759-1

REACH Registration number : 01-2119457965-22-0000

CAS number : 540-84-1

Product code : MSDS#: 0000000111

Product description : Substance

Product type : Liquid.

Other means of identification : Isooctane, 2,2,4-trimethylpentane

IMCD

Distributed by IMCD Group

sds@imcdgroup.com

24 hour Emergency Telephone number

UK customers +44 1865 407333
Non-UK customers +44 3700 492795

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

Product use : Not available.

Area of application : Consumer applications, Industrial applications, Professional applications.

Identified uses
Manufacture of substance - Industrial Distribution of substance - Industrial Formulation - Industrial Coating. - Industrial Cleaning Products - Industrial Fuels - Industrial Use in laboratories - Industrial Coating. - Professional Cleaning Products - Professional Use in laboratories - Professional Fuels - Professional Coating. - Consumer Fuels - Consumer

Uses advised against	Reason
None known.	-

1.3 Details of the supplier of the safety data sheet

INEOS Oligomers Customer Service Centre
Parc Industriel de Feluy Nord - Zone C
B-7181 Feluy
Belgium

e-mail address of person responsible for this SDS : Telephone no.:+32 (0)67 875 980
Email: OLIGOMERSMSDS@ineos.com

1.4 Emergency telephone number

National advisory body/Poison Centre

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

Telephone number : Call 111 if you urgently need medical help or advice but it's not a life-threatening situation (NHS 111 service).
In Cornwall, the Scilly Isles, Luton and Bedfordshire areas call 0845 4647 (NHS Direct).
For immediate, life-threatening emergencies, call 999 (Emergency and urgent care services).

Supplier

Telephone number : +44 1235 239 670 (CARECHEM24)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Substance

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

Flam. Liq. 2, H225
Skin Irrit. 2, H315
STOT SE 3, H336 (Narcotic effects)
Asp. Tox. 1, H304
Aquatic Acute 1, H400
Aquatic Chronic 1, H410

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

Classification according to Directive 67/548/EEC [DSD]

F; R11
Xn; R65
Xi; R38
R67
N; R50/53

See Section 16 for the full text of the R phrases or H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapour.
Causes skin irritation.
May be fatal if swallowed and enters airways.
May cause drowsiness or dizziness.
Very toxic to aquatic life with long lasting effects.

Precautionary statements

General : P103 - Read label before use.
P102 - Keep out of reach of children.
P101 - If medical advice is needed, have product container or label at hand.

Prevention : Do not ingest.
P280 - Wear protective gloves: > 8 hours (breakthrough time): nitrile rubber. Wear eye or face protection.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment.
P273 - Avoid release to the environment.

SECTION 2: Hazards identification

Response : P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P301 + P310 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

Storage : P235 - Keep cool.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazardous ingredients : 2,2,4-trimethylpentane

Supplemental label elements : Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Yes, applicable.

Tactile warning of danger : Yes, applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII : No.
P: Not available. B: Not available. T: No.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII : Not available.

Other hazards which do not result in classification : None known.

SECTION 3: Composition/information on ingredients

3.1 Substances : Substance

Product/ingredient name	Identifiers	%	Classification		Type
			67/548/EEC	Regulation (EC) No. 1272/2008 [CLP]	
2,2,4-trimethylpentane	EC: 208-759-1 CAS: 540-84-1 Index: 601-009-00-8	100	F; R11 Xn; R65 Xi; R38 R67 N; R50/53 **See Section 16 for the full text of the R-phrases declared above.**	Flam. Liq. 2, H225 Skin Irrit. 2, H315 STOT SE 3, H336 (Narcotic effects) Asp. Tox. 1, H304 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 **See Section 16 for the full text of the H statements declared above.**	[A]

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

SECTION 3: Composition/information on ingredients

Type

[A] Constituent
[B] Impurity
[C] Stabilising additive

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach. Do not ingest. If swallowed then seek immediate medical assistance.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

SECTION 4: First aid measures

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : Highly flammable liquid and vapour. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapour/gas is heavier than air and will spread along the ground. Vapours may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is very toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

5.3 Advice for firefighters

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

SECTION 6: Accidental release measures

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

6.3 Methods and material for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.

6.4 Reference to other sections : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Seveso II Directive - Reporting thresholds (in tonnes)

SECTION 7: Handling and storage

Danger criteria

Category	Notification and MAPP threshold	Safety report threshold
P5c: Flammable liquids 2 and 3 not falling under P5a or P5b	5000	50000
E1: Hazardous to the aquatic environment - Acute 1 or Chronic 1	100	200
C7b: Highly flammable (R11)	5000	50000
C9i: Very toxic for the environment	100	200

7.3 Specific end use(s)

Recommendations : Not available.

Industrial sector specific solutions : Not available.

SECTION 8: Exposure controls/personal protection

The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs

No DNELs/DMELs available.

PNECs

No PNECs available

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 8: Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. > 8 hours (breakthrough time): nitrile rubber

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves. Refer to European Standard EN 1149 for further information on material and design requirements and test methods.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Liquid. [Mobile liquid.]

Colour : Colourless.

Odour : Kerosene. (Slight)

Odour threshold : Not available.

pH : Not available.

Melting point/freezing point : -103°C

Initial boiling point and boiling range : 98 to 102°C

Flash point : Open cup: -14°C [Cleveland.]

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Upper/lower flammability or explosive limits : Lower: 0.7%
Upper: 5.5%

Vapour pressure : 5.3 kPa [room temperature]

Vapour density : 3.9 [Air = 1]

Relative density : Not available.

Solubility(ies) : Insoluble in the following materials: cold water.

SECTION 9: Physical and chemical properties

Partition coefficient: n-octanol/ water : 4

Auto-ignition temperature : 420°C

Decomposition temperature : Not available.

Viscosity : Kinematic (40°C): 7 mm^2/s (7 cSt)

Explosive properties : Not available.

Oxidising properties : Not available.

9.2 Other information

Physical/chemical properties comments : No additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability : The product is stable.

10.3 Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur. Under normal conditions of storage and use, hazardous polymerisation will not occur.

10.4 Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

10.5 Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials

10.6 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2,2,4-trimethylpentane	LC50 Inhalation Vapour LD50 Dermal LD50 Oral	Rat Rabbit Rat	>33.5 mg/l >2000 mg/kg >5000 mg/kg	4 hours - -

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitisation

Conclusion/Summary : Not available.

Mutagenicity

Conclusion/Summary : No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a mutagen.

Carcinogenicity

SECTION 11: Toxicological information

Conclusion/Summary : No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH, the International Agency for Research on Cancer (IARC) or the European Commission (EC).

Reproductive toxicity

Conclusion/Summary : No component of this product at levels greater than or equal to 0.1% is classified by established regulatory criteria as a reproductive toxin.

Teratogenicity

Conclusion/Summary : No component of this product at levels greater than 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
2,2,4-trimethylpentane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Product/ingredient name	Result
2,2,4-trimethylpentane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach. Do not ingest. If swallowed then seek immediate medical assistance.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

SECTION 11: Toxicological information

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

Conclusion/Summary : Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Other information : Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
Not available.			

Conclusion/Summary : Not available.

12.2 Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
Not available.				

Conclusion/Summary : Not available.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
2,2,4-trimethylpentane	-	-	Inherent

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
2,2,4-trimethylpentane	4	-	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : 2.38

Mobility : This product is not likely to move rapidly with surface or groundwater flows because of its low water solubility. This product is not likely to volatilise rapidly into the air because of its low vapour pressure.

12.5 Results of PBT and vPvB assessment

PBT : No.

P: Not available. B: Not available. T: No.

vPvB : Not available.

vP: Not available. vB: Not available.

SECTION 12: Ecological information

12.6 Other adverse effects : No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	UN1262	UN1262	UN1262	UN1262
14.2 UN proper shipping name	OCTANES	OCTANES	OCTANES	Octanes
14.3 Transport hazard class(es)	3 	3 	3 	3 
14.4 Packing group	II	II	II	II
14.5 Environmental hazards	Yes.	Yes.	Yes.	No.
Additional information	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg. **Hazard identification number** 33	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. **Emergency schedules (EmS)** F-E, S-E	The environmentally hazardous substance mark may appear if required by other transportation regulations. **Passenger and Cargo Aircraft** Quantity limitation: 5 L Packaging

SECTION 14: Transport information

	Limited quantity 1 L **Tunnel code** (D/E)			instructions: 353 **Cargo Aircraft Only** Quantity limitation: 60 L Packaging instructions: 364 **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L Packaging instructions: Y341

14.6 Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Other EU regulations

Europe inventory : This material is listed or exempted.

Seveso II Directive

This product is controlled under the Seveso II Directive.

Danger criteria

Category
P5c: Flammable liquids 2 and 3 not falling under P5a or P5b E1: Hazardous to the aquatic environment - Acute 1 or Chronic 1 C7b: Highly flammable (R11) C9i: Very toxic for the environment

International regulations

International lists : **Taiwan inventory (CSNN)**: This material is listed or exempted.
Australia inventory (AICS): This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.

SECTION 15: Regulatory information

Philippines inventory (PICCS): This material is listed or exempted.
United States inventory (TSCA 8b): This material is listed or exempted.
Europe inventory: This material is listed or exempted.
Canada inventory: This material is listed or exempted.

15.2 Chemical Safety Assessment : Complete.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
vPvB = Very Persistent and Very Bioaccumulative

Regulation (EC) No. 1272/2008 [CLP]; European convention concerning international road transport of dangerous goods (ADR) done in Geneva on September 30, 1957 (Dz. U. no. 35/1975, pos. 189) plus amendments; Regulation for the transport of dangerous materials on the Rhine (ADN); Occupational exposure limits; International regulations

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Flam. Liq. 2, H225	On basis of test data
Skin Irrit. 2, H315	Expert judgment
STOT SE 3, H336 (Narcotic effects)	Expert judgment
Asp. Tox. 1, H304	On basis of test data
Aquatic Acute 1, H400	Expert judgment
Aquatic Chronic 1, H410	Expert judgment

Full text of abbreviated H statements :

H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336 (Narcotic effects)	May cause drowsiness or dizziness. (Narcotic effects)
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS] :

Aquatic Acute 1, H400	ACUTE AQUATIC HAZARD - Category 1
Aquatic Chronic 1, H410	LONG-TERM AQUATIC HAZARD - Category 1
Asp. Tox. 1, H304	ASPIRATION HAZARD - Category 1
Flam. Liq. 2, H225	FLAMMABLE LIQUIDS - Category 2
Skin Irrit. 2, H315	SKIN CORROSION/IRRITATION - Category 2
STOT SE 3, H336 (Narcotic effects)	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3

Full text of abbreviated R phrases : R11- Highly flammable.
R65- Harmful: may cause lung damage if swallowed.
R38- Irritating to skin.
R67- Vapours may cause drowsiness and dizziness.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD] : F - Highly flammable
Xn - Harmful
Xi - Irritant
N - Dangerous for the environment

Use of the substance/mixture

SECTION 16: Other information

Identified uses	Sector of Use	Chemical Product Category	Process Category	Article Category	Environmental Release Category
Manufacture of substance - Industrial	Industrial uses Manufacture of bulk, large scale chemicals (including petroleum products) Manufacture of fine chemicals		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at dedicated facilities Use a laboratory reagent Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities		Manufacture of substances Industrial use of processing aids in processes and products, not becoming part of articles
Distribution of substance - Industrial	Industrial uses		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at dedicated facilities Transfer of substance or preparation into small containers (dedicated filling line, including weighing) Use a laboratory reagent		Manufacture of substances Formulation in materials Industrial use of processing aids in processes and products, not becoming part of articles Industrial use resulting in inclusion into or onto a matrix Industrial use resulting in manufacture of another substance (use of intermediates) Industrial use of reactive processing aids Industrial use of monomers for manufacture of thermoplastics Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers Industrial use of substances in closed systems Formulation of preparations
Formulation - Industrial	Industrial uses Formulation [mixing] of preparations and/or re-packaging (excluding alloys)		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at dedicated facilities Transfer of substance or preparation into small containers (dedicated filling		Formulation of preparations

SECTION 16: Other information

			line, including weighing) Use a laboratory reagent		
Coating. - Industrial	Industrial uses		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) Spraying in industrial settings and applications Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at dedicated facilities Transfer of substance or preparation into small containers (dedicated filling line, including weighing) Roller application or brushing of adhesive and other coating Treatment of articles by dipping and pouring Production of preparations or articles by tabletting, compression, extrusion, pelletisation Use a laboratory reagent		Industrial use of processing aids in processes and products, not becoming part of articles
Cleaning Products - Industrial	Industrial uses		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at dedicated facilities Roller application or brushing of adhesive and other coating Treatment of articles by dipping and pouring		Industrial use of processing aids in processes and products, not becoming part of articles
Fuels - Industrial	Industrial uses		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at dedicated facilities Transfer of substance or preparation		Industrial use of substances in closed systems

SECTION 16: Other information

			(charging/discharging) from/ to vessels/large containers at non-dedicated facilities Using material as fuel sources, limited exposure to unburned product to be expected		
Use in laboratories - Industrial	Industrial uses		Roller application or brushing of adhesive and other coating Use a laboratory reagent		Formulation of preparations Industrial use of processing aids in processes and products, not becoming part of articles
Coating. - Professional	Professional uses		Use in closed process, no likelihood of exposure Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at dedicated facilities Roller application or brushing of adhesive and other coating Spraying outside industrial settings and/or applications Treatment of articles by dipping and pouring Use a laboratory reagent Hand-mixing with intimate contact and only PPE available		Wide dispersive indoor use of processing aids in open systems Wide dispersive outdoor use of processing aids in open systems
Cleaning Products - Professional	Professional uses		Use in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at non-dedicated facilities Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at dedicated facilities Roller application or brushing of adhesive and other coating Spraying outside industrial settings and/or applications Treatment of articles by dipping and pouring Use in closed process, no likelihood of exposure		Wide dispersive indoor use of processing aids in open systems Wide dispersive outdoor use of processing aids in open systems
Use in laboratories - Professional	Professional uses		Roller application or brushing of adhesive and other coating Use a laboratory reagent		Wide dispersive indoor use of processing aids in open systems
Fuels - Professional	Professional uses		Use in closed process, no likelihood of exposure Use		Wide dispersive indoor use of substances in

SECTION 16: Other information

			in closed, continuous process with occasional controlled exposure Use in closed batch process (synthesis or formulation) Transfer of substance or preparation (charging/ discharging) from/to vessels/ large containers at non-dedicated facilities Transfer of substance or preparation (charging/discharging) from/ to vessels/large containers at dedicated facilities Using material as fuel sources, limited exposure to unburned product to be expected		closed systems Wide dispersive outdoor use of substances in closed systems
Coating. - Consumer	Consumer uses	Coatings and paints, thinners, paint removers Adhesives, sealants Anti-freeze and de-icing products Biocidal products (e.g. disinfectants, pest control) Fillers, putties, plasters, modelling clay Non-metal surface treatment products Ink and toners Leather tanning, dye, finishing, impregnation and care products Lubricants, greases, release products Polishes and wax blends Textile dyes, finishing and impregnating products; including bleaches and other processing aids			Wide dispersive indoor use of processing aids in open systems Wide dispersive outdoor use of processing aids in open systems
Fuels - Consumer	Consumer uses	Fuels			Wide dispersive indoor use of processing aids in open systems Wide dispersive outdoor use of processing aids in open systems

Training advice : Ensure operatives are trained to minimise exposures. Training staff on good practice.

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Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Exposure scenario 1. Manufacture of substance. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Manufacture of substance. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3). (SU8, 9)
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15
Environmental Release Category(ies):	ERC1,ESVOC SpERC 1.
Processes, tasks, activities covered:	Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities [GES1_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES1-ES1: General exposures (closed systems) [CS15]. no sampling [CS57].	No specific measures identified [EI18].
ES1-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56].	Handle substance within a closed system [E47]. {Provide extract ventilation to points where emissions occur [E54]. } {, or, Ensure operation is undertaken outdoors [E69]. } {Use a sampling system designed to control exposure [E89]. }
ES1-ES3: General exposures (closed systems) [CS15]. Batch process [CS55].	Handle substance within a closed system [E47]. {Provide extract ventilation to points where emissions occur [E54]. } {Ensure samples are obtained under containment or extract ventilation [E76]. }
ES1-ES4: General exposures (open systems) [CS16]. Batch process [CS55].	{Provide extract ventilation to points where emissions occur [E54]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES1-ES5: Process sampling [CS2].	{Provide extract ventilation to points where emissions occur [E54]. } {Ensure samples are obtained under containment or extract ventilation [E76]. }
ES1-ES6: Laboratory activities [CS36].	{Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure [E12]. } {Use suitable eye protection and gloves [PPE14]. }
ES1-ES7: Bulk transfers [CS14]. (open systems) [CS108].	{Provide extract ventilation to points where emissions occur [E54]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES1-ES8: Bulk transfers [CS14]. (closed systems) [CS107].	Handle substance within a closed system [E47]. {Ensure material transfers are under containment or extract ventilation [E66]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES1-ES9: Equipment cleaning and maintenance [CS39].	{Transfer via enclosed lines [E52]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Use suitable eye protection and gloves [PPE14]. }
ES1-ES10: Storage [CS67].	Store substance within a closed system [E84].

ES1-ES11: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	27000. (90000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 300 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES1-ES1: ERC1 ESVOC SpERC 1. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.05. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00003. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.0001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Soil emission controls are not applicable as there is no direct release to soil [TCR4]. Prevent discharge of undissolved substance to or recover from onsite wastewater [OMS1] Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 90.
	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 10000.
Conditions and measures related to external treatment of waste for disposal.	During manufacturing no waste of the substance is generated [ETW4].
Conditions and measures related to external recovery of waste.	During manufacturing no waste of the substance is generated [ERW2].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES1-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES1-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES1-ES4: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES1-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES1-ES6: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES1-ES7: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES1-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES1-ES9: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES1-ES10: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES11: 10ppm. Risk characterisation ratio: 0.023.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES1-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES1-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES1-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES1-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES7: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES1-ES8: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES1-ES9: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES1-ES10: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES1-ES11: 1.37mg/kg/day. Risk characterisation ratio: 0.002.

	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES1-ES1: PEC for microorganisms in STP: 0.01mg/l. Risk characterisation ratio: 1.69E-02. Local PEC in surface water: 0.001mg/l. Risk characterisation ratio: 2.62E-02. Local PEC in fresh water sediment: 0.043mg/kgdw. Risk characterisation ratio: 2.99E-02. Local PEC in sea water during emission episode: 0.0001mg/l. Risk characterisation ratio: 2.62E-03. Local PEC in marine sediment: 0.0043mg/kgdw. Risk characterisation ratio: 2.99E-03. Local PEC in soil: 0.00095mg/kgdw. Risk characterisation ratio: 2.07E-03. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment) [CSL51]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Msafe: 3000000kg/day. 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 [DSU1].
	$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 2. Distribution of substance. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Distribution of substance. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3). (SU8, 9)
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15
Environmental Release Category(ies):	ERC1; ERC1; ERC3; ERC4; ESVOC SpERC 3.
Processes, tasks, activities covered:	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 [GES1A_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES2-ES1: General exposures (closed systems) [CS15]. no sampling [CS57].	Handle substance within a closed system [E47].
ES2-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56].	Handle substance within a closed system [E47]. {Use a sampling system designed to control exposure [E89]. }
ES2-ES3: General exposures (closed systems) [CS15]. Batch process [CS55].	Handle substance within a closed system [E47]. {Ensure samples are obtained under containment or extract ventilation [E76]. }
ES2-ES4: General exposures (open systems) [CS16]. Batch process [CS55].	{Provide extract ventilation to points where emissions occur [E54]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES2-ES5: Process sampling [CS2].	{Ensure samples are obtained under containment or extract ventilation [E76]. }
ES2-ES6: Laboratory activities [CS36].	{Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure [E12]. } {Use suitable eye protection and gloves [PPE14]. }
ES2-ES7: Bulk transfers [CS14]. (closed systems) [CS107]. (eg road/railcar bottom loading/unloading, marine vessel/barge loading/unloading) [CSL85].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES2-ES8: Bulk transfers [CS14]. (open systems) [CS108]. e.g. road/railcar top loading/unloading [CSL181]. with local exhaust ventilation [CS109].	Provide extract ventilation to material transfer points and other openings [E82]. {Transfer via enclosed lines [E52]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Avoid splashing [C&H15]. }

ES2-ES9: Bulk transfers [CS14]. (open systems) [CS108]. e.g. road/railcar top loading/unloading [CSL181]. without local exhaust ventilation [CS110].	{Transfer via enclosed lines [E52]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Avoid splashing [C&H15]. }
ES2-ES10: Drum and small package filling [CS6].	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51].
ES2-ES11: Equipment cleaning and maintenance [CS39].	{Transfer via enclosed lines [E52]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Use suitable eye protection and gloves [PPE14]. }
ES2-ES12: Storage [CS67].	Store substance within a closed system [E84].
ES2-ES13: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
ES2-ES14: Drum and small package filling [CS6]. With potential for aerosol generation [CS138].	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51].
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	27000. (90000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 300 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES2-ES1: ERC1 ESVOC SpERC 3. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.001. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.000001. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.00001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Soil emission controls are not applicable as there is no direct release to soil [TCR4]. Prevent discharge of undissolved substance to or recover from onsite wastewater [OMS1] Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 90.
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES2-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES2-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES2-ES4: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES2-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES2-ES6: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES2-ES7: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES2-ES8: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES2-ES9: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES2-ES10: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES2-ES11: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES2-ES12: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES13: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES2-ES14: 0.5mg/m3.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES2-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES2-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.

	exposure resulting from contributing scenario: ES2-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES2-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES7: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES2-ES8: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES2-ES9: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES2-ES10: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES2-ES11: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES2-ES12: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES2-ES13: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES2-ES14: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES2-ES1: PEC for microorganisms in STP: 0.00000024mg/l. Risk characterisation ratio: 4.06E-07. Local PEC in surface water: 0.0000056mg/l. Risk characterisation ratio: 1.47E-04. Local PEC in fresh water sediment: 0.000083mg/kgdw. Risk characterisation ratio: 5.76E-05. Local PEC in sea water during emission episode: 0.000000021mg/l. Risk characterisation ratio: 5.50E-07. Local PEC in marine sediment: 0.00000021mg/kgdw. Risk characterisation ratio: 1.46E-07. Local PEC in soil: 0.0000013mg/kgdw. Risk characterisation ratio: 2.83E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment) [CSL51]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Msafe: 89000kg/day. 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 [DSU1]. $\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 3. Formulation & (re)packing of substances and mixtures . - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Formulation & (re)packing of substances and mixtures . Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3). (SU8, 9)
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15
Environmental Release Category(ies):	ERC2; ESVOC SpERC 4.
Processes, tasks, activities covered:	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities [GES2_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES3-ES1: General exposures (closed systems) [CS15]. In line injection of process chemicals by fixed dose pumping [CSL11]. no sampling [CS57].	Handle substance within a closed system [E47].
ES3-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56]. Continuous process [CS54].	Handle substance within a closed system [E47]. {Use a sampling system designed to control exposure [E89]. }
ES3-ES3: General exposures (closed systems) [CS15]. Batch process [CS55]. In line injection of process chemicals by fixed dose pumping [CSL11].	Handle substance within a closed system [E47]. {Ensure samples are obtained under containment or extract ventilation [E76]. }
ES3-ES4: General exposures (open systems) [CS16]. Batch process [CS55].	{Provide extract ventilation to points where emissions occur [E54]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES3-ES5: Batch processes at elevated temperatures [CS136]. (closed systems) [CS107].	Formulate in enclosed or ventilated mixing vessels [E46]. {Ensure samples are obtained under containment or extract ventilation [E76]. }
ES3-ES6: Process sampling [CS2].	Avoid dip sampling. [E42]. {Use a sampling system designed to control exposure [E89]. }
ES3-ES7: Laboratory activities [CS36].	{Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure [E12]. } {Use suitable eye protection and gloves [PPE14]. }

ES3-ES8: Bulk transfers [CS14].	{Provide extract ventilation to points where emissions occur [E54]. } {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES3-ES9: Mixing operations (open systems) [CS30].	{Provide extract ventilation to points where emissions occur [E54]. } {Use suitable eye protection and gloves [PPE14]. }
ES3-ES10: Transfer from/pouring from containers [CS22].	{Provide extract ventilation to points where emissions occur [E54]. } {, or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. } {Use suitable eye protection and gloves [PPE14]. }
ES3-ES11: Drum/batch transfers [CS8].	Use drum pumps or carefully pour from container [E64]. {Ensure material transfers are provided with suitable arrangements for vapour capture or venting [E90]. }
ES3-ES12: Production or preparation or articles by tabletting, compression, extrusion or pelletisation [CS100].	{Provide extract ventilation to points where emissions occur [E54]. } {Use suitable eye protection and gloves [PPE14]. }
ES3-ES13: Drum and small package filling [CS6].	{Ensure material transfers are provided with suitable arrangements for vapour capture or venting [E90]. } {Transfer via enclosed lines [E52]. }
ES3-ES14: Cleaning with low-pressure washers [CS42].	{Transfer via enclosed lines [E52]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Use suitable eye protection and gloves [PPE14]. }
ES3-ES15: Storage [CS67].	Store substance within a closed system [E84].
ES3-ES16: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	26000. (86000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 300 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES3-ES1: ERC2 ESVOC SpERC 4. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.025. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00002. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.0001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Prevent discharge of undissolved substance to or recover from onsite wastewater [OMS1] No air emission controls required; required removal efficiency is 0% [TCR5].
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%) [TCR8]: 61.8.If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) [STP4]: 96.3. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES3-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES3-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES3-ES4: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES3-ES5: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES3-ES6: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES3-ES7: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES3-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES9: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES10: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES11: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES12: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES13: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES14: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES3-ES15: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES16: 10ppm. Risk characterisation ratio: 0.023.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

Health: Dermal:	exposure resulting from contributing scenario: ES3-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES3-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES3-ES5: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES7: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES8: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES3-ES9: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES3-ES10: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES3-ES11: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES3-ES12: 3.43mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES3-ES13: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES3-ES14: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES3-ES15: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES3-ES16: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES3-ES1: PEC for microorganisms in STP: 0.032mg/l. Risk characterisation ratio: 5.41E-02. Local PEC in surface water: 0.0032mg/l. Risk characterisation ratio: 8.38E-02. Local PEC in fresh water sediment: 0.14mg/kgdw. Risk characterisation ratio: 9.72E-02. Local PEC in sea water during emission episode: 0.00032mg/l. Risk characterisation ratio: 8.38E-03. Local PEC in marine sediment: 0.014mg/kgdw. Risk characterisation ratio: 9.72E-03. Local PEC in soil: 0.0046mg/kgdw. Risk characterisation ratio: 1.00E-02. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment) [CSL51]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Msafe: 900000kg/day. 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 [DSU1].
	$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 4. Uses in Coatings. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Uses in Coatings. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3). (SU8, 9)
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15
Environmental Release Category(ies):	ERC4,ESVOC SpERC 4.
Processes, tasks, activities covered:	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities [GES3_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES4-ES1: General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
ES4-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56]. Use in contained systems [CS38].	Wear suitable gloves tested to EN374 [PPE15]. Handle substance within a closed system [E47]. Ensure dedicated sample points are provided [E10].
ES4-ES3: Film formation - force drying, stoving and other technologies [CS99]. Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].
ES4-ES4: Mixing operations (closed systems) [CS29]. General exposures (closed systems) [CS15].	Provide extract ventilation to points where emissions occur [E54]. No other specific measures identified [EI20].
ES4-ES5: Film formation - air drying [CS95].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].
ES4-ES6: Preparation of material for application [CS96]. Mixing operations (open systems) [CS30].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15]. No other specific measures identified [EI20].
ES4-ES7: Spraying (automatic/robotic) [CS97].	Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 [E70]. Wear suitable gloves tested to EN374 [PPE15]. 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 [E4].
ES4-ES8: Material transfers [CS3]. Dedicated facility [CS81].	Provide extract ventilation to material transfer points and other openings [E82]. Wear suitable gloves tested to EN374 [PPE15]. Transfer via enclosed lines [E52]. Clear transfer lines prior to de-coupling [E39].

ES4-ES9: Material transfers [CS3]. Non-dedicated facility [CS82].	Provide extract ventilation to material transfer points and other openings [E82]. Wear suitable gloves tested to EN374 [PPE15]. Transfer via enclosed lines [E52]. Clear transfer lines prior to de-coupling [E39].
ES4-ES10: Roller, spreader, flow application [CS98].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].
ES4-ES11: Dipping, immersion and pouring [CS4].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15].
ES4-ES12: Laboratory activities [CS36].	Handle in a fume cupboard or under extract ventilation [E83]. No other specific measures identified [EI20].
ES4-ES13: Material transfers [CS3]. Drum/batch transfers [CS8]. Transfer from/pouring from containers [CS22].	Provide extract ventilation to points where emissions occur [E54]. Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. }
ES4-ES14: Production or preparation or articles by tabletting, compression, extrusion or pelletisation [CS100].	Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. }
ES4-ES15: Equipment cleaning and maintenance [CS39].	Wear suitable gloves tested to EN374 [PPE15]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4].
ES4-ES16: Storage [CS67].	Ensure dedicated sample points are provided [E10].
ES4-ES17: Spraying [CS10]. Manual [CS34]. without local exhaust ventilation [CS110].	Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Change filter cartridge on respirator daily [PPE25]. Wear suitable gloves tested to EN374 [PPE15]. 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 [E4].
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	200. (10000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 20 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES4-ES1: ERC4 ESVOC SpERC 4. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.98. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00007. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Soil emission controls are not applicable as there is no direct release to soil [TCR4]. Prevent discharge of undissolved substance to or recover from onsite wastewater [OMS1] Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 90.
	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9]. Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%) [TCR8]: 4.3.
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) [STP4]: 96.3. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES4-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES4-ES3: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES4: 2.5ppm. Risk characterisation ratio: 0.006.
	exposure resulting from contributing scenario: ES4-ES5: 2ppm. Risk characterisation ratio: 0.005.
	exposure resulting from contributing scenario: ES4-ES6: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES7: 12.5ppm. Risk characterisation ratio: 0.029.
	exposure resulting from contributing scenario: ES4-ES8: 1.5ppm. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-ES9: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES10: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES11: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES12: 1ppm. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-ES13: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES14: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES4-ES15: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES4-ES16: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES17: 25ppm. Risk characterisation ratio: 0.058.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].

Health: Dermal:	exposure resulting from contributing scenario: ES4-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES2: 0.274mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES3: 0.274mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES4: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES5: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-ES6: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-ES7: 8.572mg/kg/day. Risk characterisation ratio: 0.011.
	exposure resulting from contributing scenario: ES4-ES8: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-ES9: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-ES10: 5.486mg/kg/day. Risk characterisation ratio: 0.007.
	exposure resulting from contributing scenario: ES4-ES11: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-ES12: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES13: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-ES14: 0.686mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES15: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-ES16: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-ES17: 8.572mg/kg/day. Risk characterisation ratio: 0.011.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES4-ES1: PEC for microorganisms in STP: 0.013mg/l. Risk characterisation ratio: 2.20E-02. Local PEC in surface water: 0.0013mg/l. Risk characterisation ratio: 3.40E-02. Local PEC in fresh water sediment: 0.056mg/kgdw. Risk characterisation ratio: 3.89E-02. Local PEC in sea water during emission episode: 0.00013mg/l. Risk characterisation ratio: 3.40E-03. Local PEC in marine sediment: 0.0056mg/kgdw. Risk characterisation ratio: 3.89E-03. Local PEC in soil: 0.00014mg/kgdw. Risk characterisation ratio: 3.04E-04. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment) [CSL51]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Msafe: 260000kg/day. 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 [DSU1].
	$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 4. Uses in Coatings. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Uses in Coatings. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC15, PROC19
Environmental Release Category(ies):	ERC8a,ESVOC SpERC 6; ERC8d.
Processes, tasks, activities covered:	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities [GES3_P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES4-1: General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
ES4-2: Filling / preparation of equipment from drums or containers. [CS45]. Use in contained systems [CS38].	Handle substance within a closed system [E47].
ES4-3: General exposures (closed systems) [CS15]. Use in contained systems [CS38].	No specific measures identified [EI18].
ES4-4: Preparation of material for application [CS96]. Use in contained batch processes [CS37].	No other specific measures identified [EI20].
ES4-5: Film formation - air drying [CS95]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Wear suitable gloves tested to EN374 [PPE15].
ES4-6: Film formation - air drying [CS95]. Indoor [OC8].	Wear suitable gloves tested to EN374 [PPE15].
ES4-7: Preparation of material for application [CS96].	Wear suitable gloves tested to EN374 [PPE15].
ES4-8: Preparation of material for application [CS96].	Wear suitable gloves tested to EN374 [PPE15].
ES4-9: Material transfers [CS3]. Drum/batch transfers [CS8]. Non-dedicated facility [CS82].	Wear suitable gloves tested to EN374 [PPE15].

ES4-10: Material transfers [CS3]. Drum/batch transfers [CS8]. Dedicated facility [CS81].	Wear suitable gloves tested to EN374 [PPE15].
ES4-11: Roller, spreader, flow application [CS98]. Indoor [OC8].	Wear suitable gloves tested to EN374 [PPE15].
ES4-12: Roller, spreader, flow application [CS98]. Manual [CS34]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Wear suitable gloves tested to EN374 [PPE15].
ES4-13: Spraying [CS10]. Manual [CS34]. Indoor [OC8].	Carry out in a vented booth or extracted enclosure [E57]. Wear suitable gloves tested to EN374 [PPE15]. 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 [E4]. {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure [CSL282]. }
ES4-14: Spraying [CS10]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Avoid carrying out operation for more than 4 hours [OC12]. Wear suitable gloves tested to EN374 [PPE15]. 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 [E4]. {Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. }
ES4-15: Dipping, immersion and pouring [CS4]. Indoor [OC8].	Wear suitable gloves tested to EN374 [PPE15].
ES4-16: Dipping, immersion and pouring [CS4]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Wear suitable gloves tested to EN374 [PPE15].
ES4-17: Laboratory activities [CS36].	No other specific measures identified [EI20].
ES4-18: Hand application - fingerpaints, pastels, adhesives [CS72].	Wear suitable gloves tested to EN374 [PPE15].
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	0.1. (0.27 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES4-ES1: ERC8a ESVOC SpERC 6. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.98. Release fraction to wastewater from wide dispersive use [OOC8]: 0.01. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.01.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Soil emission controls are not applicable as there is no direct release to soil [TCR4]. Prevent discharge of undissolved substance to or recover from onsite wastewater [OMS1] Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 90.
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) [STP4]: 96.3. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES4-1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-2: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES4-3: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES4-4: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES4-5: 35ppm. Risk characterisation ratio: 0.082.
	exposure resulting from contributing scenario: ES4-6: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES4-7: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-8: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-9: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-10: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES4-11: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-12: 70ppm. Risk characterisation ratio: 0.164.
	exposure resulting from contributing scenario: ES4-13: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-14: 210ppm. Risk characterisation ratio: 0.491.
	exposure resulting from contributing scenario: ES4-15: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES4-16: 70ppm. Risk characterisation ratio: 0.164.
	exposure resulting from contributing scenario: ES4-17: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES4-18: 100ppm. Risk characterisation ratio: 0.234.

	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES4-1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-3: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-4: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-5: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-6: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-7: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-8: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-9: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-10: 1.372mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES4-11: 5.486mg/kg/day. Risk characterisation ratio: 0.007.
	exposure resulting from contributing scenario: ES4-12: 5.486mg/kg/day. Risk characterisation ratio: 0.007.
	exposure resulting from contributing scenario: ES4-13: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES4-14: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES4-15: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-16: 2.742mg/kg/day. Risk characterisation ratio: 0.004.
	exposure resulting from contributing scenario: ES4-17: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES4-18: 28.286mg/kg/day. Risk characterisation ratio: 0.037.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES4-ES1: PEC for microorganisms in STP: 0.013mg/l. Risk characterisation ratio: 2.20E-02. Local PEC in surface water: 0.0013mg/l. Risk characterisation ratio: 3.40E-02. Local PEC in fresh water sediment: 0.056mg/kgdw. Risk characterisation ratio: 3.89E-02. Local PEC in sea water during emission episode: 0.00013mg/l. Risk characterisation ratio: 3.40E-03. Local PEC in marine sediment: 0.0056mg/kgdw. Risk characterisation ratio: 3.89E-03. Local PEC in soil: 0.00014mg/kgdw. Risk characterisation ratio: 3.04E-04. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7 [CSL77]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Msafe: 980kg/day. Not applicable for wide dispersive uses [DSU5].
	$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$

Exposure scenario 6. Uses in Coatings. - Consumer.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1		**Exposure scenario**
Title.		**Uses in Coatings. 2,2,4-trimethylpentane. CAS: 540-84-1**
Sector(s) of Use:		Consumer (SU21).
Use Descriptor.		PC1, PC4, PC8, PC9, PC15, PC18, PC23, PC24, PC31, PC34
Processes, tasks, activities covered:		Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including product transfer and preparation, application by brush, spray by hand or similar methods) and equipment cleaning [GES3_C].
Environmental Release Category(ies):		ERC8a, ERC8d
Assessment method:		Health: : Used ECETOC TRA model with modifications as recommended by ESIG. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:		**Operational conditions and risk management measures.**
Section 2.1		**Control of consumer exposure.**
Product Characteristics:		
Physical form of product:		Liquid, vapour pressure >10Pa (High volatility).
Vapour pressure:		2800Pa.
Concentration of substance in product:		See specific operational conditions below [ConsOC16].
Amounts used:		See specific operational conditions below [ConsOC16].
Frequency and duration of use:		See specific operational conditions below [ConsOC16].
Human factors not influenced by risk management:		See specific operational conditions below [ConsOC16].
Other operational conditions affecting consumer exposure.		Assumes activities are at ambient temperature (unless stated differently) [G17]. Unless otherwise indicated, assumes use with typical ventilation. Avoid contact with skin
Contributing Scenarios:		**Product categories:**
Adhesives, sealants [PC1]. --Glues, hobby use [PC1_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 30%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 9g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 4 hours/event.
Adhesives, sealants [PC1]. --Glues DIY-use (carpet glue, tile glue, wood parquet glue) [PC1_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 20%. Covers use up to [ConsOC3]: 1 day/year. For each use event, covers use amounts up to [ConsOC2]: 6390g. Covers skin contact area up to [ConsOC5]: 110cm2. Covers use in room size of [ConsOC11]: 20m3. Covers exposure up to [ConsOC14]: 6 hours/event.
	RMM	Avoid using without an operating fan and open windows [ConsRMM9]. Avoid using in room with closed doors [ConsRMM7].
Adhesives, sealants [PC1]. --Glue from spray [PC1_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 30%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 85.05g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 4 hours/event.
Adhesives, sealants [PC1]. --Sealants [PC1_4].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 30%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 75g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 1 hours/event.
Anti-freeze and de-icing products [PC4] --Pouring into radiator [PC4_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 10%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 2000g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.17 hours/event.
Anti-freeze and de-icing products [PC4] --Lock de-icer [PC4_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 4g. Covers skin contact area up to [ConsOC5]: 214cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.25 hours/event.
Biocidal products [PC8] --Laundry and dish washing products [PC8_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 5%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 15g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.5 hours/event.
Biocidal products [PC8] --Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 5%. Covers use up to [ConsOC3]: 125 day/year. For each use event, covers use amounts up to [ConsOC2]: 27g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.33 hours/event.
Biocidal products [PC8] --Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 15%. Covers use up to [ConsOC3]: 125 day/year. For each use event, covers use amounts up to [ConsOC2]: 35g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.17 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Waterborne latex wall paint [PC9a_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1.5%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2760g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Solvent rich, high solid, water borne paint [PC9a_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 27.5%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 744g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Aerosol spray can [PC9a_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 2 day/year. For each use event, covers use amounts up to [ConsOC2]: 215g. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.33 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 3 day/year. For each use event, covers use amounts up to [ConsOC2]: 491g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers exposure up to [ConsOC14]: 2 hours/event.
	RMM	Avoid using when windows closed [ConsRMM8]. Avoid using in room with closed doors [ConsRMM7].
Fillers, putties, plasters, modeling clay [PC9b] --Fillers and putty [PC9b_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 2%. Covers use up to [ConsOC3]: 12 day/year. For each use event, covers use amounts up to [ConsOC2]: 85g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 4 hours/event.

Fillers, putties, plasters, modeling clay [PC9b] --Plasters and floor equalizers [PC9b_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 2%. Covers use up to [ConsOC3]: 12 day/year. For each use event, covers use amounts up to [ConsOC2]: 13800g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers exposure up to [ConsOC14]: 2 hours/event.
	RMM	Avoid using when windows closed [ConsRMM8]. Avoid using in room with closed doors [ConsRMM7].
Fillers, putties, plasters, modeling clay [PC9b] --Modelling clay [PC9b_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1%. Covers use up to [ConsOC4]: 1 times/day. Covers skin contact area up to [ConsOC5]: 254cm2. For each use event, assumes swallowed amount of [ConsOC13]: 1g.
Finger paints [PC9c] --Finger paints [PC9c].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. Covers skin contact area up to [ConsOC5]: 254cm2. For each use event, assumes swallowed amount of [ConsOC13]: 1.35g.
Non-metal surface treatment products [PC15] --Waterborne latex wall paint [PC15_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1.5%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2760g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Non-metal surface treatment products [PC15] --Solvent rich, high solid, water borne paint [PC15_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 27.5%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 744g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Non-metal surface treatment products [PC15] --Aerosol spray can [PC15_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 2 day/year. For each use event, covers use amounts up to [ConsOC2]: 215g. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.33 hours/event.
Non-metal surface treatment products [PC15] --Removers (paint-, glue-, wall paper-, sealant-remover) [PC15_4].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 40%. Covers use up to [ConsOC3]: 3 day/year. For each use event, covers use amounts up to [ConsOC2]: 491g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2 hours/event.
Ink and toners [PC18] --Inks and toners. [PC18].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 10%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 40g. Covers skin contact area up to [ConsOC5]: 71cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Leather tanning, dye, finishing, impregnation and care products [PC23] --Polishes, wax / cream (floor, furniture, shoes) [PC23_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 29 day/year. For each use event, covers use amounts up to [ConsOC2]: 56g. Covers skin contact area up to [ConsOC5]: 430cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 1.23 hours/event.
Leather tanning, dye, finishing, impregnation and care products [PC23] --Polishes, spray (furniture, shoes) [PC23_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 8 day/year. For each use event, covers use amounts up to [ConsOC2]: 56g. Covers skin contact area up to [ConsOC5]: 430cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.33 hours/event.
Lubricants, greases, and release products [PC24] --Liquids [PC24_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2200g. Covers skin contact area up to [ConsOC5]: 468cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.17 hours/event.
Lubricants, greases, and release products [PC24] --Pastes [PC24_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 20%. Covers use up to [ConsOC3]: 10 day/year. For each use event, covers use amounts up to [ConsOC2]: 34g. Covers skin contact area up to [ConsOC5]: 468cm2.
Lubricants, greases, and release products [PC24] --Sprays [PC24_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 73g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.17 hours/event.
Polishes and wax blends [PC31] --Polishes, wax / cream (floor, furniture, shoes) [PC31_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 29 day/year. For each use event, covers use amounts up to [ConsOC2]: 142g. Covers skin contact area up to [ConsOC5]: 430cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 1.23 hours/event.
Polishes and wax blends [PC31] --Polishes, spray (furniture, shoes) [PC31_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 8 day/year. For each use event, covers use amounts up to [ConsOC2]: 35g. Covers skin contact area up to [ConsOC5]: 430cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.33 hours/event.
Textile dyes, finishing and impregnating products [PC34] --	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 10%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 115g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 1 hours/event.
Section 2.2:		**Control of environmental exposure:**
Product Characteristics:		Substance is complex UVCB [PrC3]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used		See contributing scenarios above.
Frequency and duration of use:		See contributing scenarios above.
Environmental factors not influenced by risk management:		Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.		See contributing scenarios above.
Conditions and measures related to municipal sewage treatment plant.		Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]. 2000
Conditions and measures related to external treatment of waste for disposal.		Dispose of empty containers and wastes safely [C&H8]. External treatment and disposal of waste should comply with applicable local and/or national regulations [ETW3].
Conditions and measures related to external recovery of waste.		none. External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Section 3:		**Exposure estimation:**
Health: Inhalation (vapour).		Maximum exposure resulting from contributing scenarios described:
		Adhesives, sealants [PC1]. Glues, hobby use [PC1_1]. Chronic inhalation exposure based on a yearly average: 8.52mg/m3. Risk characterisation ratio: 0.014. Acute inhalation exposure based on a single 24hr day: 8.52mg/m3. Risk characterisation ratio: 0.014.
		Adhesives, sealants [PC1]. Glues DIY-use (carpet glue, tile glue, wood parquet glue) [PC1_2]. Chronic inhalation exposure based on a yearly average: 1.43mg/m3. Risk characterisation ratio: 0.00236. Acute inhalation exposure based on a single 24hr day: 533mg/m3. Risk characterisation ratio: 0.875.
		Adhesives, sealants [PC1]. Glue from spray [PC1_3]. Chronic inhalation exposure based on a yearly average: 1.32mg/m3. Risk characterisation ratio: 0.00217. Acute inhalation exposure based on a single 24hr day: 80.5mg/m3. Risk characterisation ratio: 0.132.

	Adhesives, sealants [PC1]. Sealants [PC1_4]. Chronic inhalation exposure based on a yearly average: 35.2mg/m3. Risk characterisation ratio: 0.0579. Acute inhalation exposure based on a single 24hr day: 35.2mg/m3. Risk characterisation ratio: 0.0579.
	Anti-freeze and de-icing products [PC4] Pouring into radiator [PC4_2]. Chronic inhalation exposure based on a yearly average: 1.83mg/m3. Risk characterisation ratio: 0.00302. Acute inhalation exposure based on a single 24hr day: 1.83mg/m3. Risk characterisation ratio: 0.00302.
	Anti-freeze and de-icing products [PC4] Lock de-icer [PC4_3]. Chronic inhalation exposure based on a yearly average: 0.51mg/m3. Risk characterisation ratio: 0.00084. Acute inhalation exposure based on a single 24hr day: 0.51mg/m3. Risk characterisation ratio: 0.00084.
	Biocidal products [PC8] Laundry and dish washing products [PC8_1]. Chronic inhalation exposure based on a yearly average: 0.674mg/m3. Risk characterisation ratio: 0.00111. Acute inhalation exposure based on a single 24hr day: 0.674mg/m3. Risk characterisation ratio: 0.00111.
	Biocidal products [PC8] Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2]. Chronic inhalation exposure based on a yearly average: 0.294mg/m3. Risk characterisation ratio: 0.000484. Acute inhalation exposure based on a single 24hr day: 0.842mg/m3. Risk characterisation ratio: 0.00138.
	Biocidal products [PC8] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3]. Chronic inhalation exposure based on a yearly average: 0.618mg/m3. Risk characterisation ratio: 0.00101. Acute inhalation exposure based on a single 24hr day: 1.76mg/m3. Risk characterisation ratio: 0.0029.
	Coatings and paints, fillers putties, thinners [PC9a] Waterborne latex wall paint [PC9a_1]. Chronic inhalation exposure based on a yearly average: 1.15mg/m3. Risk characterisation ratio: 0.0019. Acute inhalation exposure based on a single 24hr day: 105mg/m3. Risk characterisation ratio: 0.173.
	Coatings and paints, fillers putties, thinners [PC9a] Solvent rich, high solid, water borne paint [PC9a_2]. Chronic inhalation exposure based on a yearly average: 8.33mg/m3. Risk characterisation ratio: 0.0137. Acute inhalation exposure based on a single 24hr day: 521mg/m3. Risk characterisation ratio: 0.856.
	Coatings and paints, fillers putties, thinners [PC9a] Aerosol spray can [PC9a_3]. Chronic inhalation exposure based on a yearly average: 0.171mg/m3. Risk characterisation ratio: 0.000281. Acute inhalation exposure based on a single 24hr day: 34.2mg/m3. Risk characterisation ratio: 0.0563.
	Coatings and paints, fillers putties, thinners [PC9a] Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4]. Chronic inhalation exposure based on a yearly average: 1.67mg/m3. Risk characterisation ratio: 0.00274. Acute inhalation exposure based on a single 24hr day: 203mg/m3. Risk characterisation ratio: 0.334.
	Fillers, putties, plasters, modeling clay [PC9b] Fillers and putty [PC9b_1]. Chronic inhalation exposure based on a yearly average: 0.176mg/m3. Risk characterisation ratio: 0.00029. Acute inhalation exposure based on a single 24hr day: 5.36mg/m3. Risk characterisation ratio: 0.00882.
	Fillers, putties, plasters, modeling clay [PC9b] Plasters and floor equalizers [PC9b_2]. Chronic inhalation exposure based on a yearly average: 7.51mg/m3. Risk characterisation ratio: 0.0123. Acute inhalation exposure based on a single 24hr day: 228mg/m3. Risk characterisation ratio: 0.375.
	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Finger paints [PC9c] Finger paints [PC9c]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Non-metal surface treatment products [PC15] Waterborne latex wall paint [PC15_1]. Chronic inhalation exposure based on a yearly average: 1.15mg/m3. Risk characterisation ratio: 0.0019. Acute inhalation exposure based on a single 24hr day: 105mg/m3. Risk characterisation ratio: 0.173.
	Non-metal surface treatment products [PC15] Solvent rich, high solid, water borne paint [PC15_2]. Chronic inhalation exposure based on a yearly average: 8.33mg/m3. Risk characterisation ratio: 0.0137. Acute inhalation exposure based on a single 24hr day: 521mg/m3. Risk characterisation ratio: 0.856.
	Non-metal surface treatment products [PC15] Aerosol spray can [PC15_3]. Chronic inhalation exposure based on a yearly average: 0.171mg/m3. Risk characterisation ratio: 0.000281. Acute inhalation exposure based on a single 24hr day: 34.2mg/m3. Risk characterisation ratio: 0.0563.
	Non-metal surface treatment products [PC15] Removers (paint-, glue-, wall paper-, sealant-remover) [PC15_4]. Chronic inhalation exposure based on a yearly average: 3.91mg/m3. Risk characterisation ratio: 0.00644. Acute inhalation exposure based on a single 24hr day: 477mg/m3. Risk characterisation ratio: 0.783.
	Ink and toners [PC18] Inks and toners. [PC18]. Chronic inhalation exposure based on a yearly average: 10.1mg/m3. Risk characterisation ratio: 0.0167. Acute inhalation exposure based on a single 24hr day: 10.1mg/m3. Risk characterisation ratio: 0.0167.
	Leather tanning, dye, finishing, impregnation and care products [PC23] Polishes, wax / cream (floor, furniture, shoes) [PC23_1]. Chronic inhalation exposure based on a yearly average: 4.05mg/m3. Risk characterisation ratio: 0.00667. Acute inhalation exposure based on a single 24hr day: 50.7mg/m3. Risk characterisation ratio: 0.0834.
	Leather tanning, dye, finishing, impregnation and care products [PC23] Polishes, spray (furniture, shoes) [PC23_2]. Chronic inhalation exposure based on a yearly average: 0.382mg/m3. Risk characterisation ratio: 0.000629. Acute inhalation exposure based on a single 24hr day: 17.4mg/m3. Risk characterisation ratio: 0.0287.
	Lubricants, greases, and release products [PC24] Liquids [PC24_1]. Chronic inhalation exposure based on a yearly average: 0.0443mg/m3. Risk characterisation ratio: 0.0000729. Acute inhalation exposure based on a single 24hr day: 4.04mg/m3. Risk characterisation ratio: 0.00665.
	Lubricants, greases, and release products [PC24] Pastes [PC24_2]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Lubricants, greases, and release products [PC24] Sprays [PC24_3]. Chronic inhalation exposure based on a yearly average: 0.202mg/m3. Risk characterisation ratio: 0.000332. Acute inhalation exposure based on a single 24hr day: 12.2mg/m3. Risk characterisation ratio: 0.0202.
	Polishes and wax blends [PC31] Polishes, wax / cream (floor, furniture, shoes) [PC31_1]. Chronic inhalation exposure based on a yearly average: 10.2mg/m3. Risk characterisation ratio: 0.0169. Acute inhalation exposure based on a single 24hr day: 129mg/m3. Risk characterisation ratio: 0.211.
	Polishes and wax blends [PC31] Polishes, spray (furniture, shoes) [PC31_2]. Chronic inhalation exposure based on a yearly average: 0.239mg/m3. Risk characterisation ratio: 0.000393. Acute inhalation exposure based on a single 24hr day: 10.9mg/m3. Risk characterisation ratio: 0.0179.
	Textile dyes, finishing and impregnating products [PC34] Chronic inhalation exposure based on a yearly average: 18mg/m3. Risk characterisation ratio: 0.0296. Acute inhalation exposure based on a single 24hr day: 18mg/m3. Risk characterisation ratio: 0.0296.
Health: Dermal:	Maximum exposure resulting from contributing scenarios described:
	Adhesives, sealants [PC1]. Glues, hobby use [PC1_1]. Chronic systemic dermal exposure: 1.29mg/kg/day. Risk characterisation ratio: 0.00185.
	Adhesives, sealants [PC1]. Glues DIY-use (carpet glue, tile glue, wood parquet glue) [PC1_2]. Chronic systemic dermal exposure: 2.65mg/kg/day. Risk characterisation ratio: 0.0038.
	Adhesives, sealants [PC1]. Glue from spray [PC1_3]. Chronic systemic dermal exposure: 1.29mg/kg/day. Risk characterisation ratio: 0.00185.
	Adhesives, sealants [PC1]. Sealants [PC1_4]. Chronic systemic dermal exposure: 1.29mg/kg/day. Risk characterisation ratio: 0.00185.

	Anti-freeze and de-icing products [PC4] Pouring into radiator [PC4_2]. Chronic systemic dermal exposure: 5.17mg/kg/day. Risk characterisation ratio: 0.00739.
	Anti-freeze and de-icing products [PC4] Lock de-icer [PC4_3]. Chronic systemic dermal exposure: 12.9mg/kg/day. Risk characterisation ratio: 0.0185.
	Biocidal products [PC8] Laundry and dish washing products [PC8_1]. Chronic systemic dermal exposure: 0.0518mg/kg/day. Risk characterisation ratio: 0.0000741.
	Biocidal products [PC8] Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2]. Chronic systemic dermal exposure: 5.18mg/kg/day. Risk characterisation ratio: 0.00741.
	Biocidal products [PC8] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3]. Chronic systemic dermal exposure: 7.75mg/kg/day. Risk characterisation ratio: 0.011.
	Coatings and paints, fillers putties, thinners [PC9a] Waterborne latex wall paint [PC9a_1]. Chronic systemic dermal exposure: 0.777mg/kg/day. Risk characterisation ratio: 0.00111.
	Coatings and paints, fillers putties, thinners [PC9a] Solvent rich, high solid, water borne paint [PC9a_2]. Chronic systemic dermal exposure: 14.2mg/kg/day. Risk characterisation ratio: 0.0203.
	Coatings and paints, fillers putties, thinners [PC9a] Aerosol spray can [PC9a_3]. Chronic systemic dermal exposure: 0mg/kg/day.
	Coatings and paints, fillers putties, thinners [PC9a] Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4]. Chronic systemic dermal exposure: 51.8mg/kg/day. Risk characterisation ratio: 0.0741.
	Fillers, putties, plasters, modeling clay [PC9b] Fillers and putty [PC9b_1]. Chronic systemic dermal exposure: 0.0863mg/kg/day. Risk characterisation ratio: 0.000123.
	Fillers, putties, plasters, modeling clay [PC9b] Plasters and floor equalizers [PC9b_2]. Chronic systemic dermal exposure: 2.07mg/kg/day. Risk characterisation ratio: 0.00296.
	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Chronic systemic dermal exposure: 1.84mg/kg/day. Risk characterisation ratio: 0.00263.
	Finger paints [PC9c] Finger paints [PC9c]. Chronic systemic dermal exposure: 92.2mg/kg/day. Risk characterisation ratio: 0.131.
	Non-metal surface treatment products [PC15] Waterborne latex wall paint [PC15_1]. Chronic systemic dermal exposure: 0.777mg/kg/day. Risk characterisation ratio: 0.00111.
	Non-metal surface treatment products [PC15] Solvent rich, high solid, water borne paint [PC15_2]. Chronic systemic dermal exposure: 14.2mg/kg/day. Risk characterisation ratio: 0.0203.
	Non-metal surface treatment products [PC15] Aerosol spray can [PC15_3]. Chronic systemic dermal exposure: 0mg/kg/day.
	Non-metal surface treatment products [PC15] Removers (paint-, glue-, wall paper-, sealant-remover) [PC15_4]. Chronic systemic dermal exposure: 41.4mg/kg/day. Risk characterisation ratio: 0.0592.
	Ink and toners [PC18] Inks and toners. [PC18]. Chronic systemic dermal exposure: 0.862mg/kg/day. Risk characterisation ratio: 0.00123.
	Leather tanning, dye, finishing, impregnation and care products [PC23] Polishes, wax / cream (floor, furniture, shoes) [PC23_1]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.0371.
	Leather tanning, dye, finishing, impregnation and care products [PC23] Polishes, spray (furniture, shoes) [PC23_2]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.0371.
	Lubricants, greases, and release products [PC24] Liquids [PC24_1]. Chronic systemic dermal exposure: 56.5mg/kg/day. Risk characterisation ratio: 0.0809.
	Lubricants, greases, and release products [PC24] Pastes [PC24_2]. Chronic systemic dermal exposure: 11.3mg/kg/day. Risk characterisation ratio: 0.0161.
	Lubricants, greases, and release products [PC24] Sprays [PC24_3]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.037.
	Polishes and wax blends [PC31] Polishes, wax / cream (floor, furniture, shoes) [PC31_1]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.0371.
	Polishes and wax blends [PC31] Polishes, spray (furniture, shoes) [PC31_2]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.0371.
	Textile dyes, finishing and impregnating products [PC34] Chronic systemic dermal exposure: 0.103mg/kg/day. Risk characterisation ratio: 0.000148.
Health: Oral:	Maximum exposure resulting from contributing scenarios described:
	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Oral: 0.999mg/kg/day. Risk characterisation ratio: 0.00143.
	Finger paints [PC9c] Finger paints [PC9c]. Oral: 67.5mg/kg/day. Risk characterisation ratio: 0.0965.
Environment:	Maximum exposure resulting from contributing scenarios described:
	ES6-ES1: PEC for microorganisms in STP: 0.000051mg/l. Risk characterisation ratio: 8.63E-05. Local PEC in surface water: 0.000011mg/l. Risk characterisation ratio: 2.88E-04. Local PEC in fresh water sediment: 0.00022mg/kgdw. Risk characterisation ratio: 1.53E-04. Local PEC in sea water during emission episode: 0.00000051mg/l. Risk characterisation ratio: 1.34E-05. Local PEC in marine sediment: 0.000022mg/kgdw. Risk characterisation ratio: 1.53E-05. Local PEC in soil: 0.000093mg/kgdw. Risk characterisation ratio: 2.02E-04. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
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 [G43]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23]. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37].
Environment	
	Not applicable for wide dispersive uses [DSU5].

Exposure scenario 7. Use in Cleaning Agents. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Use in Cleaning Agents. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3).
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC10, PROC13
Environmental Release Category(ies):	ERC4; ESVOC SpERC 8.
Processes, tasks, activities covered:	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance [GES4_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES7-ES1: Bulk transfers [CS14].	Transfer via enclosed lines [E52]. Clear transfer lines prior to de-coupling [E39]. {Provide extract ventilation to points where emissions occur [E54]. }
ES7-ES2: Automated process with (semi) closed systems. [CS93]. Use in contained systems [CS38]. Continuous process [CS54].	No other specific measures identified [EI20].
ES7-ES3: Automated process with (semi) closed systems. [CS93]. Use in contained systems [CS38]. Batch process [CS55].	No other specific measures identified [EI20].
ES7-ES4: Application of cleaning products in closed systems [CS101].	No other specific measures identified [EI20].
ES7-ES5: Filling / preparation of equipment from drums or containers. [CS45].	{Use drum pumps [E53]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES7-ES6: Use in contained batch processes [CS37].	{Handle substance within a closed system [E47]. } {, or, Provide extract ventilation to points where emissions occur [E54]. }
ES7-ES7: Degreasing small objects in cleaning station [CS41].	{Use suitable eye protection and gloves [PPE14]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES7-ES8: Cleaning with low-pressure washers [CS42].	Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. } {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure [CSL282]. }

ES7-ES9: Cleaning with high pressure washers [CS44].	Avoid carrying out operation for more than 1 hour [OC11]. Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. } {Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. } {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure [CSL282]. }
ES7-ES10: Rolling, Brushing [CS51]. Manual [CS34].	Wear suitable gloves tested to EN374 [PPE15]. No other specific measures identified [EI20]. {Dispose of waste wipe cloths in closed containers [CSL280]. }
ES7-ES11: Storage [CS67].	{Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	20. (1000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 20 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ESVOC SpERC 8. Release fraction to air from process (initial release prior to RMM) [OOC4]: 1. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.0000003. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 70.
	Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES7-ES1: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES7-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES7-ES4: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES7-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES6: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES7-ES7: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES9: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES10: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES7-ES11: 0.01ppm. Risk characterisation ratio: <0.001.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES7-ES1: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES7-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES7-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES7-ES4: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES7-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES7-ES6: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES7-ES7: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES7-ES8: 5.486mg/kg/day. Risk characterisation ratio: 0.007.
	exposure resulting from contributing scenario: ES7-ES9: 8.572mg/kg/day. Risk characterisation ratio: 0.011.
	exposure resulting from contributing scenario: ES7-ES10: 5.486mg/kg/day. Risk characterisation ratio: 0.007.

	exposure resulting from contributing scenario: ES7-ES11: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Quantitative exposure and risk assessment not possible due to lack of emissions to aquatic environment [EE7].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7 [CSL77]. To scale from an exposure of 15mins-1 hour to one of 1-4 hours, multiply by 3 [CSL78].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129].
Environment:	Msafe: 6300000kg/day. 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 [DSU1].
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 8. Use in Cleaning Agents. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use in Cleaning Agents. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC10, PROC11, PROC13
Environmental Release Category(ies):	ERC8a; ERC8d; ESVOC SpERC 9.
Processes, tasks, activities covered:	Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping automated and by hand) [GES4_P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES8-ES1: Filling / preparation of equipment from drums or containers. [CS45]. Drum/batch transfers [CS8]. Dedicated facility [CS81].	No other specific measures identified [EI20].
ES8-ES2: Automated process with (semi) closed systems. [CS93]. Use in contained systems [CS38]. Continuous process [CS54].	No other specific measures identified [EI20].
ES8-ES3: Automated process with (semi) closed systems. [CS93]. Use in contained systems [CS38]. Drum/batch transfers [CS8].	No other specific measures identified [EI20].
ES8-ES4: Semi Automated process. (e.g.: Semi automatic application of floor care and maintenance products) [CS76].	No other specific measures identified [EI20].
ES8-ES5: Filling / preparation of equipment from drums or containers. [CS45]. Non-dedicated facility [CS82].	No other specific measures identified [EI20].
ES8-ES6: Degreasing small objects in cleaning station [CS41]. Surfaces [CS48]. Cleaning [CS47].	{Use suitable eye protection and gloves [PPE14]. }
ES8-ES7: Cleaning with low-pressure washers [CS42]. Rolling, Brushing [CS51]. no spraying [CS60].	{Use suitable eye protection and gloves [PPE14]. } {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure. }

ES8-ES8: Cleaning with high pressure washers [CS44]. Spraying [CS10]. Indoor [OC8].	Carry out in a vented booth or extracted enclosure [E57]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. } {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure. }
ES8-ES9: Cleaning with high pressure washers [CS44]. Spraying [CS10]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Wear suitable gloves tested to EN374 [PPE15]. {Use suitable eye protection [PPE26]. } {Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposure. }
ES8-ES10: Cleaning [CS47]. Surfaces [CS48]. Manual [CS34]. Spraying [CS10].	{Dispose of waste wipe cloths in closed containers. }
ES8-ES11: Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. Rolling, Brushing [CS51].	{Dispose of waste wipe cloths in closed containers. } {Provide extract ventilation to points where emissions occur [E54]. }
ES8-ES12: Application of cleaning products in closed systems [CS101]. Outdoor [OC9].	No other specific measures identified [EI20].
ES8-ES13: Cleaning of medical devices [CS74].	Ensure operation is undertaken outdoors [E69]. {Provide extract ventilation to points where emissions occur [E54]. }
ES8-ES14: Storage [CS67].	{Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.01. (0.027 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES8-ES1: ERC8a ESVOC SpERC 9. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.02. Release fraction to wastewater from wide dispersive use [OOC8]: 0.000001. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES8-ES1: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES8-ES2: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES8-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES8-ES4: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES8-ES5: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES6: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES7: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES8: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES9: 350ppm. Risk characterisation ratio: 0.818.
	exposure resulting from contributing scenario: ES8-ES10: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES11: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES8-ES12: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES8-ES13: 35ppm. Risk characterisation ratio: 0.082.
	exposure resulting from contributing scenario: ES8-ES14: 0.01ppm. Risk characterisation ratio: <0.001.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES8-ES1: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES8-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES8-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES8-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.

	exposure resulting from contributing scenario: ES8-ES5: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES8-ES6: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES8-ES7: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES8-ES8: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES8-ES9: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES8-ES10: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES8-ES11: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES8-ES12: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES8-ES13: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES8-ES14: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES8-ES1: PEC for microorganisms in STP: 0.00000000051mg/l. Risk characterisation ratio: 8.63E-10. Local PEC in surface water: 0.0000056mg/l. Risk characterisation ratio: 1.47E-04. Local PEC in fresh water sediment: 0.000082mg/kgdw. Risk characterisation ratio: 5.69E-05. Local PEC in sea water during emission episode: 0.000000018mg/l. Risk characterisation ratio: 4.71E-07. Local PEC in marine sediment: 0.00000017mg/kgdw. Risk characterisation ratio: 1.18E-07. Local PEC in soil: 0.0000013mg/kgdw. Risk characterisation ratio: 2.83E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 190kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 9. Use in Cleaning Agents. - Consumer.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Exposure scenario**	
Title.	**Use in Cleaning Agents. 2,2,4-trimethylpentane. CAS: 540-84-1**	
Sector(s) of Use:	Consumer (SU21).	
Use Descriptor.	PC3, PC4, PC8, PC9, PC24, PC35, PC38	
Processes, tasks, activities covered:	Covers general exposures to consumers arising from the use of household products sold as washing and cleaning products, aerosols, coatings, de-icers, lubricants and air care products [GES4_C].	
Environmental Release Category(ies):	ERC8a, ERC8d	
Assessment method:	Health: : Used ECETOC TRA model with modifications as recommended by ESIG. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
Section 2:	**Operational conditions and risk management measures.**	
Section 2.1	**Control of consumer exposure.**	
Product Characteristics:		
Physical form of product:	Liquid, vapour pressure >10Pa (High volatility).	
Vapour pressure:	2800Pa.	
Concentration of substance in product:	See specific operational conditions below [ConsOC16].	
Amounts used:	See specific operational conditions below [ConsOC16].	
Frequency and duration of use:	See specific operational conditions below [ConsOC16].	
Human factors not influenced by risk management:	See specific operational conditions below [ConsOC16].	
Other operational conditions affecting consumer exposure.	Assumes activities are at ambient temperature (unless stated differently) [G17]. Unless otherwise indicated, assumes use with typical ventilation. Avoid contact with skin	
Contributing Scenarios:	**Product categories:**	
Air care products [PC3] --Air care, instant action (aerosol sprays) [PC3_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 4 times/day. For each use event, covers use amounts up to [ConsOC2]: 0.1g. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.3 hours/event.
Air care products [PC3] --Air care, continuous action (solid and liquid) [PC3_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 10%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 0.48g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 8 hours/event.
Anti-freeze and de-icing products [PC4] --Washing car window [PC4_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 0.5g. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.02 hours/event.
Anti-freeze and de-icing products [PC4] --Pouring into radiator [PC4_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 10%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 2000g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.17 hours/event.
Anti-freeze and de-icing products [PC4] --Lock de-icer [PC4_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 4g. Covers skin contact area up to [ConsOC5]: 214cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.25 hours/event.
Biocidal products [PC8] --Laundry and dish washing products [PC8_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 5%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 15g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.5 hours/event.
Biocidal products [PC8] --Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 5%. Covers use up to [ConsOC3]: 125 day/year. For each use event, covers use amounts up to [ConsOC2]: 27g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.33 hours/event.
Biocidal products [PC8] --Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 15%. Covers use up to [ConsOC3]: 125 day/year. For each use event, covers use amounts up to [ConsOC2]: 35g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.17 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Waterborne latex wall paint [PC9a_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1.5%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2760g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Solvent rich, high solid, water borne paint [PC9a_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 27.5%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 744g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 2.2 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Aerosol spray can [PC9a_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 2 day/year. For each use event, covers use amounts up to [ConsOC2]: 215g. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.33 hours/event.
Coatings and paints, fillers putties, thinners [PC9a] --Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 3 day/year. For each use event, covers use amounts up to [ConsOC2]: 491g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers exposure up to [ConsOC14]: 2 hours/event.
	RMM	Avoid using when windows closed [ConsRMM8]. Avoid using in room with closed doors [ConsRMM7].
Fillers, putties, plasters, modeling clay [PC9b] --Fillers and putty [PC9b_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 2%. Covers use up to [ConsOC3]: 12 day/year. For each use event, covers use amounts up to [ConsOC2]: 85g. Covers skin contact area up to [ConsOC5]: 35cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 4 hours/event.
Fillers, putties, plasters, modeling clay [PC9b] --Plasters and floor equalizers [PC9b_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 2%. Covers use up to [ConsOC3]: 12 day/year. For each use event, covers use amounts up to [ConsOC2]: 13800g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers exposure up to [ConsOC14]: 2 hours/event.
	RMM	Avoid using when windows closed [ConsRMM8]. Avoid using in room with closed doors [ConsRMM7].
Fillers, putties, plasters, modeling clay [PC9b] --Modelling clay [PC9b_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 1%. Covers use up to [ConsOC4]: 1 times/day. Covers skin contact area up to [ConsOC5]: 254cm2. For each use event, assumes swallowed amount of [ConsOC13]: 1g.

Finger paints [PC9c] --Finger paints [PC9c].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. Covers skin contact area up to [ConsOC5]: 254cm2. For each use event, assumes swallowed amount of [ConsOC13]: 1.35g.
Lubricants, greases, and release products [PC24] --Liquids [PC24_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2200g. Covers skin contact area up to [ConsOC5]: 468cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.17 hours/event.
Lubricants, greases, and release products [PC24] --Pastes [PC24_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 20%. Covers use up to [ConsOC3]: 10 day/year. For each use event, covers use amounts up to [ConsOC2]: 34g. Covers skin contact area up to [ConsOC5]: 468cm2.
Lubricants, greases, and release products [PC24] --Sprays [PC24_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC3]: 6 day/year. For each use event, covers use amounts up to [ConsOC2]: 73g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.17 hours/event.
Washing and cleaning products (including solvent based products) [PC35] --Laundry and dish washing products [PC35_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 5%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 15g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.5 hours/event.
Washing and cleaning products (including solvent based products) [PC35] --Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC35_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 15%. Covers use up to [ConsOC3]: 125 day/year. For each use event, covers use amounts up to [ConsOC2]: 35g. Covers skin contact area up to [ConsOC5]: 428cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0.2 hours/event.
Welding and soldering products, flux products [PC38] --	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 20%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 12g. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 1 hours/event.
Section 2.2:		**Control of environmental exposure:**
Product Characteristics:		Substance is complex UVCB [PrC3]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used		See contributing scenarios above.
Frequency and duration of use:		See contributing scenarios above.
Environmental factors not influenced by risk management:		Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.		See contributing scenarios above.
Conditions and measures related to municipal sewage treatment plant.		Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]. 2000
Conditions and measures related to external treatment of waste for disposal.		Dispose of empty containers and wastes safely [C&H8]. External treatment and disposal of waste should comply with applicable local and/or national regulations [ETW3].
Conditions and measures related to external recovery of waste.		none. External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Section 3:		**Exposure estimation:**
Health: Inhalation (vapour).		Maximum exposure resulting from contributing scenarios described:
		Air care products [PC3] Air care, instant action (aerosol sprays) [PC3_1]. Chronic inhalation exposure based on a yearly average: 0.0967mg/m3. Risk characterisation ratio: 0.000159. Acute inhalation exposure based on a single 24hr day: 0.0967mg/m3. Risk characterisation ratio: 0.000159.
		Air care products [PC3] Air care, continuous action (solid and liquid) [PC3_2]. Chronic inhalation exposure based on a yearly average: 0.165mg/m3. Risk characterisation ratio: 0.000271. Acute inhalation exposure based on a single 24hr day: 0.165mg/m3. Risk characterisation ratio: 0.000271.
		Anti-freeze and de-icing products [PC4] Washing car window [PC4_1]. Chronic inhalation exposure based on a yearly average: 0.000102mg/m3. Risk characterisation ratio: 0.000000169. Acute inhalation exposure based on a single 24hr day: 0.000102mg/m3. Risk characterisation ratio: 0.000000169.
		Anti-freeze and de-icing products [PC4] Pouring into radiator [PC4_2]. Chronic inhalation exposure based on a yearly average: 1.83mg/m3. Risk characterisation ratio: 0.00302. Acute inhalation exposure based on a single 24hr day: 1.83mg/m3. Risk characterisation ratio: 0.00302.
		Anti-freeze and de-icing products [PC4] Lock de-icer [PC4_3]. Chronic inhalation exposure based on a yearly average: 0.51mg/m3. Risk characterisation ratio: 0.00084. Acute inhalation exposure based on a single 24hr day: 0.51mg/m3. Risk characterisation ratio: 0.00084.
		Biocidal products [PC8] Laundry and dish washing products [PC8_1]. Chronic inhalation exposure based on a yearly average: 0.674mg/m3. Risk characterisation ratio: 0.00111. Acute inhalation exposure based on a single 24hr day: 0.674mg/m3. Risk characterisation ratio: 0.00111.
		Biocidal products [PC8] Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2]. Chronic inhalation exposure based on a yearly average: 0.294mg/m3. Risk characterisation ratio: 0.000484. Acute inhalation exposure based on a single 24hr day: 0.842mg/m3. Risk characterisation ratio: 0.00138.
		Biocidal products [PC8] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3]. Chronic inhalation exposure based on a yearly average: 0.618mg/m3. Risk characterisation ratio: 0.00101. Acute inhalation exposure based on a single 24hr day: 1.76mg/m3. Risk characterisation ratio: 0.0029.
		Coatings and paints, fillers putties, thinners [PC9a] Waterborne latex wall paint [PC9a_1]. Chronic inhalation exposure based on a yearly average: 1.15mg/m3. Risk characterisation ratio: 0.0019. Acute inhalation exposure based on a single 24hr day: 105mg/m3. Risk characterisation ratio: 0.173.
		Coatings and paints, fillers putties, thinners [PC9a] Solvent rich, high solid, water borne paint [PC9a_2]. Chronic inhalation exposure based on a yearly average: 8.33mg/m3. Risk characterisation ratio: 0.0137. Acute inhalation exposure based on a single 24hr day: 521mg/m3. Risk characterisation ratio: 0.856.
		Coatings and paints, fillers putties, thinners [PC9a] Aerosol spray can [PC9a_3]. Chronic inhalation exposure based on a yearly average: 0.171mg/m3. Risk characterisation ratio: 0.000281. Acute inhalation exposure based on a single 24hr day: 34.2mg/m3. Risk characterisation ratio: 0.0563.
		Coatings and paints, fillers putties, thinners [PC9a] Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4]. Chronic inhalation exposure based on a yearly average: 1.67mg/m3. Risk characterisation ratio: 0.00274. Acute inhalation exposure based on a single 24hr day: 203mg/m3. Risk characterisation ratio: 0.334.
		Fillers, putties, plasters, modeling clay [PC9b] Fillers and putty [PC9b_1]. Chronic inhalation exposure based on a yearly average: 0.176mg/m3. Risk characterisation ratio: 0.00029. Acute inhalation exposure based on a single 24hr day: 5.36mg/m3. Risk characterisation ratio: 0.00882.
		Fillers, putties, plasters, modeling clay [PC9b] Plasters and floor equalizers [PC9b_2]. Chronic inhalation exposure based on a yearly average: 7.51mg/m3. Risk characterisation ratio: 0.0123. Acute inhalation exposure based on a single 24hr day: 228mg/m3. Risk characterisation ratio: 0.375.

	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Finger paints [PC9c] Finger paints [PC9c]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Lubricants, greases, and release products [PC24] Liquids [PC24_1]. Chronic inhalation exposure based on a yearly average: 0.0443mg/m3. Risk characterisation ratio: 0.0000729. Acute inhalation exposure based on a single 24hr day: 4.04mg/m3. Risk characterisation ratio: 0.00665.
	Lubricants, greases, and release products [PC24] Pastes [PC24_2]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
	Lubricants, greases, and release products [PC24] Sprays [PC24_3]. Chronic inhalation exposure based on a yearly average: 0.202mg/m3. Risk characterisation ratio: 0.000332. Acute inhalation exposure based on a single 24hr day: 12.2mg/m3. Risk characterisation ratio: 0.0202.
	Washing and cleaning products (including solvent based products) [PC35] Laundry and dish washing products [PC35_1]. Chronic inhalation exposure based on a yearly average: 0.674mg/m3. Risk characterisation ratio: 0.00111. Acute inhalation exposure based on a single 24hr day: 0.674mg/m3. Risk characterisation ratio: 0.00111.
	Washing and cleaning products (including solvent based products) [PC35] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC35_3]. Chronic inhalation exposure based on a yearly average: 0.618mg/m3. Risk characterisation ratio: 0.00101. Acute inhalation exposure based on a single 24hr day: 1.76mg/m3. Risk characterisation ratio: 0.0029.
	Welding and soldering products, flux products [PC38] Chronic inhalation exposure based on a yearly average: 3.75mg/m3. Risk characterisation ratio: 0.00618. Acute inhalation exposure based on a single 24hr day: 3.75mg/m3. Risk characterisation ratio: 0.00618.
Health: Dermal:	Maximum exposure resulting from contributing scenarios described:
	Air care products [PC3] Air care, instant action (aerosol sprays) [PC3_1]. Chronic systemic dermal exposure: 0mg/kg/day.
	Air care products [PC3] Air care, continuous action (solid and liquid) [PC3_2]. Chronic systemic dermal exposure: 0.431mg/kg/day. Risk characterisation ratio: 0.000617.
	Anti-freeze and de-icing products [PC4] Washing car window [PC4_1]. Chronic systemic dermal exposure: 0mg/kg/day.
	Anti-freeze and de-icing products [PC4] Pouring into radiator [PC4_2]. Chronic systemic dermal exposure: 5.17mg/kg/day. Risk characterisation ratio: 0.00739.
	Anti-freeze and de-icing products [PC4] Lock de-icer [PC4_3]. Chronic systemic dermal exposure: 12.9mg/kg/day. Risk characterisation ratio: 0.0185.
	Biocidal products [PC8] Laundry and dish washing products [PC8_1]. Chronic systemic dermal exposure: 0.0518mg/kg/day. Risk characterisation ratio: 0.0000741.
	Biocidal products [PC8] Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2]. Chronic systemic dermal exposure: 5.18mg/kg/day. Risk characterisation ratio: 0.00741.
	Biocidal products [PC8] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3]. Chronic systemic dermal exposure: 7.75mg/kg/day. Risk characterisation ratio: 0.011.
	Coatings and paints, fillers putties, thinners [PC9a] Waterborne latex wall paint [PC9a_1]. Chronic systemic dermal exposure: 0.777mg/kg/day. Risk characterisation ratio: 0.00111.
	Coatings and paints, fillers putties, thinners [PC9a] Solvent rich, high solid, water borne paint [PC9a_2]. Chronic systemic dermal exposure: 14.2mg/kg/day. Risk characterisation ratio: 0.0203.
	Coatings and paints, fillers putties, thinners [PC9a] Aerosol spray can [PC9a_3]. Chronic systemic dermal exposure: 0mg/kg/day.
	Coatings and paints, fillers putties, thinners [PC9a] Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4]. Chronic systemic dermal exposure: 51.8mg/kg/day. Risk characterisation ratio: 0.0741.
	Fillers, putties, plasters, modeling clay [PC9b] Fillers and putty [PC9b_1]. Chronic systemic dermal exposure: 0.0863mg/kg/day. Risk characterisation ratio: 0.000123.
	Fillers, putties, plasters, modeling clay [PC9b] Plasters and floor equalizers [PC9b_2]. Chronic systemic dermal exposure: 2.07mg/kg/day. Risk characterisation ratio: 0.00296.
	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Chronic systemic dermal exposure: 1.84mg/kg/day. Risk characterisation ratio: 0.00263.
	Finger paints [PC9c] Finger paints [PC9c]. Chronic systemic dermal exposure: 92.2mg/kg/day. Risk characterisation ratio: 0.131.
	Lubricants, greases, and release products [PC24] Liquids [PC24_1]. Chronic systemic dermal exposure: 56.5mg/kg/day. Risk characterisation ratio: 0.0809.
	Lubricants, greases, and release products [PC24] Pastes [PC24_2]. Chronic systemic dermal exposure: 11.3mg/kg/day. Risk characterisation ratio: 0.0161.
	Lubricants, greases, and release products [PC24] Sprays [PC24_3]. Chronic systemic dermal exposure: 25.9mg/kg/day. Risk characterisation ratio: 0.037.
	Washing and cleaning products (including solvent based products) [PC35] Laundry and dish washing products [PC35_1]. Chronic systemic dermal exposure: 0.0518mg/kg/day. Risk characterisation ratio: 0.0000741.
	Washing and cleaning products (including solvent based products) [PC35] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC35_3]. Chronic systemic dermal exposure: 7.75mg/kg/day. Risk characterisation ratio: 0.011.
	Welding and soldering products, flux products [PC38] Chronic systemic dermal exposure: 0mg/kg/day. Risk characterisation ratio: 0.
Health: Oral:	Maximum exposure resulting from contributing scenarios described:
	Air care products [PC3] Air care, instant action (aerosol sprays) [PC3_1]. Not applicable.
	Air care products [PC3] Air care, continuous action (solid and liquid) [PC3_2]. Not applicable.
	Anti-freeze and de-icing products [PC4] Washing car window [PC4_1]. Not applicable.
	Anti-freeze and de-icing products [PC4] Pouring into radiator [PC4_2]. Not applicable.
	Anti-freeze and de-icing products [PC4] Lock de-icer [PC4_3]. Not applicable.
	Biocidal products [PC8] Laundry and dish washing products [PC8_1]. Not applicable.
	Biocidal products [PC8] Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) [PC8_2]. Not applicable.
	Biocidal products [PC8] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC8_3]. Not applicable.
	Coatings and paints, fillers putties, thinners [PC9a] Waterborne latex wall paint [PC9a_1]. Not applicable.
	Coatings and paints, fillers putties, thinners [PC9a] Solvent rich, high solid, water borne paint [PC9a_2]. Not applicable.
	Coatings and paints, fillers putties, thinners [PC9a] Aerosol spray can [PC9a_3]. Not applicable.
	Coatings and paints, fillers putties, thinners [PC9a] Removers (paint-, glue-, wall paper-, sealant-remover) [PC9a_4]. Not applicable.
	Fillers, putties, plasters, modeling clay [PC9b] Fillers and putty [PC9b_1]. Not applicable.
	Fillers, putties, plasters, modeling clay [PC9b] Plasters and floor equalizers [PC9b_2]. Not applicable.

	Fillers, putties, plasters, modeling clay [PC9b] Modelling clay [PC9b_3]. Acute inhalation exposure based on a single 24hr day: 0.999mg/kg/day. Risk characterisation ratio: 0.00143.
	Finger paints [PC9c] Finger paints [PC9c]. Acute inhalation exposure based on a single 24hr day: 67.5mg/kg/day. Risk characterisation ratio: 0.0965.
	Lubricants, greases, and release products [PC24] Liquids [PC24_1]. Not applicable.
	Lubricants, greases, and release products [PC24] Pastes [PC24_2]. Not applicable.
	Lubricants, greases, and release products [PC24] Sprays [PC24_3]. Not applicable.
	Washing and cleaning products (including solvent based products) [PC35] Laundry and dish washing products [PC35_1]. Not applicable.
	Washing and cleaning products (including solvent based products) [PC35] Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) [PC35_3]. Not applicable.
	Welding and soldering products, flux products [PC38] Not applicable.
Environment:	Maximum exposure resulting from contributing scenarios described:
	ES9-ES1: PEC for microorganisms in STP: 0.000013mg/l. Risk characterisation ratio: 2.20E-05. Local PEC in surface water: 0.0000068mg/l. Risk characterisation ratio: 1.78E-04. Local PEC in fresh water sediment: 0.00014mg/kgdw. Risk characterisation ratio: 9.72E-05. Local PEC in sea water during emission episode: 0.00000051mg/l. Risk characterisation ratio: 1.34E-05. Local PEC in marine sediment: 0.00000013mg/kgdw. Risk characterisation ratio: 9.03E-08. Local PEC in soil: 0.0000055mg/kgdw. Risk characterisation ratio: 1.20E-05. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
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 [G43]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23]. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37].
Environment	
	Not applicable for wide dispersive uses [DSU5].

Exposure scenario 10. Metal working fluids / rolling oils . - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format [CSL02].

Section 1	**Title.**
Title.	**Metal working fluids / rolling oils . Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3).
Process Category(ies):	PROC1, PROC 2, PROC3, PROC4, PROC 5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17
Environmental Release Category(ies):	ERC4; ESVOC SpERC 18.
Processes, tasks, activities covered:	Covers the use in formulated MWFs/rolling oils including transfer operations, rolling and annealing activities, cutting/machining activities, automated and manual application of corrosion protections (including brushing, dipping and spraying), equipment maintenance, draining and disposal of waste oils [GES7_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios [CSL208].	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects [CSL276]. Avoid contact with skin [CSL277]. Clean equipment and the work area every day [C&H3]. Clear spills immediately [C&H13]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed [CSL195].
ES10-ES1: General exposures (closed systems) [CS15]. no sampling [CS57].	No specific measures identified [EI18].
ES10-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56].	No specific measures identified [EI18].
ES10-ES3: General exposures (open systems) [CS16].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES10-ES4: Bulk transfers [CS14].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES10-ES5: Filling / preparation of equipment from drums or containers. [CS45]. Drum/batch transfers [CS8].	Clear transfer lines prior to de-coupling [E39]. {Use suitable eye protection and gloves [PPE14]. } {Wear suitable coveralls to prevent exposure to the skin [PPE27]. } {Use drum pumps [E53]. }
ES10-ES6: Filling / preparation of equipment from drums or containers. [CS45]. Mixing operations (open systems) [CS30].	{Use suitable eye protection and gloves [PPE14]. } {Wear suitable coveralls to prevent exposure to the skin [PPE27]. } {Use drum pumps [E53]. }
ES10-ES7: Filling / preparation of equipment from drums or containers. [CS45]. Drum and small package filling [CS6].	{Use suitable eye protection and gloves [PPE14]. } {Wear suitable coveralls to prevent exposure to the skin [PPE27]. } {Use drum pumps [E53]. }
ES10-ES8: Process sampling [CS2].	Use dedicated equipment [E85]. {Wear suitable gloves tested to EN374 [PPE15]. }

ES10-ES9: Metal machining operations [CS79].	Provide extract ventilation to points where emissions occur [E54]. {Use suitable eye protection and gloves [PPE14]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES10-ES10: Treatment by dipping and pouring [CS35].	Allow time for product to drain from workpiece [EI21]. {Use suitable eye protection and gloves [PPE14]. } {Use ventilation to extract vapours from freshly coated articles/objects and surfaces [E56]. }
ES10-ES11: Spraying [CS10].	Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 [E70]. {Wear suitable gloves tested to EN374 [PPE15]. }
ES10-ES12: Storage [CS67].	Transfer via enclosed lines [E52].
ES10-ES13: Rolling, Brushing [CS51]. Manual [CS34].	{Use suitable eye protection and gloves [PPE14]. }
ES10-ES14: Automated metal rolling/forming [CS80]. elevated temperature [CS111].	{Use suitable eye protection and gloves [PPE14]. } {Wear suitable coveralls to prevent exposure to the skin [PPE27]. } {Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES10-ES15: Semi-automated metal rolling/forming [CS83]. elevated temperature [CS111].	Provide extract ventilation to points where emissions occur [E54]. {Use suitable eye protection and gloves [PPE14]. } {Wear suitable coveralls to prevent exposure to the skin [PPE27]. }
ES10-ES16: Semi-automated metal rolling/forming [CS83].	No specific measures identified [EI18].
ES10-ES17: Equipment cleaning and maintenance [CS39]. Dedicated facility [CS81].	{Clear transfer lines prior to de-coupling [E39]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Use suitable eye protection and gloves [PPE14]. }
ES10-ES18: Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].	{Use suitable eye protection and gloves [PPE14]. } {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l) [CSL56]. Very toxic to aquatic species [CSL66]. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential [CSL68].
Amounts used per site (tonne per year).	4. (200 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 20 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ESVOC SpERC 18. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.02. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.000003. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 70.
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4] Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES10-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES10-ES2: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES10-ES3: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES10-ES4: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES6: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES7: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES8: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES10-ES9: 2.5ppm. Risk characterisation ratio: 0.006.
	exposure resulting from contributing scenario: ES10-ES10: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES11: 12.5ppm. Risk characterisation ratio: 0.029.
	exposure resulting from contributing scenario: ES10-ES12: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES10-ES13: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES14: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES15: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES10-ES16: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES10-ES17: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES10-ES18: 50ppm. Risk characterisation ratio: 0.117.

	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES10-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES10-ES2: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES10-ES3: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES6: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES10-ES7: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES8: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES10-ES9: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES10-ES10: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES10-ES10: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES10-ES11: 42.86mg/kg/day. Risk characterisation ratio: 0.055.
	exposure resulting from contributing scenario: ES10-ES12: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES10-ES13: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES10-ES14: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES10-ES15: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES10-ES16: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES17: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES10-ES18: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Quantitative exposure and risk assessment not possible due to lack of emissions to aquatic environment [EE7].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment) [CSL51].
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100% [CSL129].
Environment:	Msafe: 1100000kg/day. 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 [DSU1].
	Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html) [DSU4].

Exposure scenario 11. Metal working fluids / rolling oils . Low environmental release. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Metal working fluids / rolling oils . Low environmental release. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC 5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC17
Environmental Release Category(ies):	ERC9a; ERC9b; ESVOC SpERC 19.
Processes, tasks, activities covered:	Covers the use in formulated MWFs/rolling oils including transfer operations, rolling and annealing activities, cutting/machining activities, automated and manual application of corrosion protections (including brushing, dipping and spraying), equipment maintenance, draining and disposal of waste oils [GES7_I]. Low environmental release.
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES11-ES1: General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
ES11-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56].	Handle substance within a closed system [E47].
ES11-ES3: General exposures (closed systems) [CS15]. Batch process [CS55]. with sample collection [CS56].	Handle substance within a closed system [E47]. {Ensure dedicated sample points are provided [E10]. }
ES11-ES4: Bulk transfers [CS14].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES5: Filling / preparation of equipment from drums or containers. [CS45]. Dedicated facility [CS81]. PROC 8b	{Use drum pumps or carefully pour from container [E64]. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES6: Filling / preparation of equipment from drums or containers. [CS45]. Dedicated facility [CS81]. PROC 9	Avoid carrying out operation for more than 1 hour [OC11]. {Use drum pumps or carefully pour from container [E64]. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES7: Filling / preparation of equipment from drums or containers. [CS45]. Non-dedicated facility [CS82].	Avoid carrying out operation for more than 1 hour [OC11]. {Use a transfer container. }

ES11-ES8: Process sampling [CS2].	{Avoid contact with skin. }
ES11-ES9: Metal machining operations [CS79].	Provide extract ventilation to points where emissions occur [E54]. {Use suitable eye protection and gloves [PPE14]. }
ES11-ES10: Rolling, Brushing [CS51]. Manual [CS34].	{Use suitable eye protection and gloves [PPE14]. }
ES11-ES11: Spraying [CS10].	Carry out in a vented booth or extracted enclosure [E57]. 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 [E1]. Avoid carrying out operation for more than 1 hour [OC11]. Wear suitable gloves tested to EN374 [PPE15]. {Dispose of waste wipe cloths in closed containers. } {Provide extract ventilation to points where emissions occur [E54]. } {Use suitable eye protection [PPE26]. }
ES11-ES12: Treatment by dipping and pouring [CS35]. Outdoor [OC9].	Provide extract ventilation to points where emissions occur [E54]. {Allow time for product to drain from workpiece [EI21]. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES13: Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].	Avoid carrying out operation for more than 1 hour [OC11]. {Dispose of waste wipe cloths in closed containers. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES14: Equipment cleaning and maintenance [CS39]. Dedicated facility [CS81].	{Dispose of waste wipe cloths in closed containers. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES15: Storage [CS67].	Store substance within a closed system [E84].
ES11-ES16: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. } {Use suitable eye protection and gloves [PPE14]. }
ES11-ES17: Filling / preparation of equipment from drums or containers. [CS45].	Avoid carrying out operation for more than 1 hour [OC11]. {Use drum pumps [E53]. } {Use suitable eye protection and gloves [PPE14]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.0005. (0.0013 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES11-ES1: ERC9a ESVOC SpERC 19. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.05. Release fraction to wastewater from wide dispersive use [OOC8]: 0.025. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES11-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES11-ES2: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES11-ES4: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES11-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES11-ES6: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES7: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES11-ES9: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES10: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES11-ES11: 14ppm. Risk characterisation ratio: 0.033.
	exposure resulting from contributing scenario: ES11-ES12: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES13: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES14: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES11-ES15: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES11-ES16: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES11-ES17: 20ppm. Risk characterisation ratio: 0.047.

	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES11-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES11-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES11-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES11-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES11-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES11-ES6: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES11-ES7: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES11-ES8: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES11-ES9: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES11-ES10: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES11-ES11: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES11-ES12: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES11-ES13: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES11-ES14: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES11-ES15: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES11-ES16: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES11-ES17: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES11-ES1: PEC for microorganisms in STP: 0.00000063mg/l. Risk characterisation ratio: 1.07E-06. Local PEC in surface water: 0.0000056mg/l. Risk characterisation ratio: 1.47E-04. Local PEC in fresh water sediment: 0.000084mg/kgdw. Risk characterisation ratio: 5.83E-05. Local PEC in sea water during emission episode: 0.000000025mg/l. Risk characterisation ratio: 6.54E-07. Local PEC in marine sediment: 0.00000025mg/kgdw. Risk characterisation ratio: 1.74E-07. Local PEC in soil: 0.0000025mg/kgdw. Risk characterisation ratio: 5.43E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7. To scale from an exposure of 15mins-1 hour to one of 1-4 hours, multiply by 3.
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 9.3kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 12. Metal working fluids / rolling oils . High environmental release. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Metal working fluids / rolling oils . High environmental release. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC 5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC17
Environmental Release Category(ies):	ERC9a; ERC9b; ESVOC SpERC 20.
Processes, tasks, activities covered:	Covers the use in formulated MWFs/rolling oils including transfer operations, rolling and annealing activities, cutting/machining activities, automated and manual application of corrosion protections (including brushing, dipping and spraying), equipment maintenance, draining and disposal of waste oils [GES7_I]. High environmental release.
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES12-ES1: General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
ES12-ES2: General exposures (closed systems) [CS15]. with sample collection [CS56].	Handle substance within a closed system [E47].
ES12-ES3: General exposures (closed systems) [CS15]. Batch process [CS55]. with sample collection [CS56].	Handle substance within a closed system [E47]. {Ensure dedicated sample points are provided [E10]. }
ES12-ES4: Bulk transfers [CS14].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES5: Filling / preparation of equipment from drums or containers. [CS45]. Dedicated facility [CS81]. PROC 8b	{Use drum pumps or carefully pour from container [E64]. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES6: Filling / preparation of equipment from drums or containers. [CS45]. Dedicated facility [CS81]. PROC 9	Avoid carrying out operation for more than 1 hour [OC11]. {Use drum pumps or carefully pour from container [E64]. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES7: Filling / preparation of equipment from drums or containers. [CS45]. Non-dedicated facility [CS82].	Avoid carrying out operation for more than 1 hour [OC11]. {Use a transfer container. }

ES12-ES8: Process sampling [CS2].	{Avoid contact with skin. }
ES12-ES9: Metal machining operations [CS79].	Provide extract ventilation to points where emissions occur [E54]. {Use suitable eye protection and gloves [PPE14]. }
ES12-ES10: Rolling, Brushing [CS51]. Manual [CS34].	{Use suitable eye protection and gloves [PPE14]. }
ES12-ES11: Spraying [CS10].	Carry out in a vented booth or extracted enclosure [E57]. 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 [E1]. Avoid carrying out operation for more than 1 hour [OC11]. Wear suitable gloves tested to EN374 [PPE15]. {Dispose of waste wipe cloths in closed containers. } {Provide extract ventilation to points where emissions occur [E54]. } {Use suitable eye protection [PPE26]. }
ES12-ES12: Treatment by dipping and pouring [CS35]. Outdoor [OC9].	Provide extract ventilation to points where emissions occur [E54]. {Allow time for product to drain from workpiece [EI21]. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES13: Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].	Avoid carrying out operation for more than 1 hour [OC11]. {Dispose of waste wipe cloths in closed containers. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES14: Equipment cleaning and maintenance [CS39]. Dedicated facility [CS81].	{Dispose of waste wipe cloths in closed containers. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES15: Storage [CS67].	Store substance within a closed system [E84].
ES12-ES16: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. } {Use suitable eye protection and gloves [PPE14]. }
ES12-ES17: Filling / preparation of equipment from drums or containers. [CS45].	Avoid carrying out operation for more than 1 hour [OC11]. {Use drum pumps [E53]. } {Use suitable eye protection and gloves [PPE14]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.0005. (0.0013 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES12-ES1: ERC9a ESVOC SpERC 20. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.4. Release fraction to wastewater from wide dispersive use [OOC8]: 0.05. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.05.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES12-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES12-ES2: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES3: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES12-ES4: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES12-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES12-ES6: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES7: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES12-ES9: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES10: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES12-ES11: 14ppm. Risk characterisation ratio: 0.033.
	exposure resulting from contributing scenario: ES12-ES12: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES13: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES14: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES12-ES15: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES12-ES16: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES12-ES17: 20ppm. Risk characterisation ratio: 0.047.

	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES12-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES12-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES12-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES12-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES12-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES12-ES6: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES12-ES7: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES12-ES8: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES12-ES9: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES12-ES10: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES12-ES11: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES12-ES12: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES12-ES13: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES12-ES14: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES12-ES15: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES12-ES16: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES12-ES17: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES12-ES1: PEC for microorganisms in STP: 0.0000013mg/l. Risk characterisation ratio: 2.20E-06. Local PEC in surface water: 0.0000057mg/l. Risk characterisation ratio: 1.49E-04. Local PEC in fresh water sediment: 0.000087mg/kgdw. Risk characterisation ratio: 6.04E-05. Local PEC in sea water during emission episode: 0.000000031mg/l. Risk characterisation ratio: 8.12E-07. Local PEC in marine sediment: 0.00000055mg/kgdw. Risk characterisation ratio: 3.82E-07. Local PEC in soil: 0.0000023mg/kgdw. Risk characterisation ratio: 5.00E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7. To scale from an exposure of 15mins-1 hour to one of 1-4 hours, multiply by 3.
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 9.2kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 13. Use in Agrochemicals. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use in Agrochemicals. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC4, PROC8a, PROC8b, PROC11, PROC13
Environmental Release Category(ies):	ERC8a; ERC8d; ESVOC SpERC 26.
Processes, tasks, activities covered:	Use as an agrochemical excipient for application by manual or machine spraying, smokes and fogging; including equipment clean-downs and disposal [GES11_P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES13-ES1: Transfer from/pouring from containers [CS22].	No specific measures identified [EI18].
ES13-ES2: Mixing operations (open systems) [CS30].	No specific measures identified [EI18].
ES13-ES3: Spraying/fogging by manual application [CS24]. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Change filter cartridge on respirator daily [PPE25]. Wear suitable gloves tested to EN374 [PPE15]. {Wear suitable coveralls to prevent exposure to the skin [PPE27]. Wear rubber boots [PPE28]. }
ES13-ES4: Spraying/fogging by machine application [CS25].	Carry out in a vented booth or extracted enclosure [E57]. Avoid carrying out operation for more than 4 hours [OC12]. Wear suitable gloves tested to EN374 [PPE15].
ES13-ES5: Ad hoc manual application via trigger sprays, dipping, etc. [CS27].	Avoid carrying out operation for more than 1 hour [OC11].
ES13-ES6: Equipment cleaning and maintenance [CS39].	Avoid carrying out operation for more than 1 hour [OC11]. {Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. } {Use suitable eye protection and gloves [PPE14]. }
ES13-ES7: Storage [CS67].	Store substance within a closed system [E84].
ES13-ES8: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.0008. (0.0021 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.

Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES13-ES1: ERC8a ESVOC SpERC 26. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.9. Release fraction to wastewater from wide dispersive use [OOC8]: 0.01. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.09.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES13-ES1: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES13-ES2: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES13-ES3: 35ppm. Risk characterisation ratio: 0.082.
	exposure resulting from contributing scenario: ES13-ES4: 60ppm. Risk characterisation ratio: 0.14.
	exposure resulting from contributing scenario: ES13-ES5: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES13-ES6: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES13-ES7: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES13-ES8: 20ppm. Risk characterisation ratio: 0.047.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES13-ES1: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES13-ES2: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES13-ES3: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES13-ES4: 21.428mg/kg/day. Risk characterisation ratio: 0.028.
	exposure resulting from contributing scenario: ES13-ES5: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES13-ES6: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES13-ES7: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES13-ES8: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES13-ES1: PEC for microorganisms in STP: 0.00000041mg/l. Risk characterisation ratio: 6.94E-07. Local PEC in surface water: 0.0000056mg/l. Risk characterisation ratio: 1.47E-04. Local PEC in fresh water sediment: 0.000083mg/kgdw. Risk characterisation ratio: 5.76E-05. Local PEC in sea water during emission episode: 0.000000022mg/l. Risk characterisation ratio: 5.76E-07. Local PEC in marine sediment: 0.00000018mg/kgdw. Risk characterisation ratio: 1.25E-07. Local PEC in soil: 0.0000021mg/kgdw. Risk characterisation ratio: 4.57E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7. To scale from an exposure of 15mins-1 hour to one of 1-4 hours, multiply by 3.
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.

Environment:	Msafe: 15kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 13. Use in Agrochemicals. - Consumer.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1		**Exposure scenario**
Title.		**Use in Agrochemicals. 2,2,4-trimethylpentane. CAS: 540-84-1**
Sector(s) of Use:		Consumer (SU21).
Use Descriptor.		PC12, PC27
Processes, tasks, activities covered:		Covers the consumer use in agrochemicals in liquid and solid forms [GES11-C].
Environmental Release Category(ies):		ERC8a, ERC8d
Assessment method:		Health: : Used ECETOC TRA model with modifications as recommended by ESIG. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:		**Operational conditions and risk management measures.**
Section 2.1		**Control of consumer exposure.**
Product Characteristics:		
Physical form of product:		Liquid, vapour pressure >10Pa (High volatility).
Vapour pressure:		2800Pa.
Concentration of substance in product:		See specific operational conditions below [ConsOC16].
Amounts used:		See specific operational conditions below [ConsOC16].
Frequency and duration of use:		See specific operational conditions below [ConsOC16].
Human factors not influenced by risk management:		See specific operational conditions below [ConsOC16].
Other operational conditions affecting consumer exposure.		Assumes activities are at ambient temperature (unless stated differently) [G17]. Unless otherwise indicated, assumes use with typical ventilation. Avoid contact with skin
Contributing Scenarios:		**Product categories:**
Fertilizers [PC12] --Lawn and garden preparations [PC12_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 50g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers outdoor use [ConsOC12]. Covers exposure up to [ConsOC14]: 4 hours/event. For each use event, assumes swallowed amount of [ConsOC13]: 0.3g.
Plant protection products [PC27] --	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 50%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 50g. Covers skin contact area up to [ConsOC5]: 857cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 4 hours/event. For each use event, assumes swallowed amount of [ConsOC13]: 0.3g.
Section 2.2:		**Control of environmental exposure:**
Product Characteristics:		Substance is complex UVCB [PrC3]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used		See contributing scenarios above.
Frequency and duration of use:		See contributing scenarios above.
Environmental factors not influenced by risk management:		Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.		See contributing scenarios above.
Conditions and measures related to municipal sewage treatment plant.		Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]. 2000
Conditions and measures related to external treatment of waste for disposal.		Dispose of empty containers and wastes safely [C&H8]. External treatment and disposal of waste should comply with applicable local and/or national regulations [ETW3].
Conditions and measures related to external recovery of waste.		none. External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Section 3:		**Exposure estimation:**
Health: Inhalation (vapour).		Maximum exposure resulting from contributing scenarios described:
		Fertilizers [PC12] Lawn and garden preparations [PC12_1]. Chronic inhalation exposure based on a yearly average: 0mg/m3. Risk characterisation ratio: 0. Acute inhalation exposure based on a single 24hr day: 0mg/m3. Risk characterisation ratio: 0.
		Plant protection products [PC27] Chronic inhalation exposure based on a yearly average: 78.9mg/m3. Risk characterisation ratio: 0.129. Acute inhalation exposure based on a single 24hr day: 78.9mg/m3. Risk characterisation ratio: 0.129.
Health: Dermal:		Maximum exposure resulting from contributing scenarios described:
		Fertilizers [PC12] Lawn and garden preparations [PC12_1]. Chronic systemic dermal exposure: 51.8mg/kg/day. Risk characterisation ratio: 0.0741.
		Plant protection products [PC27] Chronic systemic dermal exposure: 51.8mg/kg/day. Risk characterisation ratio: 0.0741.
Health: Oral:		Maximum exposure resulting from contributing scenarios described:
		Fertilizers [PC12] Lawn and garden preparations [PC12_1]. Acute inhalation exposure based on a single 24hr day: 15mg/kg/day. Risk characterisation ratio: 0.0214.
		Plant protection products [PC27] Acute inhalation exposure based on a single 24hr day: 15mg/kg/day. Risk characterisation ratio: 0.0214.
Environment:		Maximum exposure resulting from contributing scenarios described:
		ES13-ES1: PEC for microorganisms in STP: 0.00000041mg/l. Risk characterisation ratio: 6.94E-07. Local PEC in surface water: 0.0000056mg/l. Risk characterisation ratio: 1.47E-04. Local PEC in fresh water sediment: 0.000083mg/kgdw. Risk characterisation ratio: 5.76E-05. Local PEC in sea water during emission episode: 0.000000022mg/l. Risk characterisation ratio: 5.76E-07. Local PEC in marine sediment: 0.00000018mg/kgdw. Risk characterisation ratio: 1.25E-07. Local PEC in soil: 0.0000021mg/kgdw. Risk characterisation ratio: 4.57E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:		**Guidance to check compliance with the exposure scenario:**
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 [G43]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23]. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37].

Environment	
	Not applicable for wide dispersive uses [DSU5].

Exposure scenario 15. Use as a fuel . - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use as a fuel . Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3).
Process Category(ies):	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16
Environmental Release Category(ies):	ERC7; ESVOC SpERC 28.
Processes, tasks, activities covered:	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste [GES12_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES15-ES1: Bulk transfers [CS14]. (eg road/railcar bottom loading/unloading, marine vessel/barge loading/unloading).	Handle substance within a closed system [E47]. {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES15-ES2: Drum/batch transfers [CS8].	{Use drum pumps [E53]. }
ES15-ES3: General exposures (closed systems) [CS15]. Continuous process [CS54]. In line injection of process chemicals by fixed dose pumping. PROC1.	Handle substance within a closed system [E47]. {Use suitable eye protection and gloves [PPE14]. }
ES15-ES4: General exposures (closed systems) [CS15]. Continuous process [CS54]. In line injection of process chemicals by fixed dose pumping. PROC2.	Handle substance within a closed system [E47]. {Use suitable eye protection and gloves [PPE14]. }
ES15-ES5: General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. In line injection of process chemicals by fixed dose pumping.	{Use suitable eye protection and gloves [PPE14]. }
ES15-ES6: General exposures (closed systems) [CS15]. Use as a fuel . PROC 1.	Handle substance within a closed system [E47].
ES15-ES7: General exposures (closed systems) [CS15]. Use as a fuel . PROC 2.	Handle substance within a closed system [E47].

ES15-ES8: Use as a fuel . PROC 16.	Handle substance within a closed system [E47].
ES15-ES9: use as a fuel additive diluent.	Handle substance within a closed system [E47].
ES15-ES10: Equipment cleaning and maintenance [CS39].	{Ensure operatives are trained to minimise exposures [EI19]. } {Use suitable eye protection and gloves [PPE14]. }
ES15-ES11: Storage [CS67].	Store substance within a closed system [E84].
ES15-ES12: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. Transfer via enclosed lines [E52]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	26000. (86000 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 300 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES15-ES1: ERC7 ESVOC SpERC 28. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.05. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00001. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. Treat air emission to provide a typical removal efficiency of (%) [TCR7]. 95.
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%) [TCR8]: 23.4. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
Conditions and measures related to external treatment of waste for disposal.	Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2].
Conditions and measures related to external recovery of waste.	This substance is consumed during use and no waste of the substance is generated [ERW3].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES15-ES1: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES15-ES2: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES15-ES3: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES4: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES15-ES5: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES15-ES6: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES7: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES15-ES8: 5ppm. Risk characterisation ratio: 0.012.
	exposure resulting from contributing scenario: ES15-ES9: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES15-ES10: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES15-ES11: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES12: 10ppm. Risk characterisation ratio: 0.023.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES15-ES1: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES15-ES2: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES15-ES3: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES4: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES15-ES5: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES7: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES15-ES8: 0.34mg/kg/day. Risk characterisation ratio: <0.001.

	exposure resulting from contributing scenario: ES15-ES9: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES10: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES15-ES11: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES15-ES12: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES15-ES1: PEC for microorganisms in STP: 0.016mg/l. Risk characterisation ratio: 2.71E-02. Local PEC in surface water: 0.0016mg/l. Risk characterisation ratio: 4.19E-02. Local PEC in fresh water sediment: 0.07mg/kgdw. Risk characterisation ratio: 4.86E-02. Local PEC in sea water during emission episode: 0.00016mg/l. Risk characterisation ratio: 4.19E-03. Local PEC in marine sediment: 0.007mg/kgdw. Risk characterisation ratio: 4.86E-03. Local PEC in soil: 0.00046mg/kgdw. Risk characterisation ratio: 1.00E-03. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 1800000kg/day. 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 [DSU1].
	$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.

Exposure scenario 16. Use as a fuel . - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use as a fuel . Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16
Environmental Release Category(ies):	ERC9a; ERC9b; ESVOC SpERC 29.
Processes, tasks, activities covered:	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste [GES12_P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES16-ES1: Bulk transfers [CS14].	Handle substance within a closed system [E47]. {Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES16-ES2: Drum/batch transfers [CS8].	{Use drum pumps [E53]. }
ES16-ES3: refuelling vehicles; aircraft, marine .	{Transfer via enclosed lines [E52]. }
ES16-ES4: General exposures (closed systems) [CS15]. PROC 1	Handle substance within a closed system [E47].
ES16-ES5: General exposures (closed systems) [CS15]. PROC 2	Handle substance within a closed system [E47].
ES16-ES6: General exposures (closed systems) [CS15]. use as a fuel additive diluent. PROC 3	Handle substance within a closed system [E47].
ES16-ES7: Use as a fuel .	Handle substance within a closed system [E47].
ES16-ES8: Equipment cleaning and maintenance [CS39]. with sample collection [CS56].	{Ensure operatives are trained to minimise exposures [EI19]. } {Use suitable eye protection and gloves [PPE14]. }
ES16-ES9: Storage [CS67].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	13. (36 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.

Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES16-ES1: ERC9a ESVOC SpERC 29. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.001. Release fraction to wastewater from wide dispersive use [OOC8]: 0.00001. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.00001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent environmental discharge consistent with regulatory requirements [OMS4]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
Conditions and measures related to external treatment of waste for disposal.	Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2].
Conditions and measures related to external recovery of waste.	This substance is consumed during use and no waste of the substance is generated [ERW3].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES16-ES1: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES16-ES2: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES16-ES3: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES16-ES4: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES16-ES5: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES16-ES6: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES16-ES7: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES16-ES8: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES16-ES9: 0.01ppm. Risk characterisation ratio: <0.001.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES16-ES1: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES16-ES2: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES16-ES3: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES16-ES4: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES16-ES5: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES16-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES16-ES7: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES16-ES8: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES16-ES9: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES16-ES1: PEC for microorganisms in STP: 0.0000066mg/l. Risk characterisation ratio: 1.12E-05. Local PEC in surface water: 0.0000062mg/l. Risk characterisation ratio: 1.62E-04. Local PEC in fresh water sediment: 0.00011mg/kgdw. Risk characterisation ratio: 7.64E-05. Local PEC in sea water during emission episode: 0.000000066mg/l. Risk characterisation ratio: 1.73E-06. Local PEC in marine sediment: 0.00000028mg/kgdw. Risk characterisation ratio: 1.94E-07. Local PEC in soil: 0.000012mg/kgdw. Risk characterisation ratio: 2.61E-05. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**

Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 36kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 17. Use as a fuel . - Consumer.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1		**Exposure scenario**
Title.		**Use as a fuel . 2,2,4-trimethylpentane. CAS: 540-84-1**
Sector(s) of Use:		Consumer (SU21).
Use Descriptor.		PC13
Processes, tasks, activities covered:		Covers consumer uses in liquid fuels [GES12_C].
Environmental Release Category(ies):		ERC9a, ERC9b
Assessment method:		Health: : Used ECETOC TRA model with modifications as recommended by ESIG. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:		**Operational conditions and risk management measures.**
Section 2.1		**Control of consumer exposure.**
Product Characteristics:		
Physical form of product:		Liquid, vapour pressure >10Pa (High volatility).
Vapour pressure:		2800Pa.
Concentration of substance in product:		See specific operational conditions below [ConsOC16].
Amounts used:		See specific operational conditions below [ConsOC16].
Frequency and duration of use:		See specific operational conditions below [ConsOC16].
Human factors not influenced by risk management:		See specific operational conditions below [ConsOC16].
Other operational conditions affecting consumer exposure.		Assumes activities are at ambient temperature (unless stated differently) [G17]. Unless otherwise indicated, assumes use with typical ventilation. Avoid contact with skin
Contributing Scenarios:		**Product categories:**
Fuels [PC13] --Liquid: Automotive Refuelling [PC13_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 51 day/year. For each use event, covers use amounts up to [ConsOC2]: 37500g. Covers skin contact area up to [ConsOC5]: 210cm2. Covers outdoor use [ConsOC12]. Covers exposure up to [ConsOC14]: 0.1 hours/event.
Fuels [PC13] --Liquid Scooter Refuelling [PC13_2].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 51 day/year. For each use event, covers use amounts up to [ConsOC2]: 3750g. Covers skin contact area up to [ConsOC5]: 210cm2. Covers outdoor use [ConsOC12]. Covers exposure up to [ConsOC14]: 0 hours/event.
Fuels [PC13] --Liquid Garden Equipment - Use [PC13_3].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 25 day/year. For each use event, covers use amounts up to [ConsOC2]: 750g. Covers outdoor use [ConsOC12]. Covers exposure up to [ConsOC14]: 2 hours/event.
Fuels [PC13] --Liquid: Garden Equipment - Refuelling [PC13_4].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 25 day/year. For each use event, covers use amounts up to [ConsOC2]: 750g. Covers skin contact area up to [ConsOC5]: 420cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0 hours/event.
Fuels [PC13] --Liquid: Home space heater fuel [PC13_6].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC4]: 1 times/day. For each use event, covers use amounts up to [ConsOC2]: 3000g. Covers skin contact area up to [ConsOC5]: 210cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0 hours/event.
Fuels [PC13] --Liquid: Lamp oil [PC13_5].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 51 day/year. For each use event, covers use amounts up to [ConsOC2]: 100g. Covers skin contact area up to [ConsOC5]: 210cm2. Covers use in room size of [ConsOC11]: 20m3. Covers use under typical household ventilation [ConsOC8]. Covers exposure up to [ConsOC14]: 0 hours/event.
Section 2.2:		**Control of environmental exposure:**
Product Characteristics:		Substance is complex UVCB [PrC3]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used		See contributing scenarios above.
Frequency and duration of use:		See contributing scenarios above.
Environmental factors not influenced by risk management:		Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.		See contributing scenarios above.
Conditions and measures related to municipal sewage treatment plant.		Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]. 2000
Conditions and measures related to external treatment of waste for disposal.		Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2].
Conditions and measures related to external recovery of waste.		none. This substance is consumed during use and no waste of the substance is generated [ERW3].
Section 3:		**Exposure estimation:**
Health: Inhalation (vapour).		Maximum exposure resulting from contributing scenarios described:
		Fuels [PC13] Liquid: Automotive Refuelling [PC13_1]. Chronic inhalation exposure based on a yearly average: 0.22mg/m3. Risk characterisation ratio: 0.000362. Acute inhalation exposure based on a single 24hr day: 1.53mg/m3. Risk characterisation ratio: 0.00253.
		Fuels [PC13] Liquid Scooter Refuelling [PC13_2]. Chronic inhalation exposure based on a yearly average: 0.146mg/m3. Risk characterisation ratio: 0.00024. Acute inhalation exposure based on a single 24hr day: 1.02mg/m3. Risk characterisation ratio: 0.00167.
		Fuels [PC13] Liquid Garden Equipment - Use [PC13_3]. Chronic inhalation exposure based on a yearly average: 0.509mg/m3. Risk characterisation ratio: 0.000838. Acute inhalation exposure based on a single 24hr day: 7.27mg/m3. Risk characterisation ratio: 0.0119.
		Fuels [PC13] Liquid: Garden Equipment - Refuelling [PC13_4]. Chronic inhalation exposure based on a yearly average: 0.0566mg/m3. Risk characterisation ratio: 0.0000931. Acute inhalation exposure based on a single 24hr day: 0.808mg/m3. Risk characterisation ratio: 0.00133.
		Fuels [PC13] Liquid: Home space heater fuel [PC13_6]. Chronic inhalation exposure based on a yearly average: 0.232mg/m3. Risk characterisation ratio: 0.000382. Acute inhalation exposure based on a single 24hr day: 0.232mg/m3. Risk characterisation ratio: 0.000382.
		Fuels [PC13] Liquid: Lamp oil [PC13_5]. Chronic inhalation exposure based on a yearly average: 0.0192mg/m3. Risk characterisation ratio: 0.0000317. Acute inhalation exposure based on a single 24hr day: 0.134mg/m3. Risk characterisation ratio: 0.000221.
Health: Dermal:		Maximum exposure resulting from contributing scenarios described:
		Fuels [PC13] Liquid: Automotive Refuelling [PC13_1]. Chronic systemic dermal exposure: 25.3mg/kg/day. Risk characterisation ratio: 0.0363.

	Fuels [PC13] Liquid Scooter Refuelling [PC13_2]. Chronic systemic dermal exposure: 25.3mg/kg/day. Risk characterisation ratio: 0.0363.
	Fuels [PC13] Liquid Garden Equipment - Use [PC13_3]. Chronic systemic dermal exposure: 0mg/kg/day.
	Fuels [PC13] Liquid: Garden Equipment - Refuelling [PC13_4]. Chronic systemic dermal exposure: 50.7mg/kg/day. Risk characterisation ratio: 0.0726.
	Fuels [PC13] Liquid: Home space heater fuel [PC13_6]. Chronic systemic dermal exposure: 25.3mg/kg/day. Risk characterisation ratio: 0.0363.
	Fuels [PC13] Liquid: Lamp oil [PC13_5]. Chronic systemic dermal exposure: 25.3mg/kg/day. Risk characterisation ratio: 0.0363.
Health: Oral:	Maximum exposure resulting from contributing scenarios described:
	Fuels [PC13] Liquid: Automotive Refuelling [PC13_1]. Not applicable.
	Fuels [PC13] Liquid Scooter Refuelling [PC13_2]. Not applicable.
	Fuels [PC13] Liquid Garden Equipment - Use [PC13_3]. Not applicable.
	Fuels [PC13] Liquid: Garden Equipment - Refuelling [PC13_4]. Not applicable.
	Fuels [PC13] Liquid: Home space heater fuel [PC13_6]. Not applicable.
	Fuels [PC13] Liquid: Lamp oil [PC13_5]. Not applicable.
Environment:	Maximum exposure resulting from contributing scenarios described:
	ES17-ES1: PEC for microorganisms in STP: 0.0000066mg/l. Risk characterisation ratio: 1.12E-05. Local PEC in surface water: 0.0000062mg/l. Risk characterisation ratio: 1.62E-04. Local PEC in fresh water sediment: 0.00011mg/kgdw. Risk characterisation ratio: 7.64E-05. Local PEC in sea water during emission episode: 0.000000066mg/l. Risk characterisation ratio: 1.73E-06. Local PEC in marine sediment: 0.0000028mg/kgdw. Risk characterisation ratio: 1.94E-06. Local PEC in soil: 0.000012mg/kgdw. Risk characterisation ratio: 2.61E-05. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
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 [G43]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23]. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37].
Environment	
	Not applicable for wide dispersive uses [DSU5].

Exposure scenario 18. Functional Fluids. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Functional Fluids. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3).
Process Category(ies):	PROC1, PROC2, PROC4, PROC8a, PROC8b, PROC9
Environmental Release Category(ies):	ERC7; ESVOC SpERC 31.
Processes, tasks, activities covered:	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers [GES13_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES18-ES1: Bulk transfers [CS14]. (closed systems) [CS107].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES18-ES2: Bulk transfers [CS14]. (closed systems) [CS107]. with sample collection [CS56].	{Transfer via enclosed lines [E52]. } {Clear transfer lines prior to de-coupling [E39]. }
ES18-ES3: Drum/batch transfers [CS8].	{Use drum pumps [E53]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES18-ES4: Filling of articles/equipment [CS84]. (closed systems) [CS107].	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES18-ES5: Filling / preparation of equipment from drums or containers. [CS45].	{Use drum pumps or carefully pour from container [E64]. } {Ensure operatives are trained to minimise exposures [EI19]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES18-ES6: General exposures (closed systems) [CS15]. operation of closed equipment containing functional fluids.	{Provide extract ventilation to points where emissions occur [E54]. }
ES18-ES7: General exposures (open systems) [CS16]. Functional Fluids.	{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 [E1]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES18-ES8: Remanufacture of reject articles [CS19].	{Allow time for product to drain from workpiece [EI21]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES18-ES9: Equipment cleaning and maintenance [CS39].	{Drain down and flush system prior to equipment break-in or maintenance [E55]. } {Provide extract ventilation to points where emissions occur [E54]. } {Use suitable eye protection and gloves [PPE14]. }
ES18-ES10: Storage [CS67].	Store substance within a closed system [E84].
ES18-ES11: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }

Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	2. (100 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 20 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES18-ES1: ERC7 ESVOC SpERC 31. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.01. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.000003. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. No air emission controls required; required removal efficiency is 0% [TCR5].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES18-ES1: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES18-ES2: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES18-ES3: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES18-ES4: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES18-ES5: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES18-ES6: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES18-ES7: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES18-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES18-ES9: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES18-ES10: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES18-ES11: 10ppm. Risk characterisation ratio: 0.023.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES18-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES18-ES2: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES18-ES3: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES18-ES4: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES18-ES5: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES18-ES6: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES18-ES7: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES18-ES8: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES18-ES9: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES18-ES10: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES18-ES11: 1.37mg/kg/day. Risk characterisation ratio: 0.002.

	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES18-ES1: PEC for microorganisms in STP: 0.000055mg/l. Risk characterisation ratio: 9.31E-05. Local PEC in surface water: 0.0000061mg/l. Risk characterisation ratio: 1.60E-04. Local PEC in fresh water sediment: 0.00011mg/kgdw. Risk characterisation ratio: 7.64E-05. Local PEC in sea water during emission episode: 0.000000055mg/l. Risk characterisation ratio: 1.44E-06. Local PEC in marine sediment: 0.0000024mg/kgdw. Risk characterisation ratio: 1.67E-06. Local PEC in soil: 0.0000014mg/kgdw. Risk characterisation ratio: 3.04E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 630000kg/day. 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 [DSU1].
	$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.

Exposure scenario 19. Functional Fluids. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Functional Fluids. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC20
Environmental Release Category(ies):	ERC9a; ERC9b; ESVOC SpERC 32.
Processes, tasks, activities covered:	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers [GES13_P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES19-ES1: Drum/batch transfers [CS8].	{Use drum pumps [E53]. } {Provide extract ventilation to points where emissions occur [E54]. }
ES19-ES2: Transfer from/pouring from containers [CS22].	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES3: Filling / preparation of equipment from drums or containers. [CS45].	Provide extract ventilation to points where emissions occur [E54]. {Use drum pumps [E53]. }
ES19-ES4: General exposures (closed systems) [CS15]. Functional Fluids. PROC 1.	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES5: General exposures (closed systems) [CS15]. Functional Fluids. PROC 2.	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES6: General exposures (closed systems) [CS15]. Functional Fluids. PROC 3.	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES7: General exposures (closed systems) [CS15]. operation of closed equipment containing functional fluids.	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES8: General exposures (closed systems) [CS15]. operation of closed equipment containing functional fluids. elevated temperature [CS111].	{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. }
ES19-ES9: Remanufacture of reject articles [CS19].	Provide extract ventilation to points where emissions occur [E54]. {Allow time for product to drain from workpiece [EI21]. }

ES19-ES10: Equipment cleaning and maintenance [CS39].	Avoid carrying out operation for more than 4 hours [OC12]. {Drain down and flush system prior to equipment break-in or maintenance [E55]. } {Use suitable eye protection and gloves [PPE14]. }
ES19-ES11: Storage [CS67].	Store substance within a closed system [E84].
ES19-ES12: Storage [CS67]. with sample collection [CS56].	Store substance within a closed system [E84]. {Ensure dedicated sample points are provided [E10]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.00075. (0.002 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES19-ES1: ERC9a ESVOC SpERC 32. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.05. Release fraction to wastewater from wide dispersive use [OOC8]: 0.025. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.025.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES19-ES1: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES19-ES2: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES19-ES3: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES19-ES4: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES19-ES5: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES19-ES6: 25ppm. Risk characterisation ratio: 0.058.
	exposure resulting from contributing scenario: ES19-ES7: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES19-ES8: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES19-ES9: 20ppm. Risk characterisation ratio: 0.047.
	exposure resulting from contributing scenario: ES19-ES10: 60ppm. Risk characterisation ratio: 0.14.
	exposure resulting from contributing scenario: ES19-ES11: 0.01ppm. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES19-ES12: 20ppm. Risk characterisation ratio: 0.047.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES19-ES1: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES19-ES2: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES19-ES3: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES19-ES4: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES19-ES5: 1.37mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES19-ES6: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES19-ES7: 1.71mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES19-ES8: 1.71mg/kg/day. Risk characterisation ratio: 0.002.
	exposure resulting from contributing scenario: ES19-ES9: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES19-ES10: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES19-ES11: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES19-ES12: 1.37mg/kg/day. Risk characterisation ratio: 0.002.

	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES19-ES1: PEC for microorganisms in STP: 0.00000095mg/l. Risk characterisation ratio: 1.61E-06. Local PEC in surface water: 0.0000057mg/l. Risk characterisation ratio: 1.49E-04. Local PEC in fresh water sediment: 0.000085mg/kgdw. Risk characterisation ratio: 5.90E-05. Local PEC in sea water during emission episode: 0.000000028mg/l. Risk characterisation ratio: 7.33E-07. Local PEC in marine sediment: 0.00000041mg/kgdw. Risk characterisation ratio: 2.85E-07. Local PEC in soil: 0.0000018mg/kgdw. Risk characterisation ratio: 3.91E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). To scale from an exposure of 1-4 hours to one >4 hours, multiply by 1.7.
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 14kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 20. Functional Fluids. - Consumer.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1		**Exposure scenario**
Title.		**Functional Fluids. 2,2,4-trimethylpentane. CAS: 540-84-1**
Sector(s) of Use:		Consumer (SU21).
Use Descriptor.		PC16, PC17
Processes, tasks, activities covered:		Use of sealed items containing functional fluids e.g. transfer oils, hydraulic fluids, refrigerants [GES13_C].
Environmental Release Category(ies):		ERC9a, ERC9b
Assessment method:		Health: : Used ECETOC TRA model with modifications as recommended by ESIG. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:		**Operational conditions and risk management measures.**
Section 2.1		**Control of consumer exposure.**
Product Characteristics:		
Physical form of product:		Liquid, vapour pressure >10Pa (High volatility).
Vapour pressure:		2800Pa.
Concentration of substance in product:		See specific operational conditions below [ConsOC16].
Amounts used:		See specific operational conditions below [ConsOC16].
Frequency and duration of use:		See specific operational conditions below [ConsOC16].
Human factors not influenced by risk management:		See specific operational conditions below [ConsOC16].
Other operational conditions affecting consumer exposure.		Assumes activities are at ambient temperature (unless stated differently) [G17]. Unless otherwise indicated, assumes use with typical ventilation. Avoid contact with skin
Contributing Scenarios:		**Product categories:**
Heat transfer fluids [PC16] --Liquids [PC16_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2200g. Covers skin contact area up to [ConsOC5]: 468cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.2 hours/event.
Hydraulic fluids [PC17] --Liquids [PC17_1].	OC	Unless otherwise stated, Covers concentrations up to [ConsOC1]: 100%. Covers use up to [ConsOC3]: 4 day/year. For each use event, covers use amounts up to [ConsOC2]: 2200g. Covers skin contact area up to [ConsOC5]: 468cm2. Covers use in a one car garage (34 m3) under typical ventilation [ConsOC10]: Covers exposure up to [ConsOC14]: 0.2 hours/event.
Section 2.2:		**Control of environmental exposure:**
Product Characteristics:		Substance is complex UVCB [PrC3]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used		See contributing scenarios above.
Frequency and duration of use:		See contributing scenarios above.
Environmental factors not influenced by risk management:		Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.		See contributing scenarios above.
Conditions and measures related to municipal sewage treatment plant.		Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 96.3. Assumed domestic sewage treatment plant flow (m3/d) [STP5]. 2000
Conditions and measures related to external treatment of waste for disposal.		Dispose of empty containers and wastes safely [C&H8]. External treatment and disposal of waste should comply with applicable local and/or national regulations [ETW3].
Conditions and measures related to external recovery of waste.		none. External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Section 3:		**Exposure estimation:**
Health: Inhalation (vapour).		Maximum exposure resulting from contributing scenarios described:
		Heat transfer fluids [PC16] Liquids [PC16_1]. Chronic inhalation exposure based on a yearly average: 0.0443mg/m3. Risk characterisation ratio: 0.0000729. Acute inhalation exposure based on a single 24hr day: 4.04mg/m3. Risk characterisation ratio: 0.00665.
		Hydraulic fluids [PC17] Liquids [PC17_1]. Chronic inhalation exposure based on a yearly average: 0.0443mg/m3. Risk characterisation ratio: 0.0000729. Acute inhalation exposure based on a single 24hr day: 4.04mg/m3. Risk characterisation ratio: 0.00665.
Health: Dermal:		Maximum exposure resulting from contributing scenarios described:
		Heat transfer fluids [PC16] Liquids [PC16_1]. Chronic systemic dermal exposure: 56.5mg/kg/day. Risk characterisation ratio: 0.0809.
		Hydraulic fluids [PC17] Liquids [PC17_1]. Chronic systemic dermal exposure: 56.5mg/kg/day. Risk characterisation ratio: 0.0809.
Health: Oral:		Maximum exposure resulting from contributing scenarios described:
		Heat transfer fluids [PC16] Liquids [PC16_1]. Not applicable.
		Hydraulic fluids [PC17] Liquids [PC17_1]. Not applicable.
Environment:		Maximum exposure resulting from contributing scenarios described:
		ES20-ES1: PEC for microorganisms in STP: 0.00000095mg/l. Risk characterisation ratio: 1.61E-06. Local PEC in surface water: 0.0000057mg/l. Risk characterisation ratio: 1.49E-04. Local PEC in fresh water sediment: 0.000086mg/kgdw. Risk characterisation ratio: 5.97E-05. Local PEC in sea water during emission episode: 0.000000028mg/l. Risk characterisation ratio: 7.33E-07. Local PEC in marine sediment: 0.00000041mg/kgdw. Risk characterisation ratio: 2.85E-07. Local PEC in soil: 0.0000018mg/kgdw. Risk characterisation ratio: 3.91E-06. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:		**Guidance to check compliance with the exposure scenario:**
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 [G43]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23]. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37].
Environment		
		Not applicable for wide dispersive uses [DSU5].

Exposure scenario 21. Road and construction applications. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Road and construction applications. Isooctane. 2,2,4-trimethylpentane.** **CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13
Environmental Release Category(ies):	ERC8d; ERC8f; ESVOC SpERC 36.
Processes, tasks, activities covered:	Application of surface coatings and binders in road and construction activities, including paving uses, manual mastic and in the application of roofing and water-proofing membranes [GES15-P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES21-ES1: Drum/batch transfers [CS8]. Non-dedicated facility [CS82].	{Use suitable eye protection and gloves [PPE14]. }
ES21-ES2: Drum/batch transfers [CS8]. Dedicated facility [CS81].	Use dedicated equipment [E85]. Clear transfer lines prior to de-coupling [E39].
ES21-ES3: Drum/batch transfers [CS8]. Dedicated facility [CS81]. elevated temperature [CS111].	Use dedicated equipment [E85]. Clear transfer lines prior to de-coupling [E39].
ES21-ES4: Rolling, Brushing [CS51]. Functional Fluids.	{Ensure operation is undertaken outdoors [E69]. }
ES21-ES5: Spraying/fogging by machine application [CS25]. Application of bitumen. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. Automate activity where possible [AP16]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Change filter cartridge on respirator daily [PPE25]. Ensure operatives are trained to minimise exposures [EI19]. Stay upwind/keep distance from source [EI22]. {Ensure operation is undertaken outdoors [E69]. }
ES21-ES6: Spraying/fogging by machine application [CS25]. Application of bitumen. Outdoor [OC9].	Ensure operation is undertaken outdoors [E69]. {Enclose machinery. } {Operate activity away from sources of substance emission or release [E77]. } {Use suitable eye protection and gloves [PPE14]. }
ES21-ES7: Dipping, immersion and pouring [CS4].	{Ensure operation is undertaken outdoors [E69]. }
ES21-ES8: Equipment cleaning and maintenance [CS39].	Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. {Use suitable eye protection and gloves [PPE14]. }
ES21-ES9: Drum and small package filling [CS6].	{Ensure operation is undertaken outdoors [E69]. }
Section 2.2:	**Control of environmental exposure:**

Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.0015. (0.0041 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES21-ES1: ERC8d ESVOC SpERC 36. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.95. Release fraction to wastewater from wide dispersive use [OOC8]: 0.01. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.04.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1].
	No wastewater treatment required [TCR6].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES21-ES1: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES21-ES2: 50ppm. Risk characterisation ratio: 0.117.
	exposure resulting from contributing scenario: ES21-ES3: 250ppm. Risk characterisation ratio: 0.584.
	exposure resulting from contributing scenario: ES21-ES4: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES21-ES5: 70ppm. Risk characterisation ratio: 0.164.
	exposure resulting from contributing scenario: ES21-ES6: 350ppm. Risk characterisation ratio: 0.818.
	exposure resulting from contributing scenario: ES21-ES7: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES21-ES8: 100ppm. Risk characterisation ratio: 0.234.
	exposure resulting from contributing scenario: ES21-ES9: 100ppm. Risk characterisation ratio: 0.234.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES21-ES1: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES21-ES2: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES21-ES3: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	exposure resulting from contributing scenario: ES21-ES4: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	exposure resulting from contributing scenario: ES21-ES5: 107.14mg/kg/day. Risk characterisation ratio: 0.139.
	exposure resulting from contributing scenario: ES21-ES6: 107.14mg/kg/day. Risk characterisation ratio: 0.139.
	exposure resulting from contributing scenario: ES21-ES7: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES21-ES8: 13.71mg/kg/day. Risk characterisation ratio: 0.018.
	exposure resulting from contributing scenario: ES21-ES9: 6.86mg/kg/day. Risk characterisation ratio: 0.009.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES21-ES1: PEC for microorganisms in STP: 0.00000076mg/l. Risk characterisation ratio: 1.29E-06. Local PEC in surface water: 0.0000057mg/l. Risk characterisation ratio: 1.49E-04. Local PEC in fresh water sediment: 0.000085mg/kgdw. Risk characterisation ratio: 5.90E-05. Local PEC in sea water during emission episode: 0.000000026mg/l. Risk characterisation ratio: 6.81E-07. Local PEC in marine sediment: 0.00000033mg/kgdw. Risk characterisation ratio: 2.29E-07. Local PEC in soil: 0.0000014mg/kgdw. Risk characterisation ratio: 3.04E-06. Risk from environmental exposure is driven by freshwater [TCR1a].

Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 28kg/day. Not applicable for wide dispersive uses [DSU5].

Exposure scenario 23. Use in laboratories. - Industrial.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use in laboratories. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Industrial (SU3).
Process Category(ies):	PROC10, PROC15
Environmental Release Category(ies):	ERC2; ERC4; ESVOC SpERC 38.
Processes, tasks, activities covered:	Use of the substance within laboratory settings, including material transfers and equipment cleaning [GES17_I].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES23-ES1: Laboratory activities [CS36].	{Handle in a fume cupboard or under extract ventilation [E83]. , or, 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 [E1]. } {Use suitable eye protection and gloves [PPE14]. }
ES23-ES2: Cleaning [CS47]. Wiping [CS50]. Rolling, Brushing [CS51].	{Handle in a fume cupboard or under extract ventilation [E83]. , or, 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 [E1]. } {Use suitable eye protection and gloves [PPE14]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	2. (100 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 20 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES23-ES1: ERC2 ESVOC SpERC 38. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.025. Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.02. Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.001.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. No air emission controls required; required removal efficiency is 0% [TCR5].

	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%) [TCR8]: 66.5.If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].
Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. Do not apply industrial sludge to natural soils [OMS2] Sludge should be incinerated, contained or reclaimed [OMS3]
Conditions and measures related to municipal sewage treatment plant.	Not applicable as there is no release to wastewater [STP1]. Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES23-ES1: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES23-ES2: 50ppm. Risk characterisation ratio: 0.117.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES23-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES23-ES2: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES23-ES1: PEC for microorganisms in STP: 0.037mg/l. Risk characterisation ratio: 6.26E-02. Local PEC in surface water: 0.0037mg/l. Risk characterisation ratio: 9.69E-02. Local PEC in fresh water sediment: 0.16mg/kgdw. Risk characterisation ratio: 1.11E-01. Local PEC in sea water during emission episode: 0.00037mg/l. Risk characterisation ratio: 9.69E-03. Local PEC in marine sediment: 0.016mg/kgdw. Risk characterisation ratio: 1.11E-02. Local PEC in soil: 0.000002mg/kgdw. Risk characterisation ratio: 4.35E-06. Risk from environmental exposure is driven by freshwater sediment [TCR1b].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 900kg/day. 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 [DSU1].
	$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$ where: mspERC: Susbstance use rate in spERC. EER,spERC: Efficacy of RMM in spERC. Frelease,,spERC: Initial release fraction in spERC. DFspERC: dilution factor of STP effluent in river. msite: Susbstance use rate at site. EER,site: Efficacy of RMM at site. Frelease,,site: Initial release fraction at site. DFsite: dilution factor of STP effluent in river.

Exposure scenario 24. Use in laboratories. - Professional.

Based on ECHA Template CSA&IR Part D June 08 combined with the GES Narrative Format.

Section 1	**Title.**
Title.	**Use in laboratories. Isooctane. 2,2,4-trimethylpentane. CAS:540-84-1.**
Sector(s) of Use:	Professional (SU22).
Process Category(ies):	PROC10, PROC15
Environmental Release Category(ies):	ERC8a; ESVOC SpERC 39.
Processes, tasks, activities covered:	Use of small quantities within laboratory settings, including material transfers and equipment cleaning [GES17-P].
Assessment method:	Health: Used ECETOC TRA model [EE1]. Environment: The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].
Section 2:	**Operational conditions and risk management measures.**
Section 2.1	**Control of worker exposure.**
Product Characteristics:	
Physical form of product:	Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4].
Concentration of substance in product:	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used:	Not applicable.
Frequency and duration of use:	Covers daily exposures up to 8 hours (unless stated differently) [G2]. Continuous process [CS54].
Human factors not influenced by risk management:	none.
Other operational conditions affecting worker exposure:	Assumes a good basic standard of occupational hygiene is implemented [G1]. Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].
Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:	none.
Contributing Scenarios:	**Risk Management Measures: Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organisational measures , 4. Personal protection. Phrases between brackets are good practice advice only, beyond REACH Chemical Safety Assessment and may be communicated in Section 5 of the ES or within the main sections of the SDS.**
Risk management measures common to all contributing scenarios.	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3]. Do not ingest. If swallowed then seek immediate medical assistance. [E14]. Avoid splashing [C&H15]. Avoid contact with contaminated tools and objects. Avoid contact with skin. Clean equipment and the work area every day [C&H3]. Clear up spills immediately and dispose of waste safely [EI9]. Management controls should be in place to ensure that risk management measures in place are being used correctly and that operational conditions are followed.
ES24-ES1: Laboratory activities [CS36].	{Handle in a fume cupboard or under extract ventilation [E83]. , or, 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 [E1]. } {Use suitable eye protection and gloves [PPE14]. }
ES24-ES2: Cleaning [CS47]. Wiping [CS50]. Rolling, Brushing [CS51].	{Handle in a fume cupboard or under extract ventilation [E83]. , or, 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 [E1]. } {Use suitable eye protection and gloves [PPE14]. }
Section 2.2:	**Control of environmental exposure:**
Product Characteristics:	Substance is complex UVCB [PrC3]. Predominantly hydrophobic [PrC4a]. Liquid, vapour pressure 0.5 - 10 kPa at STP [OC4]. Slightly soluble in water (0.1-100mg/l). Very toxic to aquatic species. Inherently biodegradable, fulfilling criteria [PrC5d]. Some bioaccumulation potential.
Amounts used per site (tonne per year).	0.001. (0.0027 kg/day.)
Frequency and duration of use:	Continuous process [CS54]. 365 days per year of operation.
Environmental factors not influenced by risk management:	Local freshwater dilution factor [EF1]: 10. Local marine water dilution factor [EF2]: 100.
Other operational conditions of use affecting environmental exposure.	No specific measures required.
	Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES24-ES1: ERC8a ESVOC SpERC 39. Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.5. Release fraction to wastewater from wide dispersive use [OOC8]: 0.5. Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.
Technical onsite conditions and measures to reduce or limit discharges, air emissions.	Common practices vary across sites thus conservative process release estimates used [TCS1]. No air emission controls required; required removal efficiency is 0% [TCR5].
	none.

Organisation measures to prevent/limit release from site.	Bund storage facilities to prevent soil and water pollution in the event of spillage [S5]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].
Conditions and measures related to municipal sewage treatment plant.	Assumed domestic sewage treatment plant flow (m3/d) [STP5]: 2000. Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 96.3.
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 [ETW3].
Conditions and measures related to external recovery of waste.	External recovery and recycling of waste should comply with applicable local and/or national regulations [ERW1].
Other environmental control measures additional to above:	none.
Section 3:	**Exposure estimation:**
Health: Inhalation (vapour).	exposure resulting from contributing scenario: ES24-ES1: 10ppm. Risk characterisation ratio: 0.023.
	exposure resulting from contributing scenario: ES24-ES2: 100ppm. Risk characterisation ratio: 0.234.
	Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Health: Dermal:	exposure resulting from contributing scenario: ES24-ES1: 0.34mg/kg/day. Risk characterisation ratio: <0.001.
	exposure resulting from contributing scenario: ES24-ES2: 27.43mg/kg/day. Risk characterisation ratio: 0.035.
	Available hazard data do not enable the derivation of a DNEL for dermal irritant effects [G32]. Risk Management Measures are based on qualitative risk characterisation [G37]. Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented [G22]. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels [G23].
Environment:	Maximum exposure resulting from contributing scenarios described.
	ES24-ES1: PEC for microorganisms in STP: 0.000025mg/l. Risk characterisation ratio: 4.23E-05. Local PEC in surface water: 0.0000081mg/l. Risk characterisation ratio: 2.12E-04. Local PEC in fresh water sediment: 0.00011mg/kgdw. Risk characterisation ratio: 7.64E-05. Local PEC in sea water during emission episode: 0.00000025mg/l. Risk characterisation ratio: 6.54E-06. Local PEC in marine sediment: 0.000011mg/kgdw. Risk characterisation ratio: 7.64E-06. Local PEC in soil: 0.000047mg/kgdw. Risk characterisation ratio: 1.02E-04. Risk from environmental exposure is driven by freshwater [TCR1a].
Section 4:	**Guidance to check compliance with the exposure scenario:**
Health:	Inhalation (vapour). No corrections required as all exposures are assumed to be for 8 hours (worse case assessment).
	Dermal: No corrections required as all exposures are assumed to be substance concentrations of up to 100%.
Environment:	Msafe: 13kg/day. Not applicable for wide dispersive uses [DSU5].