

# TERT-BUTYL METHYL ETHER

VERSION: 3.0

DATE CREATED: 18/04/2018

LANGUAGE: ENGLISH



## SIBUR-KHIMPROM JSC

### SAFETY DATA SHEET

According to Regulations (EC) 1907/2006 (REACH), (EC) 1272/2008 (CLP) & (EU) 2015/830

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Version: 3.0

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### SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

#### 1.1. Product identifier

|                        |  |
|------------------------|--|
| Product form:          | Substance  |
| Substance name:        | Tert-butyl methyl ether  |
| Chemical name:         | Tert-butyl methyl ether  |
| EC index No.:          | 603-181-00-X   |
| EC No.:                | 216-653-1  |
| CAS-No.:               | 1634-04-4  |
| REACH registration No: | 01-2119452786-27-0020  |
| Formula:               | C <sub>5</sub> H <sub>12</sub> O   |
| Synonyms:              | MTBE; methyl tertiary butyl ether; methyl t-butyl ether; 2-methoxy-2-methylpropane; propane, 2-methoxy-2-methyl- |
| Trade names:           | MTBE   |

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

##### 1.2.1. Relevant identified uses

|  |   |
|--|---|
| Use of the substance/mixture:                | Formulation<br>Use as intermediate<br>Use as process solvent and extraction agent<br>Industrial distribution of MTBE and gasoline containing MTBE<br>Fuel use<br>For the detailed identified uses of the product see Annex. |
| Most common technical function of substance: | Fuels and fuel additives.<br>MTBE acts as an octane enhancer.   |

##### 1.2.2. Uses advised against

|                      |   |
|----------------------|---|
| Restrictions on use: | Uses other than those given in section 1.2.1 are not recommended unless an assessment is completed, prior to commencement of that use, which demonstrates that the use will be controlled |
|----------------------|---|

#### 1.3. Details of the supplier of the safety data sheet

##### Only representative

|                    |  |
|--------------------|--|
| Company name:      | Gazprom Marketing and Trading France               |
| Address:           | 68 avenue des Champs-Élysées, 75008, Paris, France |
| Contact Telephone: | +33 1 42 99 73 50                                  |
| Fax:               | +33 1 42 99 73 99                                  |
| Email Address:     | didier.lebout@gazprom-mt.com                       |

##### Manufacturer

|               |  |
|---------------|--|
| Company name: | Sibur-Khimprom JSC   |
| Address:      | 98, Promishlennaya str., Perm, Perm region, 614055, Russian Federation |

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Contact phone: +7 3422 90-89-01 (Moscow, 7.00 to 15.00) - Chief Engineer

Fax: +7 3422 90-86-60

Email Address: mail-shp@sibur.ru

Emergency Telephone: +7 3422 90-87-05 (round the clock)

**Importer:** List of importers is available with the Only Representative

## 1.4. Emergency telephone number

**Emergency phone in the country of delivery** **112** (Please note that emergency numbers may vary depending upon the country of delivery though 112 remains valid as universal number)

## SECTION 2. HAZARDS IDENTIFICATION

### 2.1. Classification of the substance or mixture

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

Flam. Liq. 2 H225

Skin Irrit. 2 H315

Full text of hazard classes and H-statements : see section 16

### 2.2. Label elements

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

Hazard pictograms  
(CLP):



GHS02



GHS07

Signal word (CLP): Danger

Hazard statements H225: Highly flammable liquid.

(CLP): H315: Causes skin irritation.

Precautionary statements P210: Keep away from heat, hot surfaces, sparks, open flames and other  
(CLP): ignition sources. No smoking.

P243: Take actions to prevent static discharges.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P403+P235: Store in a well-ventilated place. Keep cool.

P302+P352: IF ON SKIN: Wash with plenty of water/...

EUH-statements: Not applicable

### 2.3. Other hazards

Other hazards not contributing to the classification: May cause lung damage if swallowed (Aspiration).

Assessment PBT / vPvB: According to Annex XIII of Regulation (EC) No.1907/2006 (REACH):  
- not fulfilling PBT (persistent/bioaccumulative/toxic) criteria;  
- not fulfilling vPvB (very persistent/very bioaccumulative) criteria.

Remark: Refer to Section 15 for classification and labelling according to UN-GHS.

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## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substances

| Name                    | Product identifier   | %             | Classification [CLP]   |
|-------------------------|--|---------------|--|
| Methyl tert-butyl ether | (CAS-No.) 1634-04-4<br>(EC No.) 216-653-1<br>(EC index No.) 603-181-00-X<br>(REACH-no) 01-2119452786-27-0020 | 97.0-<br>99.8 | H225; H315   |
| Methanol<br>(impurity)  | (CAS-No.) 67-56-1<br>(EC No.) 200-659-6<br>(EC index No.) 603-001-00-X                                       | 0.1-<br>1.0   | H225;H301; H311; H331;<br>H370<br><br>Specific Concentration limits:<br>STOT SE 1; H370: $C \geq 10\%$<br>STOT SE 2; H371: $3\% \leq C < 10\%$ |

The product does not contain impurities or additives that could affect product's labelling and classification according to Regulation (EC) No 67/548/EEC and Regulation (EC) No 1272/2008 (CLP).

### 3.2. Mixtures

Not applicable

## SECTION 4. FIRST-AID MEASURES

### 4.1. Description of first aid measures

#### Product-specific hazards and other issues

Low acute toxicity.

May be moderately irritating to skin and slightly irritating to eyes and respiratory system.

Harmful: may cause lung damage if swallowed (Aspiration).

At high doses, effects on the CNS are possible.

#### First-aid measures general

Always observe self protection methods.

Move out of dangerous area.

Remove contaminated shoes and clothing.

Consult a physician.

Show this material safety data sheet to the doctor in attendance.

#### First-aid measures after inhalation

Remove to fresh air and keep at rest in a position comfortable for breathing.

Do not leave the victim unattended.

Keep patient warm and at rest.

Immediately seek medical attention.

If breathing is difficult, give oxygen.

If unconscious place in recovery position and seek medical advice.

In the event of unconsciousness, apnea or cardiac arrest (no Pulse) apply cardiopulmonary resuscitation.

#### First-aid measures after skin contact

Immediately flush affected area with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoe.

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If irritation persists get medical advice/attention.

## First-aid measures after eye contact

Flush eyes with water thoroughly and continuously for 15 minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

If irritation persists get medical attention. The patient should be seen by an ophthalmologist.

## First-aid measures after ingestion

Clean mouth with water and drink afterwards plenty of water.

Do NOT induce vomiting.

Do not give milk or alcoholic beverages.

Never give anything by mouth to an unconscious person.

If vomiting does occur, have victim lean forward to reduce risk of aspiration.

Get medical attention immediately.

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

Symptoms/effects: Absorption by Inhalation or Ingestion of high doses may cause CNS symptoms like headache, dizziness, fatigue, muscular, weakness, drowsiness and lack of coordination.

Symptoms/effects after inhalation: Coughing, choking, wheezing, difficulty in - breathing, chest congestion, shortness of breath and/or fever. The onset of respiratory symptoms may be delayed.

Symptoms/effects after skin contact: Reddening, irritation.

Symptoms/effects after eye contact: Slight irritation.

Symptoms/effects after ingestion: Headache, dizziness, fatigue, muscular, weakness, drowsiness and lack of coordination

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

### Advice to physician

In case of ingestion the stomach should be emptied by gastric lavage under qualified medical supervision.

## SECTION 5. FIRE-FIGHTING MEASURES

### 5.1. Extinguishing media

Suitable extinguishing media SMALL FIRE: Use dry chemicals, CO<sub>2</sub>, water spray or alcohol-resistant foam.

LARGE FIRE: Use water spray, water fog or alcohol-resistant foam.

Unsuitable extinguishing media Do not use solid water stream.

### 5.2. Special hazards arising from the substance or mixture

Fire hazard: Releases flammable vapours below normal ambient temperatures. Flammable vapours may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapour source.

Explosion hazard: When mixed with air and exposed to ignition source, vapours can burn in open or explode if confined.

Hazardous decomposition products in case of fire: Carbon monoxide, carbon dioxide and other toxic vapours.

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### 5.3. Advice for firefighters

|                                 |  |
|---------------------------------|--|
| Firefighting instructions:      | Move containers from fire area if you can do it without risk.<br>Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.<br>Cool containers with flooding quantities of water until well after fire is out.<br>Do not use straight streams.<br>Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.<br>Always stay away from tanks engulfed in fire.<br>For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. |
| Protection during firefighting: | Wear positive pressure self-contained breathing apparatus (SCBA).<br>Structural firefighters protective clothing will only provide limited protection.   |
| Further information:            | Collect contaminated fire extinguishing water separately. This must not be discharged into drains.<br>Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.  |

## SECTION 6. ACCIDENTAL RELEASE MEASURE

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Emergency procedures      Ventilate area. Remove ignition sources. Evacuate unnecessary personnel to safe areas..

#### 6.1.2. For emergency responders

Emergency procedures      Use personal protective equipment.  
Ensure adequate ventilation.  
Beware of vapours accumulating to form explosive concentrations.  
Vapours can accumulate in low areas.

### 6.2. Environmental precautions

MTBE is highly volatile, partially water soluble and has only a minimal tendency to adhere to soil particles.

Even small volumes can pose a threat to the environment and nearby water resources.

Surface spills can reach groundwater through porous soil or cracked surfaces.

All efforts should be made to prevent any leaks or spills, and to protect water resources.

Where spills are possible, a comprehensive spill response plan should be developed and implemented.

If a leak or spill reaches the groundwater, the groundwater may become contaminated.

If the groundwater is a source of drinking water, the associated drinking water well(s) could become contaminated.

MTBE can impart an unpleasant taste and odour to water at very low concentrations.

### 6.3. Methods and material for containment and cleaning up

Extremely flammable liquid. Release can cause fire or explosion. Eliminate all sources of ignition.

All equipment used when handling this product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Prevent entry into waterways, sewers, basements or confined areas.

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A vapour suppressing foam may be used to reduce vapours.

Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Use clean non-sparking tools to collect absorbed material.

Water spray may reduce vapour; but may not prevent ignition in closed spaces.

Dike large spills and place materials in salvage containers.

## 6.4. Reference to other sections

SECTION 8: Exposure controls/personal protection. SECTION 13: Disposal considerations.

## SECTION 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling

Precautions for safe handling

Advice on protection against fire and explosion:

Keep container tightly closed when not in use. Extinguish all ignition sources. Wear recommended personal protective equipment. Ground /bond container and receiving equipment. All electrical equipment should be grounded and conform to applicable electric codes and regulatory requirements. Check atmosphere for explosiveness and oxygen deficiencies. Ensure adequate ventilation. Observe precautions pertaining to confined space entry. Use only non-sparking tools. Carefully vent any internal pressure before removing closure. Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair. Handle empty containers with care; vapour/residue may be flammable. Avoid contact with incompatible agents. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Hygiene measures

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use.

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Take off contaminated clothing and wash before reuse. Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### 7.2. Conditions for safe storage, including any incompatibilities

Incompatible materials

Strong oxidizing agents.

Storage area

Store only in tightly closed, properly vented containers away from heat, sparks, open flame and incompatible materials.

Store closed drums with bung in up position.

Vapour space above stored liquid may be flammable/explosive unless blanketed with inert gas.

Store in a well-ventilated place.

Electrical installations / working materials must comply with the technological safety standards.

No smoking.

Store in cool place.

Do not pressurize, cut, weld, braze solder, drill, or grind on containers.

Do not puncture or incinerate containers.

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Empty pressure vessels should be returned to the supplier.

Packaging materials

Carbon steel; avoid most plastics, Viton and Fluorel.

## 7.3. Specific end use(s)

Not applicable.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters

#### 8.1.1. Occupational Exposure Limits

##### *Tert-butyl methyl ether (CAS 1634-04-4)*

|                       | LTEL TWA<br>ppm | LTEL<br>TWA<br>mg/m <sup>3</sup> | STEL<br>ppm | STEL<br>mg/m <sup>3</sup> | Note  |
|-----------------------|-----------------|----------------------------------|-------------|---------------------------|---|
| <b>European Union</b> | 50              | 183.5                            | 100 (1)     | 367 (1)                   | Occupational<br>Exposure Limit<br>Values<br>(1) 15 minutes<br>average value |
| Austria               | 50              | 180                              | 100         | 360                       |   |
| Belgium               | 40              | 146                              | 100         | 367                       |   |
| Denmark               | 40              | 144                              | 80          | 288                       |   |
| France                | 50              | 183.5                            | 100         | 367                       |   |
| Germany (AGS)         | 50              | 180                              | 75 (1)      | 270 (1)                   | (1) 15 minutes<br>average value   |
| Germany (DFG)         | 50              | 180                              | 75          | 270                       | STV 15 minutes<br>average value   |
| Italy                 | 50              | 183.5                            | 100         | 367                       |   |
| Poland                |                 | 180                              |             | 270                       |   |
| Spain                 | 40              | 147                              |             |                           |   |
| Sweden                | 30              | 110                              | 100         | 367                       |   |
| Switzerland           | 50              | 180                              | 75          | 270                       |   |
| The Netherlands       |                 | 180                              |             | 360                       |   |
| United Kingdom        | 25              | 92                               | 75          | 275                       |   |

##### *Methanol (CAS 67-56-1)*

|                       | LTEL TWA<br>ppm | LTEL<br>TWA<br>mg/m <sup>3</sup> | STEL<br>ppm | STEL<br>mg/m <sup>3</sup> | Note |
|-----------------------|-----------------|----------------------------------|-------------|---------------------------|------|
| <b>European Union</b> | 200             | 260                              |             |                           |      |
| Austria               | 200             | 260                              | 800         | 1040                      |      |
| Belgium               | 200             | 266                              | 250         | 333                       |      |
| Denmark               | 200             | 260                              | 400         | 520                       |      |
| France                | 200             | 260                              | 1000        | 1300                      |      |
| Germany (AGS)         | 200             | 270                              | 800         | 1080                      |      |
| Germany (DFG)         | 200             | 270                              | 800         | 1080                      |      |
| Italy                 | 200             | 260                              |             |                           |      |
| Poland                |                 | 100                              |             | 300                       |      |
| Spain                 | 200             | 266                              | 250         | 333                       |      |
| Sweden                | 200             | 250                              | 250         | 350                       |      |



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|                 |     |     |     |      |  |
|-----------------|-----|-----|-----|------|--|
| Switzerland     | 200 | 260 | 800 | 1040 |  |
| The Netherlands |     | 133 |     |      |  |
| United Kingdom  | 200 | 266 | 250 | 333  |  |

**8.1.2. DNEL/ PNEC values***Tert-butyl methyl ether (CAS 1634-04-4)***DNEL/DMEL (Workers)**

|  |   |
|--|---|
| Acute - systemic effects, dermal         | No-threshold effect and/or no dose-response information available |
| Acute - systemic effects, inhalation     | No-threshold effect and/or no dose-response information available |
| Acute - local effects, dermal            | No-threshold effect and/or no dose-response information available |
| Acute - local effects, inhalation        | 357 mg/m <sup>3</sup>   |
| Long-term - systemic effects, dermal     | 5100 mg/kg bw/day   |
| Long-term - systemic effects, inhalation | 178.5 mg/m <sup>3</sup>   |
| Long-term - local effects, dermal        | No-threshold effect and/or no dose-response information available |
| Long-term - local effects, inhalation    | No-threshold effect and/or no dose-response information available |

**DNEL/DMEL (General population)**

|  |   |
|--|---|
| Acute - systemic effects, dermal         | No-threshold effect and/or no dose-response information available |
| Acute - systemic effects, inhalation     | No-threshold effect and/or no dose-response information available |
| Acute - systemic effects, oral           | No-threshold effect and/or no dose-response information available |
| Acute - local effects, dermal            | No-threshold effect and/or no dose-response information available |
| Acute - local effects, inhalation        | 214 mg/m <sup>3</sup>   |
| Long-term - systemic effects, dermal     | 3570 mg/kg bw/day   |
| Long-term - systemic effects, inhalation | 53.6 mg/m <sup>3</sup>  |
| Long-term - systemic effects, oral       | 7.1 mg/kg bw/day  |
| Long-term - local effects, dermal        | No-threshold effect and/or no dose-response information available |
| Long-term - local effects, inhalation    | No-threshold effect and/or no dose-response information available |

**PNEC (water)**

|                                      |           |
|--------------------------------------|-----------|
| PNEC aqua (freshwater)               | 5.1 mg/l  |
| PNEC aqua (marine water)             | 0.26 mg/l |
| PNEC aqua (intermittent, freshwater) | 47.2 mg/L |

**PNEC (Sediment)**

|                              |                        |
|------------------------------|------------------------|
| PNEC sediment (freshwater)   | 23 mg/kg sediment dw   |
| PNEC sediment (marine water) | 1.17 mg/kg sediment dw |

**PNEC (Soil)**

|           |                    |
|-----------|--------------------|
| PNEC soil | 1.56 mg/kg soil dw |
|-----------|--------------------|

**PNEC (Oral)**

|  |  |
|--|--|
|  |  |
|--|--|



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|                                 |                |
|---------------------------------|----------------|
| PNEC oral (secondary poisoning) | Not applicable |
| <b>PNEC (STP)</b>               |                |
| PNEC sewage treatment plant     | 71 mg/l        |

## 8.2. Exposure controls

### Appropriate engineering controls:

Provide adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits.

### Hand protection:

Chemical-resistant protective gloves (EN 374).

The selected protective gloves have to satisfy the standard EN 374 derived from it.

Glove material for example, Glove (multi-layer) – PE/EVAL/PE (PE=Polyethylene; EVAL=Ethylene-vinyl-alcohol-copolymer); Break through time  $\geq$  480 min.

Source: GESTIS substance database (hazardous substance information system of commercial professional associations).

Suitability for specific workplaces should be clarified with protective glove manufacturers. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

### Eye protection:

Wear safety glasses as minimum eye protection.

Conditions may warrant the use of tightly fitting chemical goggles and possibly a face shield.

### Skin and body protection:

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Use PPE that is chemical resistant to the product and prevents skin contact.

Fire retardant clothing is appropriate for routine occupational use.

### Respiratory protection:

In case of dusts/vapours/aerosols being formed or if the limit values like TLV are exceeded: wear respirator conforming to EN140 with type A filter or better.

### Environmental exposure controls:

Avoid release to the environment. Do not allow to enter drains or water courses. Assure that emissions are compliant with all applicable air pollution control regulations.

### Other information:

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use.

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Take off contaminated clothing and wash before reuse.

Handle in accordance with good industrial hygiene and safety practice.

Wash hands before breaks and at the end of workday.

For more information please see the relevant exposure scenario in Appendix II of this SDS.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on basic physical and chemical properties

|                                       |  |
|---------------------------------------|--|
| Physical state at 20 °C and 101.3 kPa | liquid<br>Colour: Colourless<br>Odour: characteristic terpene-like |
| Melting / freezing point              | -108.6 °C  |

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|   |  |
|---|--|
| Boiling point   | 55.3 °C  |
| Relative density  | 0.74 at 20 °C  |
| Vapour pressure   | 33000 Pa at 25 °C (OECD 104)   |
| Surface tension   | 72.5 mN/m at 21.5 °C<br>(at concentration 1.07 g/l in water)<br>19.3 mN/m at 25 °C (neat liquid)<br>18.1 mN/m at 40 °C (neat liquid) |
| Water solubility  | 41850 mg/l at 20 °C  |
| Partition coefficient n-octanol/water (log value)                           | 1.06 at 20 °C  |
| Flash point   | -28 °C (closed cup)  |
| Flammability  | highly flammable   |
| Explosive properties  | not explosive  |
| Self-ignition temperature   | 460 °C   |
| Oxidising properties  | The substance is not oxidising.  |
| Viscosity   | 0.464 mm <sup>2</sup> /s (static) at 20 °C (OECD 114)<br>0.409 mm <sup>2</sup> /s (static) at 40 °C (OECD 114)                       |
| Granulometry  | Not applicable   |
| Stability in organic solvents and identity of relevant degradation products | Not applicable   |
| Dissociation constant   | Not applicable   |

## 9.2. Other information

Not available.

## SECTION 10. STABILITY AND REACTIVITY

### 10.1. Reactivity

Stable under normal conditions. See Section 10.5.

### 10.2. Chemical stability

This material is stable when properly handled and stored.

### 10.3. Possibility of hazardous reactions

Not expected to occur under recommended handling and storage conditions.

### 10.4. Conditions to avoid

Heat, sparks, open flame, other ignition sources, and oxidizing conditions.

May accumulate static electrical charges, and may cause ignition of the vapours.

### 10.5. Incompatible materials

Contact with strong acids can decompose this material and generate extremely flammable isobutylene.

### 10.6. Hazardous decomposition products

Thermal decomposition may produce carbon monoxide and other toxic vapours.

## SECTION 11. TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

#### Acute toxicity

*Tert-butyl methyl ether (CAS 1634-04-4)*

|                  |                                      |
|------------------|--------------------------------------|
| LD50, oral, rats | > 2000 mg/kg bw (OECD Guideline 401) |
|------------------|--------------------------------------|

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|   |   |
|---|---|
| LC50, inhalation, rats                                | 85 mg/L (85000 mg/m <sup>3</sup> air) (OECD Guideline 403)  |
| LD50, dermal, rats                                    | > 2000 mg/kg bw (OECD Guideline 402)  |
| <b>Skin corrosion/irritation</b>                      | Skin irritation: Category 2   |
| Additional information                                | The substance is not corrosive.<br>Rabbit: irritating (OECD Guideline 404).<br>Erythema score: 2.9 of max. 4 (mean); time point: 24+48+72; fully reversible within: 8 days. |
| <b>Serious eye damage/irritation</b>                  | Not irritating  |
| Additional information                                | Rabbit: not irritating (OECD Guideline 405)   |
| <b>Respiratory or skin sensitisation</b>              | Not sensitizing   |
| Additional information                                | Guinea pig (intradermal): not sensitizing (Equivalent or similar to OECD Guideline 406)   |
| <b>Germ cell mutagenicity</b>                         | Not classified  |
| Additional information                                | In vitro: Genotoxicity: negative (EU Method B.13/14, OECD Guideline 471)<br>In vivo: Genotoxicity: negative (Equivalent or similar to OECD Guideline 486)                   |
| <b>Carcinogenicity</b>                                | Not classified  |
| <b><i>Tert-butyl methyl ether (CAS 1634-04-4)</i></b> |   |
| NOAEC (carcinogenicity), inhalation, mouse            | ≥ 3000 ppm (10710 mg/m <sup>3</sup> ) (EPA OPPTS 870.4200)  |
| <b>Toxicity for reproduction</b>                      | Not classified  |
| <b><i>Tert-butyl methyl ether (CAS 1634-04-4)</i></b> |   |
| NOAEC (effects on fertility), inhalation, rat         | 28560 mg/m <sup>3</sup> (8000 ppm) ()   |
| NOAEC (developmental toxicity), inhalation, rat       | 2500 ppm (1428 mg/m <sup>3</sup> ) (OECD Guideline 414)   |
| NOAEC (developmental toxicity), inhalation, mouse     | 1000 ppm (3570 mg/m <sup>3</sup> ) (EPA OTS 798.4350)   |
| <b>STOT-single exposure Repeated dose toxicity</b>    | Not classified<br>In accordance to EU CLP Regulation (EC) No. 1272/2008: classification is not necessary for repeated dose toxicity.  |
| <b><i>Tert-butyl methyl ether (CAS 1634-04-4)</i></b> |   |
| NOAEL, subchronic, oral, rat                          | 3 000 mg/L drinking water (209 mg/kg bw/d) (OECD TG 408)  |
| NOAEL, subchronic, oral, rat, male                    | 300 mg/kg bw/day (actual dose received) (OECD TG 408)   |
| NOAEC (systemic), subchronic, inhalation, rat         | 800 ppm (2856 mg/m <sup>3</sup> ) (EPA OTS 798.2450)  |
| <b>Aspiration hazard</b>                              | Not classified  |
| Additional information                                | In accordance with EU CLP Regulation this substance does not meet the criteria for classification as an aspiration hazard. This substance has a                             |

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kinematic viscosity of 0.409 mm<sup>2</sup>/s at 40°C, a surface tension of 18.1 mN/m at 40°C, is partially water soluble (41850 mg/l at 20 °C), and is highly volatile (boiling point of 55.3 °C and vapour pressure of 33 kPa at 25 °C). Presented to lung tissues as a liquid droplet, this substance would be expected to dissolve into and disperse the lipophilic structures within the cells, potentially leading to loss of function. This is partially reflected in the observed dermal irritation and the hyperemia observed in lung tissues of rats exposed to high vapour concentrations. However, due to its finite water solubility and high vapour pressure it would eventually clear from these tissues.

Alcohols and ketones of similar carbon number are specifically mentioned in UN GHS for consideration as Category 2 aspiration hazards. Based on its lower polarity and lower hydrogen bonding capacity, this substance behaves even more like a light hydrocarbon than either alcohols or ketones of the same carbon number, and so would be expected to have greater impact. Thus on the basis of existing animal studies and expert judgment that takes into account surface tension, water solubility, boiling point, and volatility (Craan AG. 1996. Aspiration hazard and consumer products: A review. International Journal for Consumer Safety. 3(3): 153-164), this substance meets the criteria to be a Category 2 aspiration hazard according to UN GHS. (See Section 15)

| <b>SECTION 12. ECOLOGICAL INFORMATION</b>          |  |
|--|--|
| <b>12.1. Toxicity</b>                              |  |
| <i>Tert-butyl methyl ether (CAS 1634-04-4)</i>     |  |
| <b>Fish (Short-term toxicity)</b>                  |  |
| LC50 (96h)   | 672 mg/l (Pimephales promelas/freshwater)(US EPA 1981)   |
| LC50 (96h))  | 574 mg/l (Menidia beryllina/saltwater) (OECD Guideline 203)  |
| <b>Fish (Long-term toxicity)</b>                   |  |
| NOEC (31 d)  | 299 mg/l (Pimephales promelas/freshwater) (ASTM E1241-92)  |
| <b>Aquatic invertebrates (Short-term toxicity)</b> |  |
| EC50 (48 h)  | 472 mg/l (Daphnia Magna) (EPA OPPTS 850.1010)  |
| EC50 (96 h)  | 106mg/l (Americamysis bahia)   |
| <b>Aquatic invertebrates (Long-term toxicity)</b>  |  |
| NOEC (21 d)  | 51 mg/l (Daphnia Magna/Freshwater) (EPA OPPTS 850.1300)  |
| NOEC (28 d):                                       | 26 mg/L ( <i>Americamysis bahia</i> /saltwater)( EPA OPPTS 850.1350)   |
| <b>Algae and aquatic plants</b>                    |  |
| EC50/LC50 (96 h)                                   | 491 mg/L   |
| EC10/LC10 or NOEC                                  | 103 mg/L (Freshwater/ algae - <i>Pseudokirchnerella subcapitata</i> ) (ASTM E1218-90)  |
| <b>Toxicity to aquatic micro-organisms</b>         |  |
| EC10 (18 h)  | 710 mg/l ( <i>Pseudomonas putida</i> /freshwater) (estimated)  |
| <b>12.2. Persistence and degradability</b>         |  |
| Abiotic degradation:                               | According to existing data, the degradation half-life of MTBE in the air is 3-6 days depending on environmental conditions (predominantly OH-radical concentration). Using a degradation rate constant of 2.84·10 <sup>-12</sup> |

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|                               | <p>cm<sup>3</sup>/molecule/s and an OH –radical concentration of 5·10<sup>5</sup> radicals/cm<sup>3</sup> a half-life of 5.65 days is calculated. This half-life for degradation in air will be used in further assessment.</p> <p>Abiotic degradation rates:<br/>Degradation for hydrolysis: 0 d-1<br/>Degradation for photolysis: 0 d-1<br/>Degradation rate in air: 0.123 d-1</p>   |
| Biodegradation                | <p>In anaerobic, static sediment/water microcosms, MTBE does not biodegrade. Under mixed aerobic/anaerobic conditions biodegradation may be a significant removal process of MTBE in aerobic sediment.</p> <p>Biotic degradation rates:<br/>Degradation in a non-adapted STP: 0 d-1<br/>Degradation in an adapted STP: Monod kinetics (default values)<br/>Degradation rate in surface water : 4.62·10<sup>-3</sup> d-1<br/>Degradation rate in aerated sediment: 2.31·10<sup>-3</sup> d-1<br/>Degradation rate in soil : 1.00·10<sup>-3</sup> d-1</p>   |
| Persistence and degradability | <p>A closed bottle test (OECD 301D) showed that MTBE is not readily biodegradable. The percentage of biodegradation ranged from 0 to 9.24. It may be concluded that MTBE is inherently biodegradable under certain conditions in aquatic aerobic environment. Therefore, in the further assessment the substance is assumed to be “inherently biodegradable, not fulfilling criteria” for professional and consumer releases and on the regional scale.</p> <p>There is good evidence for ready biodegradability when sewage sludge has become adapted to the substance. Such conditions will apply where there are continuous releases of MTBE to a STP, such as for large production and processing sites. Thus, the substance can be assumed to be readily biodegradable in such cases.</p> |

## 12.3. Bioaccumulative potential

|                          |  |
|--------------------------|--|
| Aquatic bioaccumulation: | BCF: 1.5 (Cyprinus carpio) (whole body w.w.)   |
| Secondary poisoning:     | Considering the measured log KOW of MTBE of 1.06, it is not expected that MTBE would bioconcentrate in high extent or would accumulate in biota for long time periods. |

## 12.4. Mobility in soil

|                         |                                   |
|-------------------------|-----------------------------------|
| Biodegradation in soil: | A half-life of 101.6 days in soil |
|-------------------------|-----------------------------------|

## 12.5. Results of PBT and vPvB assessment

Regarding all available data on biotic and abiotic degradation, bioaccumulation and toxicity it can be stated that the substance does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

## 12.6. Other adverse effects

Not available.

# SECTION 13. DISPOSAL CONSIDERATIONS

## 13.1. Waste treatment methods

|                                |   |
|--------------------------------|---|
| Waste disposal recommendations | Contaminated product, soil or water may be hazardous waste due to potentially low flash point. Dispose of in compliance with respective national and local regulations. |
|--------------------------------|---|

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Assure effluent complies with applicable regulations. Landfill solids at permitted sites. Use registered transporters. Burn concentrated liquids in systems designed for low flash point material. Avoid flame-outs.

Assure emissions comply with applicable regulations. Avoid overloading/poisoning plant biomass. Dilute aqueous waste may biodegrade.

Contaminated adsorbent must be removed in sealed, plastic lined drums and disposed of via an authorised waste disposal contractor.

European List of Waste  
(LoW) code

13 07 02\* – gasoline;

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

## SECTION 14. TRANSPORT INFORMATION

### 14.1. Land transport (ADR/ RID)

UN-No. 2398  
Proper Shipping Name: METHYL tert-BUTYL ETHER  
Hazard class: 3  
Packing group: II  
Hazard label: 3



Classification Code: F1  
Hazard identification  
number (HIN): 33  
Tunnel restriction code  
(ADR) D/E  
Environmental hazard: NO

### 14.2. Inland waterway transport (ADN)

UN-No. 2398  
Proper Shipping Name: METHYL tert-BUTYL ETHER  
Hazard class: 3  
Packing group: II  
Hazard label: 3



Classification Code: F1  
Hazard identification  
number (HIN): 33  
Environmental hazard: NO

### 14.3. Sea transport (IMDG)

UN-No. 2398  
Proper Shipping Name: METHYL tert-BUTYL ETHER  
Hazard class: 3  
Packing group: II  
Hazard label: 3



EmS-No. (Fire) F - E



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EmS-No. (Spillage) S - D

Marine pollutant: NO

## 14.4. Air transport (IATA/ICAO)

UN-No. 2398

Proper Shipping Name: Methyl tert-butyl ether

Hazard class: 3

Packing group: II

Hazard label: 3



ERG Code 3L

Environmental hazard: NO

## 14.5. Special precautions for user

Always transport in closed containers. Ensure that persons transporting the product know what to do in the event of an accident or spillage. For information regarding Exposure Controls/Personal Protection see Section 8 of the SDS

## 14.6. Transport in bulk according to Annex II of Marpol and the IBC Code

Marpol Details:

Marpol Annex: II

IMO Ship Type: 3

IMO Pollution Category: Z

## SECTION 15. REGULATORY INFORMATION

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

#### 15.1.1. EU-Regulations

Authorisations and/or restrictions on use (Annex XVII): Not applicable.

MTBE is not on the REACH Candidate List.

MTBE is not on the REACH Annex XIV List.

Other information, restriction and prohibition regulations Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer. Annex II - Not listed.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances- (SEVESO III):

Physical Hazard – P5b - Flammable liquids.

Directive 2013/39/EU priority substances in the field of water policy (amending Directive 2006/60/EC – Water Framework Directive and Directive 2008/105/EC on environmental quality standards in the field of water policy): Not listed.

Regulation (EC) No 850/2004 on persistent organic pollutants: Annex III – Not listed.

Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals: Not listed.



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## 15.1.2. Globally Harmonized System of Classification and Labelling of Chemicals (UN-GHS)

### Classification according to UN-GHS:

H225 Flammable Liquid Cat. 2

H303 Acute toxicity Category 5

H305 Aspiration hazard Category 2

H316 Skin corrosion/irritation Cat. 3

### Labelling according to UN-GHS:

Hazard pictogram(s) GHS02: flame, GHS08: health hazard



Signal word(s)

Danger

Hazard Statement(s):

H225: Highly flammable liquid.

H303: May be harmful if swallowed.

H305: May be harmful if swallowed and enters airways.

H316: Causes mild skin irritation.

Precautionary statement(s)

P210 - Keep away from heat/sparks/open flames/.../hot surfaces. ... No smoking

P243 - Take precautionary measures against static discharge

P280 - Wear protective gloves/protective clothing/eye protection/face protection

P301+310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P331 Do NOT induce vomiting.

P302+352 - IF ON SKIN: Wash with plenty of soap and water.

P403+P235 - Store in a well-ventilated place. Keep cool.

## 15.1.3. National regulations

AwSV (Germany, 2017): Wassergefährdungsklasse (WGK) 1 (low danger for water pollution).

## 15.2. Chemical safety assessment

Chemical Safety Report has been performed for tert-butyl methyl ether.

## SECTION 16. OTHER INFORMATION

### 16.1. Indication of changes

| Version | Date of change | Section  | Description of changes   |
|---------|----------------|--|--|
| 1.0     | 17/03/2010     |  | Version was created according to Regulations (EC) No 1907/2006 (Article 31.1).   |
| 2.1     | 08/02/2011     |  | Version was created according to Regulation (EC) No 1272/2008 (Regulation CLP) & 453/2010.   |
| 2.2     | 21/03/2012     | 1.1; 2.2;<br>3; 8; 9; 11; 12; 14;<br>15; 16;<br>Annex I; II. | Version was created according to recommendations of Guidance on the compilation of safety data sheets (ECHA. Version 1.0 – September 2011) and due to update of CSR by Lead Registrant (31/10/2011):<br>1. Phrases “For the detailed identified uses of the product see Annex 1” and “The use of the substance should be limited to those specified in |

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|     |            |             |   |
|-----|------------|-------------|---|
|     |            |             | <p>Annex 1” were added to Section 1.1.</p> <p>2. UN-GHS LABELLING was added to Section 2.2.</p> <p>3. Phrase “Other hazards” was added to Section 2.2.</p> <p>4. Phrase “The Full Text for all S, P-Phrases is displayed in Section 16” was added to Section 2.2.</p> <p>5. Index No (CLP) was added to table of Section 3.</p> <p>6. Phrase “M-factor: none” was added to Section 3.</p> <p>7. Section 8 was fully updated.</p> <p>8. Remarks/Justification was added to table of Section</p> <p>9. Section 11 was reconfigured and Remarks/Justification were added to table.</p> <p>10. Section 12 was reconfigured and Remarks/Justification were added to table.</p> <p>11. Section 14 was reconfigured.</p> <p>12. Sections 15, 16 were fully updated.</p> <p>13. Specific Environmental Release Categories (SpERC) were added to Appendix I for IU: 1; 2; 3; 4; 5; 6; 7; 8.</p> <p>14. Appendix II was fully reconfigured.</p> |
| 3.0 | 18/04/2018 | 1-16, Annex | SDS has been corrected in according to new data of Registration dossier, Chemical Safety Report, and new Transport information.   |

## 16.2. Abbreviations and acronyms

|          |   |
|----------|---|
| ADR      | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| AGS      | The German Committee on Hazardous Substances (Ausschuss für Gefahrstoffe – AGS)     |
| BCF      | Bioconcentration factor   |
| DFG      | Germany Research Foundation   |
| DNEL     | Derived No Effect Level   |
| IMDG     | International Maritime Dangerous Goods  |
| ICAO-TI  | Technical Instructions for the Safe Transport of Dangerous Goods by Air             |
| $K_{oc}$ | Adsorption coefficient  |
| $K_{ow}$ | octanol-water partition coefficient   |
| LC50     | Lethal Concentration to 50 % of a test population                                   |
| LD50     | Lethal Dose to 50% of a test population (Median Lethal Dose)                        |
| LOAEC    | Lowest Observable Adverse Effect Concentration                                      |
| LTEL     | Long Term Exposure Limit  |
| NIOSH    | National Institute for Occupational Safety and Health (USA CDC)                     |
| NOEC     | No Observed Effect Concentration  |
| NOAEL    | No Observed Adverse Effect Level  |
| OECD     | Organization for Economic Co-operation and Development                              |
| OSHA     | Occupational Safety & Health Administration (USA)                                   |
| PNEC     | Predicted No Effect Concentration   |

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|           |  |
|-----------|--|
| PBT       | Persistent, bioaccumulative, toxic chemical                                  |
| vPvB      | Very Persistent, Very Bioaccumulative  |
| RID       | Regulations concerning the International Carriage of Dangerous Goods by Rail |
| SCOEL     | Scientific Committee on Occupational Exposure Limits                         |
| STEL      | Short Term Exposure Limit  |
| STP       | sewage treatment plant   |
| STOT      | Specific Target Organ Toxicity   |
| (STOT) RE | Repeated Exposure  |
| (STOT) SE | Single Exposure  |
| TWA       | Time Weighted Average  |
| UN        | United Nations   |
| WGK       | Wassergefährdungsklasse ( <i>German: Water Hazard Class</i> )                |

### 16.3. Full text of H- and EUH-statements:

|       |                           |   |
|-------|---------------------------|---|
| H225: | Flammable Liquid Cat. 2.  | Highly flammable liquid.  |
| H315: | Skin irritation Cat. 2.   | Causes skin irritation.   |
| H301: | Acute Tox. 3(oral)        | Toxic if swallowed.   |
| H311: | Acute Tox. 3(dermal)      | Toxic in contact with skin.   |
| H331: | Acute Tox. 3 (Inhalation) | Toxic if inhaled.   |
| H370: | STOT SE 1                 | Causes damage to organs.<br>Target organs: Optic nerve (nervus opticus), central nervous system.    |
| H371: | STOT SE 2                 | May cause damage to organs.<br>Target organs: Optic nerve (nervus opticus), central nervous system. |

### 16.4. List of ES (exposure scenario) given in Appendix I to the extended SDS

|     |  |
|-----|--|
| ES1 | Formulation  |
| ES2 | Use as intermediate  |
| ES3 | Use as process solvent and extraction agent                  |
| ES4 | Industrial distribution of MTBE and gasoline containing MTBE |
| ES5 | Fuel use – Industrial  |
| ES6 | Fuel use – Professional                                      |
| ES7 | Fuel use – Consumer  |

### 16.5. Key literature references and sources

#### DOCUMENTS, PROVIDED BY FERC CONSORTIUM:

CHEMICAL SAFETY REPORT to tert-butyl methyl ether (CAS 1634-04-4).

#### EU DIRECTIVES

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

Regulation (EC) No 1272/2008 REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

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Regulations. Commission regulation (EU) no 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

DIRECTIVE 1999/45/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances.

COMMISSION DECISION of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes (notified under document number (2001/118/EC).

### UK REGULATORY REFERENCES

Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations 1988. Health and Safety at Work Act 1974.

### ENVIRONMENTAL LISTING

Control of Pollution Act 1974.

### STATUTORY INSTRUMENTS

Notification of New Substances Regulations (NONS) 1993. The Export and Import of Dangerous Chemicals Regulations 2005 number 928.

### APPROVED CODE OF PRACTICE

Classification and Labelling of Substances and Preparations Dangerous for Supply (EU 2001/59/EC). Safety Data Sheets for Substances and Preparations (REACH).

### GUIDANCE NOTES

Workplace Exposure Limits EH40. Introduction to Local Exhaust Ventilation HS(G)37. CHIP for everyone HSG(108).

### **Training advice**

Personnel handling ammonia has to be acquainted demonstrably with its hazardous properties, with health and environmental protection principles related to the product and first aid principles.

### *DISCLAIMER*

*This information is based on our current level of knowledge. This information may be subject to revision as new knowledge and experience becomes available, and SIBUR makes no warranties and assumes no liability in connection with any use of this information. Since SIBUR cannot be aware of all aspects of your business and the impact the REACH Regulation has for your company, SIBUR strongly encourages you to get familiar with the REACH Regulation in order to comply with its requirements and timelines.*

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## ANNEX. EXPOSURE SCENARIOS

### 1. Exposure scenario 1 (ES1)

| Section 1  | Exposure Scenario Title   |
|--|---|
| Title  | MTBE Formulation & (re)packing of substances and mixtures. - Industrial.<br>CAS: 1634-04-4  |
| Use Descriptor   | Sector of Use: Industrial (SU3)   |
|  | Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15  |
|  | Environmental Release Categories: ERC2; ESVOC SpERC 2.2v1   |
| 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, large and small scale packing, maintenance and associated laboratory activities [GES2_I]   |
| Assessment method:   | Health: Used ECETOC TRA model [EE1]. (v3).Environment: Used EUSES model [EE4]. Used ESVOC SpERC #4.   |
| <b>Section 2</b>   | <b>Operational conditions and risk management measures</b>  |
| <b>Section 2.1</b>   | <b>Control of environmental exposure:</b>   |
| Product characteristics  | Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].   |
| Regional tonnage of MTBE (tonne per year).   | 659,000 tpa. (2,197,125 kg/day. )   |
| Fraction of EU production volume for region  | 0.25  |
| Fraction of tonnage for application  | 0.985   |
| 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   |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions.                           | Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29].<br>ES2-E1: ERC2. ESVOC SpERC 2.2v1.<br>Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.025.<br>Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.005.<br>Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.0001.<br>Fraction of main source: 0.05<br>No air emission controls required; required removal efficiency is 0% [TCR5].<br>Soil emission controls are not applicable as there is no direct release to soil [TCR4].<br>Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of $\geq$ (%) [TCR8]: 99. Assumed industrial waste water treatment plant flow (m3/d): 2000. |
| Organisation measures to prevent/limit release from site.  | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].  |
| Conditions and measures related to municipal sewage treatment plant.   | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 99. 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.   |
| <b>Section 2.2</b>   | <b>Control of worker exposure</b>   |
| <b>Product characteristics</b>   |   |
| Physical form of product   | Liquid, vapour pressure > 10 kPa [OC5].   |
| Concentration of substance in product  | Covers percentage substance in the product up to 100 % (unless stated differently) [G13].   |
| Amounts used   | <i>Not applicable</i>   |
| Frequency and duration of use  | Covers daily exposures up to 8 hours (unless stated differently) [G2].<br>Continuous process [CS54].  |
| Human factors not influenced by risk management  | <i>Not applicable</i>   |
| 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].<br>Outdoor use [OOC1].   |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to | Common practices vary across sites thus conservative process release estimates used [TCS1].   |

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|  |  |
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| control dispersion from source towards workers:  |  |
| <b>Contributing Scenarios</b>  | <b>Risk Management Measures</b>  |
| General measures (skin irritants) [G19].   | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].  |
| ES2-CS1: PROC1. General exposures (closed systems) [CS15].   | No specific measures identified [EI18].  |
| ES2-CS2: PROC2. General exposures (closed systems) [CS15]. ; With sample collection [CS56].  | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].  |
| ES2-CS3: PROC3. General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; With sample collection [CS56].   | Provide extract ventilation to points where emissions occur [E54].   |
| ES2-CS4: PROC4. General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45]. | Provide extract ventilation to points where emissions occur [E54].   |
| ES2-CS5: PROC3. General exposures (closed systems) [CS15]. ; Batch processes at elevated temperatures [CS136]. With sample collection [CS56].                                      | Formulate in enclosed or ventilated mixing vessels [E46]. Provide extract ventilation to points where emissions occur [E54].   |
| ES2-CS6: PROC3. Process sampling [CS2].  | Provide extract ventilation to points where emissions occur [E54]. Avoid carrying out activities involving exposure for more than 15 minutes [OC26]. ,or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| ES2-CS7: PROC15. Laboratory activities [CS36]. Cleaning [CS47] [wiping, brushing, flushing]  | Handle in a fume cupboard or under extract ventilation [E83].  |
| ES2-CS8: PROC8b. Bulk transfers [CS14]. Dedicated facility [CS81]. (eg road/railcar bottom loading/unloading, marine vessel/barge loading/unloading).                              | Provide extract ventilation to material transfer points and other openings [E82].  |
| ES2-CS9: PROC5. Mixing operations (open systems) [CS30]. Batch process [CS55].   | Provide extract ventilation to points where emissions occur [E54].   |
| ES2-CS10: PROC8a. Manual [CS34]. Transfer from/pouring from containers [CS22]. Non-dedicated facility [CS82].  | Ensure material transfers are under containment or extract ventilation [E66].  |
| ES2-CS11: PROC8b. Drum/batch transfers [CS8]. Dedicated facility [CS81].   | Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Avoid carrying out activities involving exposure for more than 1 hour [OC27]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Use drum pumps [E53].  |
| ES2-CS12: PROC9. Drum and small package filling [CS6]. Dedicated facility [CS81].  | Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Use drum pumps [E53].   |
| ES2-CS13: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].  | Drain down and flush system prior to equipment break-in or maintenance [E55]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]   |
| ES2-CS14: PROC1. Storage [CS67]. General exposures (closed systems) [CS15]   | No specific measures identified [EI18].  |
| ES2-CS15: PROC2. Storage [CS67]. General exposures (closed systems) [CS15]. with sample collection [CS56].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]   |
| <b>Section 3:</b>  | <b>Exposure estimation:</b>  |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described.  |
|  | ES2-E1: PEC for microorganisms in STP: 0.0101mg/l. Risk characterisation ratio: 1.42E-04.<br>Local PEC in surface water: 0.00185mg/l. Risk characterisation ratio: 3.63E-04.<br>Local PEC in fresh water sediment: 0.00177mg/kgww. Risk characterisation ratio: 3.54E-04.<br>Local PEC in sea water during emission episode: 0.000211mg/l. Risk characterisation ratio: 8.12E-04.<br>Local PEC in marine sediment: 0.000201mg/kgww. Risk characterisation ratio: 8.04E-04.<br>Local PEC in agricultural soil (30 day average): 0.0995mg/kgww. Risk characterisation ratio: 7.21E-02.<br>Local PEC in grassland (180 day average): 0.106mg/kgww. Risk characterisation ratio: 7.68E-02. Risk from environmental exposure is driven by soil [TCR1f]. |
| <b>Health: Inhalation (vapour)</b>   | exposure resulting from contributing scenario ES2-CS1: 8 hour average 0.01ppm - Risk characterisation ratio: <0.01. 15 minute average 0.04ppm - Risk characterisation ratio: <0.01.  |



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|                        | <p>exposure resulting from contributing scenario ES2-CS2: 8 hour average 18ppm - Risk characterisation ratio: 0.35. 15 minute average 35ppm - Risk characterisation ratio: 0.35.</p> <p>exposure resulting from contributing scenario ES2-CS3: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm - Risk characterisation ratio: 0.2.</p> <p>exposure resulting from contributing scenario ES2-CS4: 8 hour average 10ppm - Risk characterisation ratio: 0.2. 15 minute average 40ppm - Risk characterisation ratio: 0.4.</p> <p>exposure resulting from contributing scenario ES2-CS5: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm - Risk characterisation ratio: 0.2.</p> <p>exposure resulting from contributing scenario ES2-CS6: 8 hour average 0.5ppm - Risk characterisation ratio: 0.01. 15 minute average 20ppm - Risk characterisation ratio: 0.2.</p> <p>exposure resulting from contributing scenario ES2-CS7: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm - Risk characterisation ratio: 0.2.</p> <p>exposure resulting from contributing scenario ES2-CS8: 8 hour average 7.5ppm - Risk characterisation ratio: 0.15. 15 minute average 30ppm - Risk characterisation ratio: 0.3.</p> <p>exposure resulting from contributing scenario ES2-CS9: 8 hour average 25ppm - Risk characterisation ratio: 0.5. 15 minute average 50ppm - Risk characterisation ratio: 0.5.</p> <p>exposure resulting from contributing scenario ES2-CS10: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 50ppm - Risk characterisation ratio: 0.5.</p> <p>exposure resulting from contributing scenario ES2-CS11: 8 hour average 0.3ppm - Risk characterisation ratio: &lt;0.01. 15 minute average 6ppm - Risk characterisation ratio: &lt;0.01.</p> <p>exposure resulting from contributing scenario ES2-CS12: 8 hour average 4ppm - Risk characterisation ratio: 0.08. 15 minute average 16ppm - Risk characterisation ratio: 0.16.</p> <p>exposure resulting from contributing scenario ES2-CS13: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm - Risk characterisation ratio: 0.5.</p> <p>exposure resulting from contributing scenario ES2-CS14: 8 hour average 0.01ppm - Risk characterisation ratio: &lt;0.01. 15 minute average 0.04ppm - Risk characterisation ratio: &lt;0.01.</p> <p>exposure resulting from contributing scenario ES2-CS15: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm - Risk characterisation ratio: 0.5.</p> <p>Risk management measures described will protect against acute exposure.</p> |
| <b>Health: Dermal:</b> | <p>exposure resulting from contributing scenario ES2-CS1: 0.03mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS2: 0.27mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS3: 0.013mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS4: 0.13mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS5: 0.013mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS6: 0.0013mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS7: 0.0068mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS8: 0.13mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS9: 0.27mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS10: 0.054mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS11: 0.027mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS12: 0.13mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS13: 1.6mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS14: 0.03mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES2-CS15: 0.16mg/kg/day. Risk characterisation ratio: &lt;0.001.</p>   |



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|                     | 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].   |
| <b>Section 4:</b>   | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b> | 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]. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required [DSU8]. Further details on scaling and control technologies are provided in SpERC factsheet ( <a href="http://cefic.org/en/reach-for-industries-libraries.html">http://cefic.org/en/reach-for-industries-libraries.html</a> ) [DSU4]. |
| <b>Health:</b>      | No data  |

## 2. Exposure scenario 2 (ES2)

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|---|--|
| <b>Section 1</b>  | <b>Exposure Scenario Title</b>   |
| Title   | <b>MTBE. Use as an intermediate.<br/>CAS:1634-04-4.</b>  |
| Use Descriptor  | <b>Sector of Use: Industrial (SU3)</b>   |
|   | Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15   |
|   | Environmental Release Categories: ERC6a.; ESVOC SpERC 6.1a.v1  |
| Processes, tasks, activities covered  | Use of substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container) [GES1B_I].   |
| Assessment method:  | Health: Used ECETOC TRA model [EE1]. (v3).Environment: Used EUSES model [EE4]. Used ESVOC SpERC #2..   |
| <b>Section 2</b>  | <b>Operational conditions and risk management measures</b>   |
| <b>Section 2.1</b>  | <b>Control of environmental exposure</b>   |
| <b>Product characteristics</b>  | Substance is a unique structure [PrC1].  |
|   | Predominantly hydrophobic [PrC4a].   |
|   | Readily biodegradable [PrC5a].   |
| <b>Operational conditions</b>   | Outdoor use [OOC1].  |
| <b>Amounts used</b>   |  |
| Regional tonnage of MTBE (tone per year).   | 8,030 tpa. (26767 kg/day. )  |
| Fraction of EU production volume for region   | 0.25   |
| Fraction of tonnage for application   | 0.012  |
| Fraction of chemical in formulation   | 1  |
| <b>Frequency and duration of use</b>  |  |
| <b>Type of release</b>  | Continuous release [FD2].  |
| <b>Emission days (days/year) [FD4]:</b>   | 300  |
| 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.<br>Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29].<br>ES3-E1: ERC6a. ESVOC SpERC 2. Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.005.<br>Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.01.<br>Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.001.<br>Fraction of main source: 1.0 |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions | No air emission controls required; required removal efficiency is 0% [TCR5].<br>Soil emission controls are not applicable as there is no direct release to soil [TCR4].<br>Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of $\geq$ (%) [TCR8]: 90.<br>Assumed industrial waste water treatment plant flow (m3/d): 2000..   |
| Organisation measures to prevent/limit release from site.                             | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].   |
| Conditions and measures related to municipal sewage treatment plant.                  | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 90. 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].   |

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| Other environmental control measures additional to above:  | none.  |
| <b>Section 2.2.</b>  | <b>Control of worker exposure</b>  |
| <b>Product characteristics</b>   |  |
| Physical form of product   | Liquid, vapour pressure > 10 kPa [OC5].  |
| 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  | Not applicable   |
| 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]. Outdoor use [OOC1].   |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:                   | Common practices vary across sites thus conservative process release estimates used [TCS1].  |
| <b>Contributing Scenarios</b>  | <b>Risk Management Measures</b>  |
| General measures (skin irritants) [G19].   | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].  |
| ES3-CS1: PROC1. General exposures (closed systems) [CS15].   | No specific measures identified [EI18].  |
| ES3-CS2: PROC2. General exposures (closed systems) [CS15]. with sample collection [CS56].  | Ensure operation is undertaken outdoors [E69].   |
| ES3-CS3: PROC3. General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. with sample collection [CS56].   | Provide extract ventilation to points where emissions occur [E54].   |
| ES3-CS4: PROC4. General exposures (open systems) [CS16]. Batch process [CS55]. with sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45]. | Ensure material transfers are under containment or extract ventilation [E66].  |
| ES3-CS5: PROC8b. Process sampling [CS2]. Dedicated facility [CS81].  | Provide extract ventilation to points where emissions occur [E54].   |
| ES3-CS6: PROC15. Laboratory activities [CS36]. Cleaning [CS47]. Wiping [CS50]. Rolling, Brushing [CS51].   | Handle in a fume cupboard or under extract ventilation [E83].  |
| ES3-CS7: PROC8b. Bulk closed loading and unloading [CS501]. Dedicated facility [CS81].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].   |
| ES3-CS8: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].   |
| ES3-CS9: PROC1. Storage [CS67]. Bulk transfers [CS14].   | No specific measures identified [EI18].  |
| ES3-CS10: PROC2. Storage [CS67]. General exposures (closed systems) [CS15]. Batch process [CS55].  | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].   |
| <b>Section 3:</b>  | <b>Exposure estimation:</b>  |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described.  |
|  | <p>ES3-E1:</p> <p>PEC for microorganisms in STP: 0.0101mg/l. Risk characterisation ratio: 1.42E-04.</p> <p>Local PEC in surface water: 0.00185mg/l. Risk characterisation ratio: 3.63E-04.</p> <p>Local PEC in fresh water sediment: 0.00177mg/kgww. Risk characterization ratio: 3.63E-04.</p> <p>Local PEC in sea water during emission episode: 0.000211mg/l. Risk characterisation ratio: 8.12E-04.</p> <p>Local PEC in marine sediment: 0.0002mg/kgww. Risk characterisation ratio: 8.00E-04.</p> <p>Local PEC in agricultural soil (30 day average): 0.00514mg/kgww. Risk characterisation ratio: 3.72E-03.</p> <p>Local PEC in grassland (180 day average): 0.00522mg/kgww. Risk characterisation ratio: 3.78E-03.</p> <p>Risk from environmental exposure is driven by soil [TCR1f].</p> |
| <b>Health: Inhalation (vapour).</b>  | exposure resulting from contributing scenario ES3-CS1: 8 hour average 0.01ppm - Risk characterisation ratio: <0.01. 15 minute average 0.04ppm - Risk characterisation ratio: <0.01   |
|  | exposure resulting from contributing scenario ES3-CS2: 8 hour average 18ppm - Risk characterisation ratio: 0.35. 15 minute average 35ppm - Risk characterisation ratio: 0.35.  |
|  | exposure resulting from contributing scenario ES3-CS3: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm - Risk characterisation ratio: 0.2.   |

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|                        | <p>exposure resulting from contributing scenario ES3-CS4: 8 hour average 10ppm - Risk characterisation ratio: 0.2. 15 minute average 40ppm – Risk characterisation ratio: 0.4.</p> <p>exposure resulting from contributing scenario ES3-CS5: 8 hour average 1.5ppm - Risk characterisation ratio: 0.03. 15 minute average 30ppm -Risk characterisation ratio: 0.3.</p> <p>exposure resulting from contributing scenario ES3-CS6: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm – Risk characterisation ratio: 0.2.</p> <p>exposure resulting from contributing scenario ES3-CS7: 8 hour average 27ppm - Risk characterisation ratio: 0.54. 15 minute average 49ppm – Risk characterisation ratio: 0.49</p> <p>exposure resulting from contributing scenario ES3-CS8: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm – Risk characterisation ratio: 0.5.</p> <p>exposure resulting from contributing scenario ES3-CS9: 8 hour average 0.01ppm - Risk characterisation ratio: &lt;0.01. 15 minute average 0.04ppm -Risk characterisation ratio: &lt;0.01.</p> <p>exposure resulting from contributing scenario ES3-CS10: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm – Risk characterisation ratio: 0.5.</p> <p>Risk management measures described will protect against acute exposure.</p> |
| <b>Health: Dermal:</b> | <p>exposure resulting from contributing scenario ES3-CS1: 0.03mg/kg/day. Risk characterisation ratio: &lt;0.001.</p>   |
|                        | <p>exposure resulting from contributing scenario ES3-CS2: 0.27mg/kg/day. Risk characterisation ratio: &lt;0.001</p> <p>exposure resulting from contributing scenario ES3-CS3: 0.013mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS4: 0.13mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS5: 0.13mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS6: 0.0068mg/kg/day. Risk characterisation ratio: &lt;0.001</p> <p>exposure resulting from contributing scenario ES3-CS7: 1.6mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS8: 1.6mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS9: 0.03mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>exposure resulting from contributing scenario ES3-CS10: 0.16mg/kg/day. Risk characterisation ratio: &lt;0.001.</p> <p>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].</p>   |
| <b>Section 4:</b>      | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b>    | <p>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]. If scaling reveals a condition of unsafe use (i.e., RCRs &gt; 1), additional RMMs or a site-specific chemical safety assessment is required [DSU8]. Further details on scaling and control technologies are provided in SpERC factsheet (<a href="http://cefic.org/en/reach-for-industries-libraries.html">http://cefic.org/en/reach-for-industries-libraries.html</a>) [DSU4].</p>   |
| <b>Health:</b>         | No data  |

## 3. Exposure scenario 3 (ES3)

| Section 1                            | Exposure Scenario Title  |
|--------------------------------------|--|
| <b>Title</b>                         | <b>MTBE. Use as a process chemical or extraction solvent.<br/>CAS:1634-04-4.</b>   |
| Use Descriptor                       | Sector of Use: Industrial (SU3)  |
|                                      | Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15   |
|                                      | Environmental Release Categories: ERC4.; ESVOC SpERC 4.24.v1   |
| Processes, tasks, activities covered | Covers the use a process chemical or extraction solvent, including exposures during use (including product transfer, mixing and preparation plus manual and automated application) and equipment cleaning. |

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| Section 2  | Operational conditions and risk management measures  |
|--|--|
| <b>Section 2.1</b>   | <b>Control of environmental exposure</b>   |
| <b>Product characteristics</b>   | Substance is a unique structure [PrC1].  |
|  | Predominantly hydrophobic [PrC4a].   |
|  | Readily biodegradable [PrC5a].   |
| <b>Amounts used</b>  |  |
| Regional tonnage of MTBE (tone per year).  | 2010 tpa. (6692 kg/day. )  |
| Fraction of EU production volume for region  | 0.25   |
| Fraction of tonnage for application  | 0.003  |
| Fraction of chemical in formulation  | 1  |
| 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.   |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions.   | <p>Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29].</p> <p>ES4-E1: ERC4. ESVOC SpERC 38.</p> <p>Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.025.</p> <p>Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.02.</p> <p>Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.0001.</p> <p>Fraction of main source: 0.3</p> <p>No air emission controls required; required removal efficiency is 0% [TCR5].</p> <p>Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of <math>\geq</math> (%) [TCR8]: 99.</p> <p>Assumed industrial waste water treatment plant flow (m3/d): 2000.</p> |
| Organisation measures to prevent/limit release from site.  | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].   |
| Conditions and measures related to municipal sewage treatment plant.   | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 99. 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   |
| <b>Section 2.2</b>   | <b>Control of worker exposure</b>  |
| <b>Product characteristics</b>   |  |
| Physical form of product   | Liquid, vapour pressure > 10 kPa [OC5].  |
| Concentration of substance in product  | Covers percentage substance in the product up to 100 % (unless stated differently) [G13].  |
| Amounts used   | <i>Not applicable</i>  |
| 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  | Not applicable   |
| 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]. Outdoor use [OOC1].   |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers: | Common practices vary across sites thus conservative process release estimates used [TCS1].  |
| <b>Contributing Scenarios</b>  | <b>Risk Management Measures</b>  |
| General measures (skin irritants) [G19].   | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately.<br>Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].   |
| ES4-CS1: PROC1. General exposures (closed systems) [CS15].   | No specific measures identified [E118].  |
| ES4-CS2: PROC2. General exposures (closed systems) [CS15]. with sample collection [CS56].  | Ensure operation is undertaken outdoors [E69].   |
| ES4-CS3: PROC3. General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. with sample collection [CS56]. [CS56].                       | Provide extract ventilation to points where emissions occur [E54].   |

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| ES4-CS4: PROC4. General exposures (open systems) [CS16]. Batch process [CS55]. with sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45]. | Ensure material transfers are under containment or extract ventilation [E66].   |
| ES4-CS5: PROC8b. Process sampling [CS2]. Dedicated facility [CS81].  | Provide extract ventilation to points where emissions occur [E54]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].  |
| ES4-CS6: PROC15. Laboratory activities [CS36]. Cleaning [CS47]. Wiping [CS50]. Rolling, Brushing [CS51].   | Handle in a fume cupboard or under extract ventilation [E83].   |
| ES4-CS7: PROC8b. Bulk closed loading and unloading [CS501]. Dedicated facility [CS81].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]  |
| ES4-CS8: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].   | Drain down and flush system prior to equipment break-in or maintenance [E55]. Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| ES4-CS9: PROC1. Storage [CS67]. General exposures (closed systems) [CS15].   | No specific measures identified [E118].   |
| ES4-CS10: PROC2. Storage [CS67]. General exposures (closed systems) [CS15]. with sample collection [CS56].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| <b>Section 3:</b>  | <b>Exposure estimation:</b>   |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described.   |
|  | <p>ES4-E1:<br/>                     PEC for microorganisms in STP: 0.0101mg/l. Risk characterisation ratio: 1.42E-04.<br/>                     Local PEC in surface water: 0.00185mg/l. Risk characterisation ratio: 3.63E-04.<br/>                     Local PEC in fresh water sediment: 0.00177mg/kgww. Risk characterization ratio: 3.54E-04.<br/>                     Local PEC in sea water during emission episode: 0.00021mg/l. Risk characterisation ratio: 8.08E-04.<br/>                     Local PEC in marine sediment: 0.0002mg/kgww. Risk characterisation ratio: 8.00E-04.<br/>                     Local PEC in agricultural soil (30 day average): 0.00199mg/kgww. Risk characterisation ratio: 1.44E-03.<br/>                     Local PEC in grassland (180 day average): 0.00198mg/kgww. Risk characterisation ratio: 1.43E-03.<br/>                     Risk from environmental exposure is driven by soil [TCR1f].</p> |
| <b>Health: Inhalation (vapour).</b>  | exposure resulting from contributing scenario ES4-CS1: 8 hour average 0.01ppm - Risk characterisation ratio: <0.01. 15 minute average 0.04ppm - Risk characterisation ratio: <0.01.   |
|  | exposure resulting from contributing scenario ES4-CS2: 8 hour average 18ppm - Risk characterisation ratio: 0.35. 15 minute average 35ppm – Risk characterisation ratio: 0.35.   |
|  | exposure resulting from contributing scenario ES4-CS3: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm – Risk characterisation ratio: 0.2.  |
|  | exposure resulting from contributing scenario ES4-CS4: 8 hour average 10ppm - Risk characterisation ratio: 0.2. 15 minute average 40ppm – Risk characterisation ratio: 0.4.   |
|  | exposure resulting from contributing scenario ES4-CS5: 8 hour average 1.5ppm - Risk characterisation ratio: 0.03. 15 minute average 30ppm - Risk characterisation ratio: 0.3.   |
|  | exposure resulting from contributing scenario ES4-CS6: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm – Risk characterisation ratio: 0.2.  |
|  | exposure resulting from contributing scenario ES4-CS7: 8 hour average 27ppm - Risk characterisation ratio: 0.54. 15 minute average 49ppm – Risk characterisation ratio: 0.49.   |
|  | exposure resulting from contributing scenario ES4-CS8: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm – Risk characterisation ratio: 0.5.   |
|  | exposure resulting from contributing scenario ES4-CS9: 8 hour average 0.01ppm - Risk characterisation ratio: <0.01. 15 minute average 0.04ppm - Risk characterisation ratio: <0.01.   |
|  | exposure resulting from contributing scenario ES4-CS10: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 50ppm – Risk characterisation ratio: 0.5.  |
|  | Risk management measures described will protect against acute exposure.   |
| <b>Health: Dermal:</b>   | exposure resulting from contributing scenario ES4-CS1: 0.03mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES4-CS2: 0.27mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES4-CS3: 0.013mg/kg/day. Risk characterisation ratio: <0.001.   |
|  | exposure resulting from contributing scenario ES4-CS4: 0.13mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES4-CS5: 0.13mg/kg/day. Risk characterisation ratio: <0.001.  |

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|                     | exposure resulting from contributing scenario ES4-CS6: 0.0068mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES4-CS7: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|                     | exposure resulting from contributing scenario ES4-CS8: 8.2mg/kg/day. Risk characterisation ratio: 0.002.   |
|                     | exposure resulting from contributing scenario ES4-CS9: 0.006mg/kg/day. Risk characterisation ratio: <0.001.  |
|                     | exposure resulting from contributing scenario ES4-CS10: 0.82mg/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].   |
| <b>Section 4:</b>   | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b> | 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]. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required [DSU8]. Further details on scaling and control technologies are provided in SpERC factsheet ( <a href="http://cefic.org/en/reach-for-industries-libraries.html">http://cefic.org/en/reach-for-industries-libraries.html</a> ) [DSU4]. |
| <b>Health:</b>      | No data  |

## 4. Exposure scenario

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|--|--|
| <b>Section 1</b>   | <b>Exposure Scenario Title</b>   |
| <b>Title</b>   | <b>MTBE. Distribution of substance.<br/>CAS:1634-04-4.</b>   |
| Use Descriptor   | Sector of Use: Industrial (SU3)  |
|  | Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15  |
|  | Environmental Release Categories: ERC1, ERC2   |
|  | Specific Environmental Release Categories: ESVOC SpERC 1.1b.v1   |
| 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].   |
| <b>Section 2</b>   | <b>Operational conditions and risk management measures</b>   |
| <b>Section 2.1</b>   | <b>Control of environmental exposure</b>   |
| Product characteristics  | Substance is a unique structure [PrC1].<br>Predominantly hydrophobic [PrC4a].<br>Readily biodegradable [PrC5a].  |
| Regional tonnage of MTBE (tonne per year) – transport                                  | 659,000 tpa. (2,197,125 kg/day. )  |
| Fraction of EU production volume for region – transport                                | 0.25   |
| Fraction of tonnage for application – transport  | 0.985  |
| Fraction of chemical in formulation – transport  | 0.15   |
| Regional tonnage of MTBE (kg per day) – storage (see Annex C)                          | 8.4  |
| 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.   |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions. | <u>Transport [CS58]</u><br>Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29].<br>ES5-E1: ERC1, ERC2. ESVOC SpERC 3.<br>Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.0001.<br>Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00001.<br>Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.<br>Fraction of main source: 0.05<br><u>Bulk Product Storage [CS85]</u><br>Assessment of storage conditions give rise to the following release estimates.<br>See annex C for details. |



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|  | <p>ES5-E2: ERC1, ERC2.<br/>                     Local release to air: 0kg/day.<br/>                     Local release to water: 8.4kg/day.<br/>                     Local release to soil: 0kg/day.<br/>                     Fraction of main source: 1.0</p> <p>No air emission controls required; required removal efficiency is 0% [TCR5].<br/>                     Soil emission controls are not applicable as there is no direct release to soil [TCR4].<br/>                     Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of <math>\geq</math> (%) [TCR8]: Transport: 95. Storage: 99.<br/>                     Assumed industrial waste water treatment plant flow (m3/d): 2000.</p> |
| Organisation measures to prevent/limit release from site.  | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].  |
| Conditions and measures related to municipal sewage treatment plant.   | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: Transport: 95. Storage: 99.<br>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.   |
| <b>Section 2.2</b>   | <b>Control of worker exposure</b>   |
| <b>Product characteristics</b>   |   |
| Physical form of product   | Liquid, vapour pressure > 10 kPa [OC5].   |
| Concentration of substance in product  | Covers percentage substance in the product up to 100 % (unless stated differently) [G13].   |
| Amounts used   | <i>Not applicable</i>   |
| 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  | <i>Not applicable</i>   |
| 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]. Outdoor use [OOC1].  |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:                   | Common practices vary across sites thus conservative process release estimates used [TCS1].   |
| <b>Contributing Scenarios</b>  | <b>Risk Management Measures</b>   |
| General measures (skin irritants) [G19].   | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].   |
| ES5-CS1: PROC1. General exposures (closed systems) [CS15].   | No specific measures identified [E118].   |
| ES5-CS2: PROC2. General exposures (closed systems) [CS15]. with sample collection [CS56].  | Ensure operation is undertaken outdoors [E69].  |
| ES5-CS3: PROC3. General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. with sample collection [CS56]  | Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]   |
| ES5-CS4: PROC4. General exposures (open systems) [CS16]. Batch process [CS55]. with sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45]. | Provide extract ventilation to points where emissions occur [E54]; Ensure samples are obtained under containment or extract ventilation [E76]   |
| ES5-CS5: PROC3. Process sampling [CS2].  | Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 15 minutes [OC26]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| ES5-CS6: PROC15. Laboratory activities [CS36]. Cleaning [CS47]. Wiping [CS50]. Rolling, Brushing [CS51].   | Handle in a fume cupboard or under extract ventilation [E83].   |
| ES5-CS7: PROC8b. Bulk closed loading and unloading [CS501]. Dedicated facility [CS81].   | Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]  |
| ES5-CS8: PROC8a. Bulk open loading and unloading [CS503]. Non-dedicated facility [CS82].   | Ensure material transfers are under containment or extract ventilation [E66]. , or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]   |
| ES5-CS9: PROC9. Drum and small package filling [CS6]. Dedicated facility [CS81].   | Use drum pumps [E53]. Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51].  |
| ES5-CS10: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82].  | Drain down and flush system prior to equipment break-in or maintenance [E55].   |



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| ES5-CS11: PROC1. Storage [CS67]. General exposures (closed systems) [CS15].                                | No specific measures identified [EI18].  |
| ES5-CS12: PROC2. Storage [CS67]. General exposures (closed systems) [CS15]. with sample collection [CS56]. | Avoid carrying out activities involving exposure for more than 1 hour [OC27], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]  |
| <b>Section 3:</b>  | <b>Exposure estimation:</b>  |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described.  |
|  | <p>ES5-E1 (transport [CS58]):<br/>                     PEC for microorganisms in STP: 0.00964mg/l. Risk characterisation ratio: 1.36E-04.<br/>                     Local PEC in surface water: 0.00181mg/l. Risk characterisation ratio: 3.55E-04.<br/>                     Local PEC in fresh water sediment: 0.00173mg/kgww. Risk characterization ratio: 3.46E-04.<br/>                     Local PEC in sea water during emission episode: 0.00542mg/l. Risk characterisation ratio: 2.08E-02.<br/>                     Local PEC in marine sediment: 0.00531mg/kgww. Risk characterisation ratio: 2.12E-02.<br/>                     Local PEC in agricultural soil (30 day average): 0.00164mg/kgww. Risk characterisation ratio: 1.19E-03.<br/>                     Local PEC in grassland (180 day average): 0.000520mg/kgww. Risk characterisation ratio: 3.77E-04.<br/>                     Risk from environmental exposure is driven by marine sediment [TCR1d].</p> |
|  | <p>ES5-E2 (bulk product storage [CS85]):<br/>                     PEC for microorganisms in STP: 0.00978mg/l. Risk characterisation ratio: 1.38E-04.<br/>                     Local PEC in surface water: 0.00182mg/l. Risk characterisation ratio: 3.57E-04.<br/>                     Local PEC in fresh water sediment: 0.00174mg/kgdw. Risk characterization ratio: 3.48E-04.<br/>                     Local PEC in sea water during emission episode: 0.000208mg/l. Risk characterisation ratio: 8.00E-04.<br/>                     Local PEC in marine sediment: 0.000198mg/kgdw. Risk characterisation ratio: 7.92E-04.<br/>                     Local PEC in agricultural soil (30 day average): 0.00902mg/kgdw. Risk characterisation ratio: 6.54E-03.<br/>                     Local PEC in grassland (180 day average): 0.00062mg/kgdw. Risk characterisation ratio: 4.49E-04<br/>                     Risk from environmental exposure is driven by soil [TCR1f].</p> |
| <b>Health: Inhalation (vapour).</b>  | <p>exposure resulting from contributing scenario ES5-CS1: 8 hour average 0.01ppm - Risk characterisation ratio: &lt;0.01. 15 minute average 0.04ppm - Risk characterisation ratio: &lt;0.01.<br/>                     exposure resulting from contributing scenario</p>  |
|  | <p>ES5-CS2: 8 hour average 18ppm - Risk characterisation ratio: 0.35. 15 minute average 35ppm – Risk characterisation ratio: 0.35.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS3: 8 hour average 21ppm - Risk characterisation ratio: 0.42. 15 minute average 35ppm – Risk characterisation ratio: 0.35.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS4: 8 hour average 10ppm - Risk characterisation ratio: 0.2. 15 minute average 40ppm – Risk characterisation ratio: 0.4.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS5: 8 hour average 3.4ppm - Risk characterisation ratio: 0.07. 15 minute average 35ppm -Risk characterisation ratio: 0.35.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS6: 8 hour average 5ppm - Risk characterisation ratio: 0.1. 15 minute average 20ppm – Risk characterisation ratio: 0.2.</p>  |
|  | <p>exposure resulting from contributing scenario ES5-CS7: 8 hour average 21ppm - Risk characterisation ratio: 0.42. 15 minute average 49ppm – Risk characterisation ratio: 0.49.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS8: 8 hour average 25ppm - Risk characterisation ratio: 0.5. 15 minute average 50ppm – Risk characterisation ratio: 0.5</p>  |
|  | <p>exposure resulting from contributing scenario ES5-CS9: 8 hour average 4ppm - Risk characterisation ratio: 0.08. 15 minute average 16ppm – Risk characterisation ratio: 0.16.</p>  |
|  | <p>exposure resulting from contributing scenario ES5-CS10: 8 hour average 25ppm - Risk characterisation ratio: 0.5. 15 minute average 50ppm – Risk characterisation ratio: 0.5.<br/>                     exposure resulting from contributing scenario</p>   |
|  | <p>ES5-CS11: 8 hour average 0.01ppm - Risk characterisation ratio: &lt;0.01. 15 minute average 0.04ppm - Risk characterisation ratio: &lt;0.01.</p>  |
|  | <p>exposure resulting from contributing scenario ES5-CS12: 8 hour average 18ppm - Risk characterisation ratio: 0.35. 15 minute average 35ppm -Risk characterisation ratio: 0.35.</p>   |
|  | <p>Risk management measures described will protect against acute exposure.</p>   |
| <b>Health: Dermal:</b>   | <p>exposure resulting from contributing scenario ES5-CS1: 0.03mg/kg/day. Risk characterisation ratio: &lt;0.001.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS2: 0.27mg/kg/day. Risk characterisation ratio: &lt;0.001.</p>   |
|  | <p>exposure resulting from contributing scenario ES5-CS3: 0.082mg/kg/day. Risk characterisation ratio: &lt;0.001.</p>  |

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|                     | exposure resulting from contributing scenario ES5-CS4: 0.13mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS5: 0.013mg/kg/day. Risk characterisation ratio: <0.001.  |
|                     | exposure resulting from contributing scenario ES5-CS6: 0.0068mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS7: 0.54mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS8: 0.27mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS9: 0.13mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS10: 2.7mg/kg/day. Risk characterisation ratio: <0.001.   |
|                     | exposure resulting from contributing scenario ES5-CS11: 0.03mg/kg/day. Risk characterisation ratio: <0.001.  |
|                     | exposure resulting from contributing scenario ES5-CS12: 0.27mg/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].   |
| <b>Section 4:</b>   | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b> | 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]. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required [DSU8]. Further details on scaling and control technologies are provided in SpERC factsheet ( <a href="http://cefic.org/en/reach-for-industries-libraries.html">http://cefic.org/en/reach-for-industries-libraries.html</a> ) [DSU4]. |
| <b>Health:</b>      | No data  |

## 5. Exposure scenario 5 (ES5)

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| <b>Section 1</b>   | <b>Exposure Scenario Title</b>  |
| <b>Title</b>   | <b>MTBE. Use as a fuel .<br/>CAS:1634-04-4.</b>   |
| Use Descriptor   | Sector of Use: Industrial (SU3)   |
|  | Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16   |
|  | Environmental Release Categories: ERC6b.; ESVOC SpERC 7.12a.v1  |
|  | Specific Environmental Release Categories: ESVOC3 SpERC   |
| 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]. (v3).Environment: Used EUSES model [EE4]. Used ESVOC SpERC #28.  |
| <b>Section 2</b>   | <b>Operational conditions and risk management measures</b>  |
| <b>Section 2.1</b>   | <b>Control of environmental exposure</b>  |
| <b>Product characteristics</b>   | Substance is a unique structure [PrC1].   |
|  | Predominantly hydrophobic [PrC4a].  |
|  | Readily biodegradable [PrC5a].  |
| Regional tonnage of MTBE (tonneper year).  | 659,000 tpa. (2,197,125 kg/day)   |
| Fraction of EU production volume for region  | 0.25  |
| Fraction of tonnage for application  | 0.985   |
| Fraction of chemical in formulation  | 0.15  |
| 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.  |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions. | Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29]. ES6-E1: ERC7. ESVOC SpERC 28.   |

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|   | <p>Release fraction to air from process (initial release prior to RMM) [OOC4]: 0.0025.<br/>                 Release fraction to wastewater from process (initial release prior to RMM) [OOC5]: 0.00001.<br/>                 Release fraction to soil from process (initial release prior to RMM) [OOC6]: 0.<br/>                 Fraction of main source: 0.02</p> <p>No air emission controls required; required removal efficiency is 0% [TCR5].<br/>                 Soil emission controls are not applicable as there is no direct release to soil [TCR4].<br/>                 Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of <math>\geq</math> (%) [TCR8]: 95.<br/>                 Assumed industrial waste water treatment plant flow (m3/d): 2000.</p> |
| Organisation measures to prevent/limit release from site.   | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].  |
| Conditions and measures related to municipal sewage treatment plant.  | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 95.<br>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.   |
| <b>Section 2.2</b>  | <b>Control of worker exposure</b>   |
| <b>Product characteristics</b>  |   |
| Physical form of product  | Liquid, vapour pressure > 10 kPa [OC5].   |
| Concentration of substance in product   | See contributing scenarios below.   |
| Amounts used  | <i>Not applicable</i>   |
| 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   | <i>Not applicable</i>   |
| 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]. Outdoor use [OOC1].  |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:    | Common practices vary across sites thus conservative process release estimates used [TCS1].   |
| <b>Contributing Scenarios</b>   | <b>Risk Management Measures</b>   |
| Risk management measures common to all contributing scenarios.  | Limit the substance in product to 15 % [OC20].  |
| General measures (skin irritants) [G19].  | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].   |
| ES6-CS1: PROC8b. Bulk transfers [CS14]. Batch process [CS55]. with sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45].   | Use vapour recovery units when necessary [A7]. Ensure material transfers are under containment or extract ventilation [E66].  |
| ES6-CS2: PROC8b. Drum/batch transfers [CS8]. Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. Dedicated facility [CS81]. | Use drum pumps [E53].   |
| ES6-CS3: PROC1. General exposures (closed systems) [CS15].  | No other specific measures identified [EI20].   |
| ES6-CS4: PROC2. General exposures (closed systems) [CS15]. with sample collection [CS56].   | No other specific measures identified [EI20].   |
| ES6-CS5: PROC3. General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. with sample collection [CS56].                                  | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| ES6-CS6: PROC16. Use as a fuel . (closed systems) [CS107].  | No other specific measures identified [EI20].   |
| ES6-CS7: PROC3. Batch process [CS55]. (closed systems) [CS107].   | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22].  |
| ES6-CS8: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]. For example: fuel pump repair. Indoor [OC8].                             | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Drain down and flush system prior to equipment break-in or maintenance [E55]   |
| ES6-CS9: PROC1. Storage [CS67]. General exposures (closed systems) [CS15].  | No other specific measures identified [EI20].   |

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| ES6-CS10: PROC2. Storage [CS67]. General exposures (closed systems) [CS15]. with sample collection [CS56]. | Ensure operation is undertaken outdoors [E69].   |
| <b>Section 3:</b>  | <b>Exposure estimation:</b>  |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described.  |
|  | <p>ES6-E1:<br/>                     PEC for microorganisms in STP: 0.00943mg/l. Risk characterisation ratio: 1.33E-04.<br/>                     Local PEC in surface water: 0.00178mg/l. Risk characterisation ratio: 3.49E-04.<br/>                     Local PEC in fresh water sediment: 0.00171mg/kgww. Risk characterization ratio: 3.42E-04.<br/>                     Local PEC in sea water during emission episode: 0.000204mg/l. Risk characterisation ratio: 7.85E-04.<br/>                     Local PEC in marine sediment: 0.000194mg/kgww. Risk characterization ratio: 7.76E-04.<br/>                     Local PEC in agricultural soil (30 day average): 0.00442mg/kgww. Risk characterisation ratio: 3.20E-03.<br/>                     Local PEC in grassland (180 day average): 0.00418mg/kgww. Risk characterisation ratio: 3.03E-03<br/>                     Risk from environmental exposure is driven by soil [TCR1f].</p> |
| <b>Health: Inhalation (vapour).</b>  | exposure resulting from contributing scenario ES6-CS1: 8 hour average 18ppm - Risk characterisation ratio: 0.36. 15 minute average 50ppm – Risk/ characterisation ratio: 0.5.  |
|  | exposure resulting from contributing scenario ES6-CS2: 8 hour average 18ppm - Risk characterisation ratio: 0.36. 15 minute average 50ppm – Risk characterisation ratio: 0.5.   |
|  | exposure resulting from contributing scenario ES6-CS3: 8 hour average 0.006ppm - Risk characterisation ratio: <0.01. 15 minute average 0.024ppm - Risk characterisation ratio: <0.01.  |
|  | exposure resulting from contributing scenario ES6-CS4: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 15ppm – Risk characterisation ratio: 0.15.   |
|  | exposure resulting from contributing scenario ES6-CS5: 8 hour average 18ppm - Risk characterisation ratio: 0.36. 15 minute average 15ppm – Risk characterisation ratio: 0.15.  |
|  | exposure resulting from contributing scenario ES6-CS6: 8 hour average 15ppm - Risk characterisation ratio: 0.3. 15 minute average 15ppm – Risk characterisation ratio: 0.15.   |
|  | exposure resulting from contributing scenario ES6-CS7: 8 hour average 18ppm - Risk characterisation ratio: 0.36. 15 minute average 15ppm – Risk characterisation ratio: 0.15.  |
|  | exposure resulting from contributing scenario ES6-CS8: 8 hour average 18ppm - Risk characterisation ratio: 0.36. 15 minute average 30ppm – Risk characterisation ratio: 0.30.  |
|  | exposure resulting from contributing scenario ES6-CS9: 8 hour average 0.006ppm - Risk characterisation ratio: <0.01. 15 minute average 0.024ppm - Risk characterisation ratio: <0.01.  |
|  | exposure resulting from contributing scenario ES6-CS10: 8 hour average 11ppm - Risk characterisation ratio: 0.21. 15 minute average 42ppm - Risk characterisation ratio: 0.42  |
|  | Risk management measures described will protect against acute exposure.  |
| <b>Health: Dermal:</b>   | exposure resulting from contributing scenario ES6-CS1: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS2: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS3: 0.018mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS4: 0.16mg/kg/day. Risk characterisation ratio: <0.001.   |
|  | exposure resulting from contributing scenario ES6-CS5: 0.082mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS6: 0.04mg/kg/day. Risk characterisation ratio: <0.001.   |
|  | exposure resulting from contributing scenario ES6-CS7: 0.082mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS8: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS9: 0.018mg/kg/day. Risk characterisation ratio: <0.001.  |
|  | exposure resulting from contributing scenario ES6-CS10: 0.16mg/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].   |

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| <b>Section 4:</b>   | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b> | 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]. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required [DSU8]. Further details on scaling and control technologies are provided in SpERC factsheet ( <a href="http://cefic.org/en/reach-for-industries-libraries.html">http://cefic.org/en/reach-for-industries-libraries.html</a> ) [DSU4]. |
| <b>Health:</b>      | No data  |

## 6. Exposure scenario 6 (ES6)

|  |   |
|--|---|
| <b>Section 1</b>   | <b>Exposure Scenario Title</b>  |
| <b>Title</b>   | <b>MTBE. Use as a fuel .<br/>CAS:1634-04-4.</b>   |
| Use Descriptor   |   |
|  | Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC16.   |
|  | Environmental Release Categories: ERC8b, ERC8e.; ESVOC SpERC 29   |
|  | Specific Environmental Release Categories: ESVOC3 SpERC   |
| 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]. (v3).Environment: Used EUSES model [EE4]. Used ESIG SpERCs.  |
| <b>Section 2</b>   | <b>Operational conditions and risk management measures</b>  |
| <b>Section 2.1</b>   | <b>Control of environmental exposure</b>  |
| <b>Product characteristics</b>   | Substance is a unique structure [PrC1].<br>Predominantly hydrophobic [PrC4a].<br>Readily biodegradable [PrC5a].   |
| Regional tonnage of MTBE (tonneper year).  | 659,000 tpa. (2,197,125 kg/day)   |
| Fraction of EU production volume for region  | 0.25  |
| Fraction of tonnage for application  | 0.985   |
| Fraction of chemical in formulation  | 0.15  |
| 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.  |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions. | Conditions given in SPERC fact sheet give rise to following releases fractions [OOC29].<br>ES7-E1: ERC8b, ERC8e. ESVOC SpERC 29.<br>Release fraction to air from wide dispersive use (regional only) [OOC7]: 0.01.<br>Release fraction to wastewater from wide dispersive use [OOC8]: 0.00005.<br>Release fraction to soil from wide dispersive use (regional only) [OOC9]: 0.00005.<br>Fraction of main source: 6.24E-04<br>No air emission controls required; required removal efficiency is 0% [TCR5].<br>Soil emission controls are not applicable as there is no direct release to soil [TCR4].<br>Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%) [TCR8]: 37.<br>Assumed industrial waste water treatment plant flow (m3/d): 2000. |
| Organisation measures to prevent/limit release from site.                              | Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14].  |
| Conditions and measures related to municipal sewage treatment plant.                   | Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]: 37.<br>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.   |
| <b>Section 2.2</b>   | <b>Control of worker exposure</b>   |
| <b>Product characteristics</b>   |   |
| Physical form of product   | Liquid, vapour pressure > 10 kPa [OC5].   |

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| Concentration of substance in product   | Limit the substance in product to 15 % [OC20 ].  |
| 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   | <i>Not applicable</i>  |
| 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]. Outdoor use [OOC1].   |
| Technical conditions and measures at a process level to prevent release and technical conditions and measures to control dispersion from source towards workers:    | Common practices vary across sites thus conservative process release estimates used [TCS1].  |
| <b>Contributing Scenarios</b>   | <b>Risk Management Measures</b>  |
| General measures (skin irritants) [G19].  | Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].  |
| ES7-CS1: PROC8b. Bulk transfers [CS14]. Batch process [CS55]. with sample collection [CS56]. Filling / preparation of equipment from drums or containers. [CS45].   | Use vapour recovery units when necessary [A7]. Ensure material transfers are under containment or extract ventilation [E66].   |
| ES7-CS2: PROC8b. Drum/batch transfers [CS8]. Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. Dedicated facility [CS81]. | Use vapour recovery units when necessary [A7]. Ensure material transfers are under containment or extract ventilation [E66].   |
| ES7-CS3: PROC8b. refueling vehicles.  | Ensure operation is undertaken outdoors [E69].   |
| ES7-CS4: PROC2. General exposures (closed systems) [CS15]. with sample collection [CS56]  | No specific measures identified [EI18].  |
| ES7-CS5: PROC3. General exposures (closed systems) [CS15]. Use in contained batch processes [CS37]. with sample collection [CS56].                                  | Ensure operation is undertaken outdoors [E69].   |
| ES7-CS6: PROC9. Drum and small package filling [CS6]. Dedicated facility [CS81].  | Avoid carrying out activities involving exposure for more than 1 hour [OC27]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Use drum pumps or carefully pour from container [E64].   |
| ES7-CS7: PROC16. Use as a fuel . (closed systems) [CS107].  | Ensure operation is undertaken outdoors [E69].   |
| ES7-CS8: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]. For example: fuel pump repair. Indoor [OC8].                             | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Drain down system prior to equipment break-in or maintenance [E65].   |
| ES7-CS9: PROC8a. Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]. For example: fuel pump repair. Outdoor [OC9].                            | Avoid carrying out activities involving exposure for more than 4 hours [OC28]. , or, Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Drain down system prior to equipment break-in or maintenance [E65].   |
| ES7-CS10: PROC1. Storage [CS67]. General exposures (closed systems) [CS15].   | No specific measures identified [EI18].  |
| <b>Section 3:</b>   | <b>Exposure estimation:</b>  |
| <b>Environment:</b>   | Maximum exposure resulting from contributing scenarios described.  |
|   | ES7-E1:<br>PEC for microorganisms in STP: 0.00000294mg/l. Risk characterisation ratio: 4.14E-08.<br>Local PEC in surface water: 0.000844mg/l. Risk characterisation ratio: 1.65E-04.<br>Local PEC in fresh water sediment: 0.000783mg/kgww. Risk characterization ratio: 1.57E-04.<br>Local PEC in sea water during emission episode: 0.000109mg/l. Risk characterisation ratio: 4.19E-04.<br>Local PEC in marine sediment: 0.000102mg/kgww. Risk characterization ratio: 4.08E-04.<br>Local PEC in agricultural soil (30 day average): 0.000121mg/kgww. Risk characterisation ratio: 8.77E-05.<br>Local PEC in grassland (180 day average): 0.0000357mg/kgww. Risk characterisation ratio: 2.59E-05.<br>Risk from environmental exposure is driven by marine water [TCR1c]. |
| <b>Health: Inhalation (vapour).</b>   | exposure resulting from contributing scenario ES7-CS1: 8 hour average 0.39ppm - Risk characterisation ratio: <0.01. 15 minute average 16ppm - Risk characterisation ratio: <0.01.  |
|   | exposure resulting from contributing scenario ES7-CS2: 8 hour average 0.39ppm - Risk characterisation ratio: <0.01. 15 minute average 16ppm - Risk characterisation ratio: <0.01.  |
|   | exposure resulting from contributing scenario ES7-CS3: 8 hour average 0.4ppm - Risk characterisation ratio: <0.01. 15 minute average 16ppm - Risk characterisation ratio: <0.01.   |



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|                        | exposure resulting from contributing scenario ES7-CS4: 8 hour average 0.8ppm - Risk characterisation ratio: 0.02. 15 minute average 17ppm - Risk characterisation ratio: 0.17.         |
|                        | exposure resulting from contributing scenario ES7-CS5: 8 hour average 0.8ppm - Risk characterisation ratio: 0.02. 15 minute average 17ppm - Risk characterisation ratio: 0.17.         |
|                        | exposure resulting from contributing scenario ES7-CS6: 8 hour average 6ppm - Risk characterisation ratio: 0.12. 15 minute average 30ppm - Risk characterisation ratio: 0.3.            |
|                        | exposure resulting from contributing scenario ES7-CS7: 8 hour average 21ppm - Risk characterisation ratio: 0.42. 15 minute average 21ppm - Risk characterisation ratio: 0.21.          |
|                        | exposure resulting from contributing scenario ES7-CS8: 8 hour average 12ppm - Risk characterisation ratio: 0.25. 15 minute average 25ppm - Risk characterisation ratio: 0.25.          |
|                        | exposure resulting from contributing scenario ES7-CS9: 8 hour average 6.5ppm - Risk characterisation ratio: 0.13. 15 minute average 13.2ppm - Risk characterisation ratio: 0.13.       |
|                        | exposure resulting from contributing scenario ES7-CS10: 8 hour average 0.006ppm - Risk characterisation ratio: <0.01. 15 minute average 0.024ppm - Risk characterisation ratio: <0.01. |
|                        | Risk management measures described will protect against acute exposure.  |
| <b>Health: Dermal:</b> | exposure resulting from contributing scenario ES7-CS1: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|                        | exposure resulting from contributing scenario ES7-CS2: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|                        | exposure resulting from contributing scenario ES7-CS3: 1.6mg/kg/day. Risk characterisation ratio: <0.001.  |
|                        | exposure resulting from contributing scenario ES7-CS4: 0.16mg/kg/day. Risk characterisation ratio: <0.001.   |
|                        | exposure resulting from contributing scenario ES7-CS5: 0.082mg/kg/day. Risk characterisation ratio: <0.001.  |
|                        | exposure resulting from contributing scenario ES7-CS6: 0.16mg/kg/day. Risk characterisation ratio: <0.001.   |
|                        | exposure resulting from contributing scenario ES7-CS7: 0.04mg/kg/day. Risk characterisation ratio: <0.001.   |
|                        | exposure resulting from contributing scenario ES7-CS8: 0.98mg/kg/day. Risk characterisation ratio: <0.001.   |
|                        | exposure resulting from contributing scenario ES7-CS9: 0.98mg/kg/day. Risk characterisation ratio: <0.001.   |
|                        | exposure resulting from contributing scenario ES7-CS10: 0.018mg/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].         |
| <b>Section 4:</b>      | <b>Guidance to check compliance with the exposure scenario:</b>  |
| <b>Environment:</b>    | Not applicable for wide dispersive uses [DSU5].  |
| <b>Health:</b>         | No data  |

## 7. Exposure scenario 7 (ES7)

|                                       |  |
|---------------------------------------|--|
| <b>Section 1</b>                      | <b>Exposure Scenario Title</b>   |
| <b>Title</b>                          | <b>Use in Fuels of MTBE; CAS RN1634-04-4</b>   |
| Use Descriptor                        | Sector of Use: Consumer (SU21)   |
|                                       | Product Categories: PC13   |
|                                       | Environmental Release Categories: ERC8b, ERC8e.  |
|                                       | Specific Environmental Release Categories: ESVOC SpERC 30  |
| Processes, tasks, activities covered  | Covers consumer uses in liquid fuels [GES12_C].  |
| Assessment method:                    | Health: Based on ESIG GES Consumer with refined exposure modifiers from SCEDS.<br>Environment: Used EUSES model [EE4]. |
| <b>Section 2</b>                      | <b>Operational conditions and risk management measures</b>   |
| <b>Section 2.1</b>                    | <b>Control of consumer exposure</b>  |
| <b>Product characteristics</b>        |  |
| Physical form of product              | Liquid, vapour pressure > 10 kPa [OC5].  |
| Concentration of substance in product | Limit the substance in product to 15 % [OC20].   |
| Amounts used                          | Not applicable   |



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| Contributing Scenarios:  |   | Product categories:  |
|--|---|--|
| Fuels [PC13]. --Liquid: Automotive Refuelling [PC13_1].                      | OC  | Covers concentrations up to [ConsOC1]: 15%. For each use event, covers use amounts up to [ConsOC2]: 37500g. Covers use up to [ConsOC3]: 1 times per week [CSL111]. Covers use up to [ConsOC3]: 3 minutes per event [CSL113]. Covers skin contact area up to [ConsOC5]: 210cm <sup>2</sup> . Covers outdoor use [ConsOC12].   |
|  | RMM   | No specific measures identified [EI18].  |
| Fuels [PC13]. --Liquid: Garden Equipment - Refuelling [PC13_4].              | OC  | Covers concentrations up to [ConsOC1]: 15%. For each use event, covers use amounts up to [ConsOC2]: 750g. Covers use up to [ConsOC3]: 26 times per year [CSL112]. Covers use up to [ConsOC3]: 2 minutes per event [CSL113]. Covers skin contact area up to [ConsOC5]: 420cm <sup>2</sup> . Covers outdoor use [ConsOC12].    |
|  | RMM   | No specific measures identified [EI18].  |
| Fuels [PC13]. --Liquid Scooter Refuelling [PC13_2].                          | OC  | Covers concentrations up to [ConsOC1]: 15%. For each use event, covers/ use amounts up to [ConsOC2]: 3750g. Covers use up to [ConsOC3]: 1 times per week [CSL111]. Covers use up to [ConsOC3]: 2 minutes per event [CSL113]. Covers skin contact area up to [ConsOC5]: 210cm <sup>2</sup> . Covers outdoor use [ConsOC12].   |
|  | RMM   | No specific measures identified [EI18].  |
| Fuels [PC13]. --refuelling of boats:   | OC  | Covers concentrations up to [ConsOC1]: 15%. For each use event, covers use amounts up to [ConsOC2]: 225000g. Covers use up to [ConsOC3]: 1 times per week [CSL111]. Covers use up to [ConsOC3]: 18 minutes per event [CSL113]. Covers skin contact area up to [ConsOC5]: 210cm <sup>2</sup> . Covers outdoor use [ConsOC12]. |
|  | RMM   | No specific measures identified [EI18].  |
| Fuels [PC13]. --refuelling of boats:   | OC  | Covers concentrations up to [ConsOC1]: 15%. For each use event, covers use amounts up to [ConsOC2]: 127500g. Covers use up to [ConsOC3]: 1 times per week [CSL111]. Covers use up to [ConsOC3]: 12 minutes per event [CSL113]. Covers skin contact area up to [ConsOC5]: 210cm <sup>2</sup> . Covers outdoor use [ConsOC12]. |
|  | RMM   | No specific measures identified [EI18].  |
| <b>Section 2.2</b>   |   | <b>Control of environmental exposure</b>   |
| <b>Product characteristics</b>   |   | Substance is a unique structure [PrC1].  |
|  |   | Predominantly hydrophobic [PrC4a].   |
|  |   | Readily biodegradable [PrC5a].   |
| 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.        | Assumes use at not more than 20°C above ambient temperature, unless stated differently [G15].   |  |
| Organisation measures to prevent/limit release from site.                    | 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 (m <sup>3</sup> /d) [STP5]. 2000<br>Estimated substance removal from wastewater via domestic sewage treatment (%) [STP3]. 95 |  |
| Conditions and measures related to external treatment of waste for disposal. | This substance is consumed during use and no waste of the substance is generated [ERW3]   |  |
| Conditions and measures related to external recovery of waste.               | none.   |  |
| <b>Section 3:</b>  |   | <b>Exposure estimation:</b>  |
| <b>Health: Inhalation (vapour).</b>  |   | Maximum exposure resulting from contributing scenarios described:  |
|  |   | Fuels [PC13]. Liquid: Automotive Refuelling [PC13_1]. Short term concentration during exposure event (mg/m <sup>3</sup> ) 32.6mg/m <sup>3</sup> . Risk characterisation ratio: 0.152.  |
|  |   | Fuels [PC13]. Liquid: Garden Equipment - Refuelling [PC13_4]. Short term concentration during exposure event (mg/m <sup>3</sup> ) 28.6mg/m <sup>3</sup> . Risk characterisation ratio: 0.133.  |
|  |   | Fuels [PC13]. Liquid Scooter Refuelling [PC13_2]. Short term concentration during exposure event (mg/m <sup>3</sup> ) 32.8mg/m <sup>3</sup> . Risk characterisation ratio: 0.153.  |
|  |   | Fuels [PC13]. refuelling of boats: Short term concentration during exposure event (mg/m <sup>3</sup> ) 182mg/m <sup>3</sup> . Risk characterisation ratio: 0.85.   |
|  |   | Fuels [PC13]. refuelling of boats: Short term concentration during exposure event (mg/m <sup>3</sup> ) 107mg/m <sup>3</sup> . Risk characterisation ratio: 0.5.  |
| <b>Health: Dermal:</b>   |   | Maximum exposure resulting from contributing scenarios described:  |
|  |   | Fuels [PC13]. Liquid: Automotive Refuelling [PC13_1]. Chronic systemic dermal exposure: 0.0105mg/kg/day. Risk characterisation ratio: 0.0000294.   |
|  |   | Fuels [PC13]. Liquid: Garden Equipment - Refuelling [PC13_4]. Chronic systemic dermal exposure: 10.5mg/kg/day. Risk characterisation ratio: 0.00294.   |
|  |   | Fuels [PC13]. Liquid Scooter Refuelling [PC13_2]. Chronic systemic dermal exposure: 5.25mg/kg/day. Risk characterisation ratio: 0.00147.   |

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|                      | Fuels [PC13]. refuelling of boats: Chronic systemic dermal exposure: 0.0105mg/kg/day. Risk characterisation ratio: 0.00000294.  |
|                      | Fuels [PC13]. refuelling of boats: Chronic systemic dermal exposure: 0.0105mg/kg/day. Risk characterisation ratio: 0.00000294.  |
| <b>Health: Oral:</b> | Maximum exposure resulting from contributing scenarios described:   |
|                      | Fuels [PC13]. Liquid: Automotive Refuelling [PC13_1]. Not applicable.   |
|                      | Fuels [PC13]. Liquid: Garden Equipment - Refuelling [PC13_4]. Not applicable.   |
|                      | Fuels [PC13]. Liquid Scooter Refuelling [PC13_2]. Not applicable.   |
|                      | Fuels [PC13]. refuelling of boats: Not applicable.  |
|                      | Fuels [PC13]. refuelling of boats: Not applicable.  |
| <b>Environment:</b>  | Maximum exposure resulting from contributing scenarios described:   |
|                      | ES8-E1:<br>EC for microorganisms in STP: 0.00000294mg/l. Risk characterisation ratio: 4.14E-08.<br>Local PEC in surface water: 0.000844mg/l. Risk characterisation ratio: 1.65E-04.<br>Local PEC in fresh water sediment: 0.000783mg/kgww. Risk characterisation ratio: 1.57E-04.<br>Local PEC in sea water during emission episode: 0.000109mg/l. Risk characterisation ratio: 4.19E-04.<br>Local PEC in marine sediment: 0.000102mg/kgww. Risk characterisation ratio: 4.08E-04.<br>Local PEC in agricultural soil (30 day average): 0.000121mg/kgww. Risk characterisation ratio: 8.77E-05.<br>Local PEC in grassland (180 day average): 0.0000357mg/kgww. Risk characterisation ratio: 2.59E-05.<br>Risk from environmental exposure is driven by marine water [TCR1c]. |
| <b>Section 4:</b>    | <b>Guidance to check compliance with the exposure scenario:</b>   |
| <b>Health</b>        | Not applicable.   |
| <b>Environment</b>   | Not applicable for wide dispersive uses [DSU5].   |

**END OF SAFETY DATA SHEET**