

SAFETY DATA SHEET

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

1.1. Product identifier

Name of the substance Residual Fuel Oils - All Grades (Refer to Synonyms for Product Name)
Identification number 649-024-00-9
Registration number 01-2119474894-22-0031
Synonyms No,6 Fuel Oil * Bunker Fuel Oil 180 - 380 cst.
SDS number 2003
Issue date 29-July-2011
Version number 05
Revision date 30-August-2013
Supersedes date 17-August-2012

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

Identified uses Distribution of a substance. Formulation & (re) packaging of substances and mixtures.
Manufacture of substance. Use as a Fuel.
Uses advised against None known.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name Valero Energy Ltd
Address 1 Westferry Circus
Canary Wharf
London E14 4HA
UK
Telephone 01/210 345 4593 (General information; US)
e-mail CorpHSE@valero.com
Contact person Industrial Hygienist

1.4. Emergency telephone number 0044/(0)18 65 407333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification Carc. Cat. 2;R45, Repr. Cat. 3;R63, Xn;R20-48/21, R66, N;R50/53

The full text for all R-phrases is displayed in section 16.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards

| | | |
|--|-----------------------------------|--|
| Acute toxicity, inhalation | Category 4 | H332 - Harmful if inhaled. |
| Carcinogenicity | Category 1B | H350 - May cause cancer. |
| Reproductive toxicity | Category 2 | H361d - Suspected of damaging the unborn child. |
| Specific target organ toxicity - repeated exposure | Category 2 (blood, thymus, liver) | H373 - May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure. |
| Aspiration hazard | Category 1 | H304 - May be fatal if swallowed and enters airways. |

Environmental hazards

| | | |
|--|------------|--|
| Hazardous to the aquatic environment, long-term aquatic hazard | Category 1 | H410 - Very toxic to aquatic life with long lasting effects. |
|--|------------|--|


Hazard summary

Physical hazards Not classified for physical hazards.

| | |
|------------------------------|--|
| Health hazards | May cause cancer. Also harmful by inhalation. Also harmful: danger of serious damage to health by prolonged exposure in contact with skin. Possible risk of harm to the unborn child. Repeated exposure may cause skin dryness or cracking. |
| Environmental hazards | Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. |
| Specific hazards | Breathing of high vapour concentrations may cause dizziness, light-headedness, headache, nausea and loss of co-ordination. Continued inhalation may result in unconsciousness. Prolonged or repeated contact with skin may cause redness, itching, irritation, eczema/chapping and oil acne. Components of the product may be absorbed into the body through the skin. |
| Main symptoms | In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea. Defatting of the skin. Dermatitis. Ingestion may cause irritation and malaise. |

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

| | |
|------------------------------|---|
| Contains: | Fuel oil, residual |
| Identification number | 649-024-00-9 |
| Hazard pictograms |  |
| Signal word | Danger |
| Hazard statements | H304 - May be fatal if swallowed and enters airways. H332 - Harmful if inhaled. H350 - May cause cancer. H361d - Suspected of damaging the unborn child. H373 - May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure. H410 - Very toxic to aquatic life with long lasting effects. |

Precautionary statements

| | |
|-------------------|---|
| Prevention | P201 - Obtain special instructions before use. P280 - Wear protective gloves/protective clothing/eye protection/face protection. P260 - Do not breathe dust/fume/gas/mist/vapors/spray. |
| Response | P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTRE or doctor/physician. P331 - Do NOT induce vomiting. |
| Storage | P403 + P233 - Store in a well-ventilated place. Keep container tightly closed. |
| Disposal | P501 - Dispose of contents/container in accordance with local/regional/national/international regulations. |

Supplemental label information Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

Not a PBT or vPvB substance or mixture. Hydrogen sulfide (H₂S) can accumulate in the headspace of storage tanks and reach potentially hazardous concentrations. Static accumulator - Static accumulating flammable materials can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite material and vapor may cause flash fire (or explosion).

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

| Chemical name | % | CAS-No. / EC No. | REACH Registration No. | INDEX No. | Notes |
|------------------------|-----|--|------------------------|--------------|-------|
| Fuel oil, residual | 100 | 68476-33-5 270-675-6 | 01-2119474894-22-0031 | 649-024-00-9 | |
| Classification: | | DSD: Carc. Cat. 2;R45, Repr. Cat. 3;R63, Xn;R20-48/21, R66, N;R50/53 | | | |
| | | CLP: Acute Tox. 4;H332, Carc. 1B;H350, STOT RE 2;H373, Aquatic Chronic 1;H410 | | | |

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.

Composition comments

This product is registered under the REACH Regulation 1907/2006 as a UVCB. The full text for all R- and H-phrases is displayed in section 16. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First aid measures

General information

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

| | |
|---------------------|---|
| Inhalation | Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention. If there is any suspicion of inhalation of H ₂ S: Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures. Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Provision of oxygen may help. Obtain medical advice for further treatment. |
| Skin contact | Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention. |
| Eye contact | Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Get medical attention if irritation develops or persists. |
| Ingestion | Immediately rinse mouth and drink plenty of water or milk. Keep person under observation. Do not induce vomiting. If vomiting occurs, keep head low. Transport immediately to hospital and take these instructions. |

4.2. Most important symptoms and effects, both acute and delayed Defatting of the skin. May cause eye irritation on direct contact. In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea. May cause damage to organs () through prolonged or repeated exposure.

4.3. Indication of any immediate medical attention and special treatment needed Treat symptomatically. Symptoms may be delayed.

SECTION 5: Firefighting measures

| | |
|---|---|
| General fire hazards | The product is combustible, and heating may generate vapours which may form explosive vapour/air mixtures. Material will float and can be re-ignited on surface of water. |
| 5.1. Extinguishing media | |
| Suitable extinguishing media | Water spray, foam, dry powder or carbon dioxide. |
| Unsuitable extinguishing media | Do not use water jet as an extinguisher, as this will spread the fire. |
| 5.2. Special hazards arising from the substance or mixture | Thermal decomposition may produce smoke, oxides of carbon and lower molecular weight organic compounds whose composition have not been characterised. Sulfur Oxides (SO _x). Nitrogen Oxides (NO _x). |
| 5.3. Advice for firefighters | |
| Special protective equipment for firefighters | Self-contained breathing apparatus and full protective clothing must be worn in case of fire. |
| Special fire fighting procedures | Move containers from fire area if you can do it without risk. Use water spray to cool unopened containers. Cool containers with flooding quantities of water until well after fire is out. |

SECTION 6: Accidental release measures

| | |
|---|---|
| 6.1. Personal precautions, protective equipment and emergency procedures | |
| For non-emergency personnel | Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillages cannot be contained. |
| For emergency responders | Keep unnecessary personnel away. Wear protective clothing as described in Section 8 of this safety data sheet. |
| 6.2. Environmental precautions | Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. |

6.3. Methods and material for containment and cleaning up

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use non-sparking tools and explosion-proof equipment. Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas.

Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.

6.4. Reference to other sections

For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Before entering storage tanks and commencing any operation in a confined area check the atmosphere for oxygen content and flammability. (Subject to applicability) If sulfur compounds are suspected to be present in the product, check the atmosphere for H₂S content. Access to work area should be restricted to people handling the product only. Should be handled in closed systems, if possible. Avoid inhalation of vapors and contact with skin, eyes and clothing. Avoid release to the environment. Wear appropriate personal protective equipment. Immediately change contaminated clothes. Do not eat, drink or smoke when using the product. Be aware of potential for surfaces to become slippery. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities

Store in a cool, dry place with adequate ventilation. Keep away from incompatible materials, open flames and high temperatures. Keep away from food, drink and animal feeding stuffs.

7.3. Specific end use(s)

Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Manufacture of substance. Use as a Fuel.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

Bulgaria

| Material | Type | Value |
|-------------------------------------|------|-----------------------|
| Fuel oil, residual (CAS 68476-33-5) | TWA | 300 mg/m ³ |

Czech Republic

| Material | Type | Value |
|-------------------------------------|---------|------------------------|
| Fuel oil, residual (CAS 68476-33-5) | Ceiling | 1000 mg/m ³ |
| | TWA | 400 mg/m ³ |

Iceland

| Material | Type | Value |
|-------------------------------------|------|-----------------------|
| Fuel oil, residual (CAS 68476-33-5) | TWA | 180 mg/m ³ |
| | | 25 ppm |

Italy

| Material | Type | Value |
|-------------------------------------|------|---------|
| Fuel oil, residual (CAS 68476-33-5) | STEL | 500 ppm |
| | TWA | 300 ppm |

Romania

| Material | Type | Value |
|-------------------------------------|------|-----------------------|
| Fuel oil, residual (CAS 68476-33-5) | STEL | 500 mg/m ³ |
| | TWA | 300 mg/m ³ |

Biological limit values

No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no-effect level (DNEL)

| Material | Type | Route | Value | Form |
|-------------------------------------|---------|------------|-------------------------------|--|
| Fuel oil, residual (CAS 68476-33-5) | Workers | Dermal | 0,065 mg/kg/8h | Long term exposure systemic effects |
| | | Inhalation | 4700 mg/m ³ /15min | Aerosol, Acute exposure systemic effects |
| | | Inhalation | 0,12 mg/m ³ /8h | Aerosol, Long term exposure systemic effects |

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

General information Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Keep working clothes separately. Launder contaminated clothing before reuse.

Eye/face protection Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.

Skin protection

- Hand protection Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Viton, Polyurethane, Nitrile rubber. Suitable gloves can be recommended by the glove supplier. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Wear suitable gloves tested to EN374.

- Other Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

Respiratory protection In case of inadequate ventilation or risk of inhalation of oil mist, suitable respiratory equipment with combination filter (type A2/P2) can be used. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

Hygiene measures When using, do not eat, drink or smoke. Wash hands after handling. Launder contaminated clothing before reuse. Private clothes and working clothes should be kept separately. Handle in accordance with good industrial hygiene and safety practices. Follow up on any medical surveillance requirements.

Environmental exposure controls Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

| | |
|---|--|
| Appearance | Black liquid. |
| Physical state | Liquid. |
| Form | Liquid. |
| Colour | Black. |
| Odour | Petroleum. |
| Odour threshold | Not available. |
| pH | Not applicable. |
| Melting point/freezing point | Not available. |
| Initial boiling point and boiling range | 160 - 600 °C (320 - 1112 °F) |
| Flash point | 62,0 °C (143,6 °F) Pensky-Martens Closed Cup |
| Evaporation rate | Not available. |
| Flammability (solid, gas) | Non flammable. |
| Upper/lower flammability or explosive limits | |
| Flammability limit - lower (%) | Not available. |
| Flammability limit - upper (%) | Not available. |

| | |
|--|--|
| Vapour pressure | < 0,04 psi estimated |
| Vapour density | > 1 estimated |
| Relative density | Not available. |
| Solubility(ies) | Insoluble in water. |
| Partition coefficient (n-octanol/water) | Not applicable. |
| Auto-ignition temperature | 263 °C (505,4 °F) |
| Decomposition temperature | Not available. |
| Viscosity | 10 - 55 mm ² /s (100°C) |
| Explosive properties | Not explosive. |
| Oxidizing properties | Not oxidizing. |
| 9.2. Other information | |
| Density | 840,00 - 1100,00 kg/m ³ (15 °C) |

SECTION 10: Stability and reactivity

| | |
|---|--|
| 10.1. Reactivity | The product is stable and non reactive under normal conditions of use, storage and transport. |
| 10.2. Chemical stability | Stable under normal temperature conditions and recommended use. |
| 10.3. Possibility of hazardous reactions | Hazardous polymerisation does not occur. |
| 10.4. Conditions to avoid | Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. |
| 10.5. Incompatible materials | Strong acids. Strong oxidizers such as nitrates, chlorates, peroxides. |
| 10.6. Hazardous decomposition products | Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours. |

SECTION 11: Toxicological information

| | |
|---|---|
| General information | Occupational exposure to the substance or mixture may cause adverse effects. |
| Information on likely routes of exposure | |
| Ingestion | Ingestion may cause irritation and malaise. |
| Inhalation | Harmful if inhaled. In high concentrations, vapours and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea. |
| Skin contact | Repeated exposure may cause skin dryness or cracking. May be absorbed through the skin. |
| Eye contact | Direct contact with eyes may cause temporary irritation. |
| Symptoms | Skin irritation. Defatting of the skin. Rash. May cause eye irritation on direct contact. In high concentrations, vapours and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea. |
| 11.1. Information on toxicological effects | |
| Acute toxicity | Harmful if inhaled. |
| Skin corrosion/irritation | Based on available data, the classification criteria are not met. |
| Serious eye damage/eye irritation | Direct contact with eyes may cause temporary irritation. |
| Respiratory sensitisation | Based on available data, the classification criteria are not met. |
| Skin sensitisation | Based on available data, the classification criteria are not met. |
| Germ cell mutagenicity | Based on available data, the classification criteria are not met. |
| Carcinogenicity | Suspected of causing cancer. |
| IARC Monographs. Overall Evaluation of Carcinogenicity | |
| Fuel oil, residual (CAS 68476-33-5) | 2B Possibly carcinogenic to humans. |
| Reproductive toxicity | Suspected of damaging fertility or the unborn child. |
| Specific target organ toxicity - single exposure | Based on available data, the classification criteria are not met. |
| Specific target organ toxicity - repeated exposure | May cause damage to organs through prolonged or repeated exposure: Blood. Thymus. Liver. |
| Aspiration hazard | May be fatal if swallowed and enters airways. |
| Mixture versus substance information | Not available. |

Other information Symptoms may be delayed.

SECTION 12: Ecological information

12.1. Toxicity Oil spills are generally hazardous to the environment.

| Product | Species | Test results |
|-------------------------------------|---------|---|
| Fuel oil, residual (CAS 68476-33-5) | | |
| Aquatic | | |
| Algae | EL50 | Pseudokirchneriella subcapitata 0,75 mg/l, 72 Hours |
| Crustacea | EL50 | Daphnia magna 2 mg/l, 48 Hours |
| Fish | LL50 | Oncorhynchus mykiss 79 mg/l, 96 Hours |

12.2. Persistence and degradability The degradability of the product has not been stated.

12.3. Bioaccumulative potential No data available on bioaccumulation.

Partition coefficient n-octanol/water (log Kow) Not available.

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil Not available.

Mobility in general The product is insoluble in water. It will spread on the water surface while some of the components will eventually sediment in water systems. The volatile components of the product will spread in the atmosphere.

12.5. Results of PBT and vPvB assessment Not a PBT or vPvB substance or mixture.

12.6. Other adverse effects Very toxic to aquatic life with long lasting effects. Oil spills are generally hazardous to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied.

EU waste code 13 07 03*
The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Disposal methods/information Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground.

SECTION 14: Transport information

ADR

14.1. UN number UN3082

14.2. UN proper shipping name Environmentally hazardous substance, liquid, n.o.s. (Fuel oil, residual)

14.3. Transport hazard class(es) 9

Subsidiary class(es) -

14.4. Packing group III

14.5. Environmental hazards Yes

Tunnel restriction code E

Labels required 9

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number UN3082

14.2. UN proper shipping name Environmentally hazardous substance, liquid, n.o.s. (Fuel oil, residual)

14.3. Transport hazard class(es) 9

Subsidiary class(es) -

14.4. Packing group III

14.5. Environmental hazards Yes

Labels required 9

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number UN3082
14.2. UN proper shipping name Environmentally Hazardous Liquid, N.o.s. (Fuel oil, residual)
14.3. Transport hazard class(es) 9
Subsidiary class(es) -
14.4. Packing group III
14.5. Environmental hazards Yes
Labels required 9
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number UN3082
14.2. UN proper shipping name Environmentally hazardous substance, liquid, n.o.s. (Fuel oil, residual)
14.3. Transport hazard class(es) 9
Subsidiary class(es) -
14.4. Packing group III
14.5. Environmental hazards Yes
Labels required 9
ERG code 9L
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

14.1. UN number UN3082
14.2. UN proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Residues (petroleum), atmospheric)
14.3. Transport hazard class(es) 9
Subsidiary class(es) -
14.4. Packing group III
14.5. Environmental hazards
Marine pollutant Yes
Labels required 9
EmS F-A, S-F
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable. However, this product is a liquid and if transported in bulk covered under MARPOL 73/78, Annex I.

SECTION 15: Regulatory information

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

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I

Not listed.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Fuel oil, residual (CAS 68476-33-5)

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not regulated.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding

Fuel oil, residual (CAS 68476-33-5)

Other EU regulations

Directive 96/82/EC (Seveso II) on the control of major-accident hazards involving dangerous substances

Not regulated.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Fuel oil, residual (CAS 68476-33-5)

Directive 94/33/EC on the protection of young people at work

Fuel oil, residual (CAS 68476-33-5)

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006. 96/82/EC (Seveso II) Directive; Part 2 (Classified Substances) - Extremely Flammable

National regulations

Young people under 18 years old are not allow to work with this product according to the EU Directive 94/33/EC on the protection of young people at work. Pregnant women should not work with the product, if there is the least risk of exposure.

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

List of abbreviations

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.
DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, bioaccumulative and toxic.
vPvB: Very Persistent and very Bioaccumulative.

References

Chemical safety report.
CLP files – <http://concaawe.org/>

Information on evaluation method leading to the classification of mixture

The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.

Full text of any statements or R-phrases and H-statements under Sections 2 to 15

R20 Harmful by inhalation.
R45 May cause cancer.
R48/21 Harmful: danger of serious damage to health by prolonged exposure in contact with skin.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R63 Possible risk of harm to the unborn child.
R66 Repeated exposure may cause skin dryness or cracking.
H332 Harmful if inhaled.
H350 May cause cancer.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

This SDS contains revisions in the following section(s):

This safety data sheet contains revisions in the following section(s): 2, 3, 5, 7, 11, 12.

Training information

Follow training instructions when handling this material.

Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with EC No 1272/2008 by Valero Energy Ltd. Valero Energy Ltd. does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

Annex to the extended Safety Data Sheet (eSDS)

1 - Exposure Scenario Worker

1. Distribution of substance

List of use descriptors

Sector(s) of Use SU3: Industrial uses

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles.
 ERC5: Industrial use resulting in inclusion into or onto a matrix.
 ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates).
 ERC6b: Industrial use of reactive processing aids.
 ERC6c: Industrial use of monomers for manufacture of thermoplastics.
 ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.
 Specific Environmental Release Category:
 ESVOC SpERC 1.1b.v1

List of names of contributing worker scenarios and corresponding PROCs

PROC1: Use in closed process, no likelihood of exposure.
 PROC2: Use in closed, continuous process with occasional controlled exposure.
 PROC3: Use in closed batch process (synthesis or formulation).
 PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
 PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
 PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity

Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use of processing aids in processes and products, not becoming part of articles.

Product characteristics

Concentration of the substance in a mixture

Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.

Physical state

Liquid

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Fraction of EU tonnage used in region: 0,1

Regional use tonnage (tons/year): 1,1 e7

Fraction of Regional tonnage used locally: 0,002

Annual site tonnage (tons/year): 2,3 e4

Maximum daily site tonnage (kg/day): 7,7 e4

Frequency and duration of use

Batch process Not available.

Continuous process Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10

Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

| Type | Emission days (days/year) | Emission factors | | | Remarks |
|------------------------------|---------------------------|------------------|---------|-----------|---------|
| | | Air | Soil | Water | |
| initial release prior to RMM | 300 | 0,0001 | 0,00001 | 0,0000001 | |

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Common practices vary across sites thus conservative process release estimates used.

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

Air Treat air emission to provide a typical removal efficiency of (%): 90
Soil Not available.
Water Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of \geq (%): 0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%): 0
Sediment Not available.
Remarks Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). No wastewater treatment required.

Organisational measures to prevent/limit release from site Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type Municipal STP
Discharge rate 2000
Treatment effectiveness 88,8
Sludge treatment technique Not available.
Measures to limit air emissions Not available.
Remarks Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 3,8e5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) 88,8

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment Not available.
Disposal methods Not available.
Treatment effectiveness Not available.
Remarks External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations External recovery and recycling of waste should comply with applicable local and/or national regulations.
Treatment effectiveness Not available.
Remarks Not available.

Additional good practice advice beyond the REACH CSA Additional information on the basis for the allocation of the indentified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
Use in closed batch process (synthesis or formulation).
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
Use as laboratory reagent.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product Liquid

Vapour pressure Liquid, vapour pressure 0,5 - 10 kPa at STP.
Process temperature Assumes use at not more than 20°C above ambient temperature, unless stated differently.; Assumes a good basic standard of occupational hygiene is implemented.

Amounts used

Not available.

Frequency and duration of use

| Duration | Frequency of use | Remarks |
|----------|------------------|---|
| 8 | 1 day | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

| Area of use | Room size | Temperature | Ventilation rate | Remarks |
|-------------|-----------|-------------|------------------|---------|
|-------------|-----------|-------------|------------------|---------|

Other relevant operational conditions

Not available.

Risk management measures (RMM)

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

Process sampling, Outdoor;
 Sample via a closed loop or other system to avoid exposure.

General exposures (closed systems);
 Handle substance within a closed system.
 Sample via a closed loop or other system to avoid exposure.

Bulk product storage;
 Store substance within a closed system.

Product sampling;
 Sample via a closed loop or other system to avoid exposure.

marine vessel/barge (un)loading;
 Transfer via enclosed lines.
 Clear transfer lines prior to de-coupling.
 Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Equipment cleaning and maintenance;
 Drain down and flush system prior to equipment break-in or maintenance.
 Retain drain downs in sealed storage pending disposal or for subsequent recycle.

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

Laboratory activities;
 Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
 Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

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

Process sampling, Outdoor;
 Avoid carrying out activities involving exposure for more than 15 minutes.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

General exposures (closed systems);
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Bulk product storage;
 Avoid carrying out activities involving exposure for more than 4 hours.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Product sampling;
 Avoid carrying out activities involving exposure for more than 15 minutes.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Laboratory activities;
 Wear suitable gloves tested to EN374.

marine vessel/barge (un)loading;
 Avoid carrying out activities involving exposure for more than 4 hours.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Road tanker/rail car loading;
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment cleaning and maintenance;
 Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Avoid carrying out activities involving exposure for more than 4 hours.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

| | Exposure level | RCR | Method | Remarks |
|---|--------------------------|-------|--------|---------------------|
| General exposures (closed systems) | 0,01 mg/m ³ | 0.058 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| General exposures (closed systems) + Process sampling + Outdoor | 0,5 mg/m ³ | 0.625 | ** | All routes |
| | 0,5 mg/m ³ | 0.292 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | | 0.858 | ** | All routes |
| General exposures (closed systems) | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Bulk product storage | 0,064 mg/m ³ | 0.887 | ** | All routes |
| | 0,34 mg/kg bw/day | 0.320 | ** | Inhalation Exposure |
| Product sampling | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,5 mg/m ³ | 0.887 | ** | All routes |
| Laboratory activities | 0,5 mg/m ³ | 0.292 | ** | Inhalation Exposure |
| | 0,03 mg/kg bw/day | 0.417 | ** | Dermal Exposure |
| marine vessel/barge (un)loading | 0,03 mg/kg bw/day | 0.1 | ** | All routes |
| | 0,064 mg/m ³ | 0.517 | ** | Inhalation Exposure |
| Road tanker/rail car loading | 0,34 mg/kg bw/day | 0.320 | ** | Dermal Exposure |
| | 0,17 mg/m ³ | 0.567 | ** | All routes |
| Equipment cleaning and maintenance | 0,17 mg/m ³ | 0.887 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.283 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | All routes |
| | 0,0024 mg/m ³ | 0.850 | ** | Inhalation Exposure |
| | 0,2 mg/kg bw/day | 0.020 | ** | Dermal Exposure |
| | | 0.833 | ** | All routes |
| | | 0.853 | ** | |

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

2 - Exposure Scenario Worker

1. Formulation & (re)packing of substances and mixtures

List of use descriptors

Sector(s) of Use SU3: Industrial uses

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC ERC2: Formulation of preparations.
Specific Environmental Release Category: ESVOC SpERC 2.2.v1

List of names of contributing worker scenarios and corresponding PROCs PROC1: Use in closed process, no likelihood of exposure.
PROC2: Use in closed, continuous process with occasional controlled exposure.
PROC3: Use in closed batch process (synthesis or formulation).
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Formulation of preparations.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.

Physical state Liquid

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Fraction of EU tonnage used in region: 0,1

Regional use tonnage (tons/year): 1,1 e7

Fraction of Regional tonnage used locally: 0,0026

Annual site tonnage (tons/year): 3 e4

Maximum daily site tonnage (kg/day): 1 e5

Frequency and duration of use

Batch process Not available.

Continuous process Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10

Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

| Type | Emission days (days/year) | Emission factors | | | Remarks |
|------------------------------|---------------------------|------------------|--------|----------|---------|
| | | Air | Soil | Water | |
| initial release prior to RMM | 300 | 0,0022 | 0,0001 | 0,000005 | |

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Common practices vary across sites thus conservative process release estimates used.

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

Air Treat air emission to provide a typical removal efficiency of (%): 0

| | |
|-----------------|--|
| Soil | Not available. |
| Water | Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of \geq (%): 54,0. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%): 0 |
| Sediment | Not available. |
| Remarks | Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. Prevent discharge of undissolved substance to or recover from onsite wastewater. |

Organisational measures to prevent/limit release from site Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

| | |
|---|--|
| Type | Municipal STP |
| Discharge rate | 2000 |
| Treatment effectiveness | 88,8 |
| Sludge treatment technique | Not available. |
| Measures to limit air emissions | Not available. |
| Remarks | Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 1,1e5 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

| | |
|---------------------------------|---|
| Suitable waste treatment | Not available. |
| Disposal methods | Not available. |
| Treatment effectiveness | Not available. |
| Remarks | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

| | |
|------------------------------------|---|
| Suitable recover operations | External recovery and recycling of waste should comply with applicable local and/or national regulations. |
| Treatment effectiveness | Not available. |
| Remarks | Not available. |

Additional good practice advice beyond the REACH CSA Additional information on the basis for the allocation of the identified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
Use in closed batch process (synthesis or formulation).
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
Use as laboratory reagent.

Product characteristics

| | |
|--|--|
| Concentration of the substance in a mixture | Covers percentage substance in the product up to 100 % (unless stated differently). |
| Physical form of the product | Liquid |
| Vapour pressure | Liquid, vapour pressure 0,5 - 10 kPa at STP. |
| Process temperature | Assumes use at not more than 20°C above ambient temperature, unless stated differently.; Assumes a good basic standard of occupational hygiene is implemented. |

Amounts used

Not available.

Frequency and duration of use

| Duration | Frequency of use | Remarks |
|----------|------------------|---|
| 8 | 1 day | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

| Area of use | Room size | Temperature | Ventilation rate | Remarks |
|-------------|-----------|-------------|------------------|---------|
|-------------|-----------|-------------|------------------|---------|

Other relevant operational conditions

Not available.

Risk management measures (RMM)

| | |
|---|--|
| Technical conditions and measures at process level (source) to prevent release | General exposures (closed systems), Process sampling; Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. |
| | General exposures (closed systems); Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. |
| | Bulk product storage; Store substance within a closed system. |
| | Product sampling; Sample via a closed loop or other system to avoid exposure. |
| Technical conditions and measures to control dispersion from source towards the worker | marine vessel/barge (un)loading; Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle. |
| | Equipment cleaning and maintenance; Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. |
| | Laboratory activities; Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Road tanker/rail car loading; Ensure material transfers are under containment or extract ventilation. Drum/batch transfers; Ensure material transfers are under containment or extract ventilation. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour), or Ensure operation is undertaken outdoors. |
| Organizational measures to prevent/limit releases, dispersion and exposure | General measures (carcinogens); Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. |

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

General exposures (closed systems), Process sampling;
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

General exposures (closed systems);
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Bulk product storage;
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Product sampling;
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Laboratory activities;
Wear suitable gloves tested to EN374.

marine vessel/barge (un)loading;
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Road tanker/rail car loading;
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Drum/batch transfers;
Avoid carrying out activities involving exposure for more than 1 hour.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment cleaning and maintenance;
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

3. Exposure Estimation

Environment

EUSES version 2.1. has been used to estimate environmental emissions unless otherwise indicated.

When the recommended risk management measures and operational conditions are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

Health

| | Exposure level | RCR | Method | Remarks |
|--|-------------------------|-------|--------|---------------------|
| General exposures (closed systems) | 0,01 mg/m ³ | 0.058 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| General exposures (closed system) + Process sampling | 0,5 mg/m ³ | 0.625 | ** | All routes |
| | 0,5 mg/m ³ | 0.292 | ** | Inhalation Exposure |
| General exposures (closed systems) | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.858 | ** | All routes |
| General exposures (closed systems) | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Bulk product storage | 0,064 mg/m ³ | 0.887 | ** | All routes |
| | 0,34 mg/kg bw/day | 0.320 | ** | Inhalation Exposure |
| Product sampling | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.887 | ** | All routes |
| Laboratory activities | 0,5 mg/m ³ | 0.292 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| marine vessel/barge (un)loading | 0,5 mg/m ³ | 0.858 | ** | All routes |
| | 0,03 mg/kg bw/day | 0.417 | ** | Inhalation Exposure |
| Road tanker/rail car loading | 0,03 mg/kg bw/day | 0.1 | ** | Dermal Exposure |
| | 0,03 mg/kg bw/day | 0.517 | ** | All routes |
| Road tanker/rail car loading | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Road tanker/rail car loading | 0,34 mg/kg bw/day | 0.887 | ** | All routes |
| | 0,17 mg/m ³ | 0.283 | ** | Inhalation Exposure |
| Road tanker/rail car loading | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.850 | ** | All routes |

| | | | | |
|------------------------------------|--------------------------|-------|----|---------------------|
| Drum/batch transfers | 5 mg/m ³ | 0.175 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | | 0.742 | ** | All routes |
| Equipment cleaning and maintenance | 0,0024 mg/m ³ | 0.020 | ** | Inhalation Exposure |
| | 0,2 mg/kg bw/day | 0.833 | ** | Dermal Exposure |
| | | 0.853 | ** | All routes |

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Health

Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

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

3 - Exposure Scenario Worker

1. Manufacture of substances

List of use descriptors

Sector(s) of Use SU3: Industrial uses
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC ERC1: Manufacture of substances.
Specific Environmental Release Category:
ESVOC SpERC 1.1.v1

List of names of contributing worker scenarios and corresponding PROCs PROC1: Use in closed process, no likelihood of exposure.
PROC2: Use in closed, continuous process with occasional controlled exposure.
PROC3: Use in closed batch process (synthesis or formulation).
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling / recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel / barge, road / rail car and bulk container).

2.1. Contributing exposure scenario controlling environmental exposure for Manufacture of substances.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).
Substance is complex UVCB. Predominantly hydrophobic.

Physical state Liquid

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Fraction of EU tonnage used in region: 0,1

Regional use tonnage (tons/year): 1,1 e7

Fraction of Regional tonnage used locally: 0,052

Annual site tonnage (tons/year): 6 e5

Maximum daily site tonnage (kg/day): 2 e6

Frequency and duration of use

Batch process Not available.

Continuous process Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10

Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

| Type | Emission days (days/year) | Emission factors | | | Remarks |
|------------------------------|---------------------------|------------------|--------|----------|---------|
| | | Air | Soil | Water | |
| initial release prior to RMM | 300 | 0,0001 | 0,0001 | 0,000003 | |

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Common practices vary across sites thus conservative process release estimates used.

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

| | |
|-----------------|--|
| Air | Treat air emission to provide a typical removal efficiency of (%): 90 |
| Soil | Not available. |
| Water | Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of \geq (%): 85,9. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%): 0 |
| Sediment | Not available. |
| Remarks | Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). Onsite wastewater treatment required. Prevent discharge of undissolved substance to or recover from onsite wastewater. |

Organisational measures to prevent/limit release from site Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant**Size of municipal sewage system/treatment plant (m3/d)**

| | |
|---|--|
| Type | Municipal STP |
| Discharge rate | 10000 |
| Treatment effectiveness | 88,8 |
| Sludge treatment technique | Not available. |
| Measures to limit air emissions | Not available. |
| Remarks | Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 2,6e5 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |

Conditions and measures related to external treatment of waste for disposal**Fraction of used amount transferred to external waste treatment**

| | |
|---------------------------------|---|
| Suitable waste treatment | Not available. |
| Disposal methods | Not available. |
| Treatment effectiveness | Not available. |
| Remarks | During manufacturing no waste of the substance is generated to treat. |

Conditions and measures related to external recovery of waste**Fraction of used amount transferred to external waste treatment**

| | |
|------------------------------------|---|
| Suitable recover operations | During manufacturing no waste of the substance is generated to recover. |
| Treatment effectiveness | Not available. |
| Remarks | Not available. |

Additional good practice advice beyond the REACH CSA Additional information on the basis for the allocation of the identified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
 Use in closed batch process (synthesis or formulation).
 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
 Use as laboratory reagent.

Product characteristics

| | |
|--|--|
| Concentration of the substance in a mixture | Covers percentage substance in the product up to 100 % (unless stated differently). |
| Physical form of the product | Liquid |
| Vapour pressure | Liquid, vapour pressure 0,5 - 10 kPa at STP. |
| Process temperature | Assumes use at not more than 20°C above ambient temperature, unless stated differently.; Assumes a good basic standard of occupational hygiene is implemented. |

Amounts used

Not available.

Frequency and duration of use

| Duration | Frequency of use | Remarks |
|----------|------------------|---|
| 8 | 1 day | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

| Area of use | Room size | Temperature | Ventilation rate | Remarks |
|-------------|-----------|-------------|------------------|---------|
|-------------|-----------|-------------|------------------|---------|

Other relevant operational conditions

Not available.

Risk management measures (RMM)

| | |
|---|--|
| Technical conditions and measures at process level (source) to prevent release | <p>General exposures (closed systems); Handle substance within a closed system.</p> <p>Process sampling, Outdoor; Sample via a closed loop or other system to avoid exposure.</p> <p>Bulk product storage; Store substance within a closed system.</p> <p>marine vessel/barge (un)loading; Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle.</p> <p>Equipment cleaning and maintenance; Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle.</p> |
| Technical conditions and measures to control dispersion from source towards the worker | <p>Laboratory activities; Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.</p> <p>Road tanker/rail car loading; Ensure material transfers are under containment or extract ventilation.</p> |
| Organizational measures to prevent/limit releases, dispersion and exposure | <p>General measures (carcinogens); Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.</p> |

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

General exposures (closed systems);
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Process sampling, Outdoor;
Avoid carrying out activities involving exposure for more than 15 minutes.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Bulk product storage;
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Laboratory activities;
Wear suitable gloves tested to EN374.

marine vessel/barge (un)loading;
Avoid carrying out activities involving exposure for more than 4 hours.
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Road tanker/rail car loading;
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment cleaning and maintenance;
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

| | Exposure level | RCR | Method | Remarks |
|---|--------------------------|-------|--------|---------------------|
| General exposures (closed systems) | 0,01 mg/m ³ | 0.058 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| General exposures (closed systems) + Process sampling + Outdoor | 0,5 mg/m ³ | 0.625 | ** | All routes |
| | 0,5 mg/m ³ | 0.292 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | | 0.858 | ** | All routes |
| General exposures (closed systems) | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Bulk product storage | 0,064 mg/m ³ | 0.320 | ** | All routes |
| | 0,34 mg/kg bw/day | 0.567 | ** | Inhalation Exposure |
| Laboratory activities | 0,03 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,5 mg/m ³ | 0.887 | ** | All routes |
| marine vessel/barge (un)loading | 0,5 mg/m ³ | 0.417 | ** | Inhalation Exposure |
| | 0,03 mg/kg bw/day | 0.1 | ** | Dermal Exposure |
| | | 0.517 | ** | All routes |
| | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| Road tanker/rail car loading | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | | 0.887 | ** | All routes |
| Equipment cleaning and maintenance | 0,17 mg/m ³ | 0.283 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.340 | ** | Dermal Exposure |
| | | 0.623 | ** | All routes |
| | 0,0024 mg/m ³ | 0.020 | ** | Inhalation Exposure |
| | 0,2 mg/kg bw/day | 0.750 | ** | Dermal Exposure |
| | | 0.853 | ** | All routes |

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>). Scaled local assessments for EU refineries have been performed using site-specific data and are attached in PETRORISK file in IUCLID section 13 - "Site-Specific Production" worksheet. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required. Consequently a Tier 2 assessment was performed in an attempt to refine conservative exposure assumptions and improve risk estimates. The Tier 2 analysis demonstrates that no refineries have RCRs > 1 (see Appendix 4 and PETRORISK file en IUCLID section 13 - "Tier 2 Site Specific Production worksheet"):

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.

4 - Exposure Scenario Worker

1. Use as a fuel

List of use descriptors

Sector(s) of Use SU3: Industrial uses

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles.
 ERC5: Industrial use resulting in inclusion into or onto a matrix.
 ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates).
 ERC6b: Industrial use of reactive processing aids.
 ERC6c: Industrial use of monomers for manufacture of thermoplastics.
 ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.
 Specific Environmental Release Category:
 ESVOC SpERC 1.1b.v1

List of names of contributing worker scenarios and corresponding PROCs

PROC1: Use in closed process, no likelihood of exposure.
 PROC2: Use in closed, continuous process with occasional controlled exposure.
 PROC3: Use in closed batch process (synthesis or formulation).
 PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
 PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
 PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity

Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use of processing aids in processes and products, not becoming part of articles.

Product characteristics

Concentration of the substance in a mixture

Covers percentage substance in the product up to 100 % (unless stated differently). Substance is complex UVCB. Predominantly hydrophobic.

Physical state

Liquid

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Fraction of EU tonnage used in region: 0,1

Regional use tonnage (tons/year): 1,1 e7

Fraction of Regional tonnage used locally: 0,14

Annual site tonnage (tons/year): 1,5 e6

Maximum daily site tonnage (kg/day): 5 e6

Frequency and duration of use

Batch process Not available.

Continuous process Emission days (days/year): 300

Environment factors not influenced by risk management

Local freshwater dilution factor: 10

Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

| Type | Emission days (days/year) | Emission factors | | | Remarks |
|------------------------------|---------------------------|------------------|------|------------|---------|
| | | Air | Soil | Water | |
| initial release prior to RMM | 300 | 0,0007 | 0 | 0,00000044 | |

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Common practices vary across sites thus conservative process release estimates used.

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

Air Treat air emission to provide a typical removal efficiency of (%): 95
Soil Not available.
Water Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of \geq (%): 87,7. If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%): 0
Sediment Not available.
Remarks Risk from environmental exposure is driven by freshwater sediment. Onsite wastewater treatment required. Prevent discharge of undissolved substance to or recover from onsite wastewater.

Organisational measures to prevent/limit release from site Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type Municipal STP
Discharge rate 2000
Treatment effectiveness 88,8
Sludge treatment technique Not available.
Measures to limit air emissions Not available.
Remarks Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d): 5,2e6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) 88,8

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment Not available.
Disposal methods Not available.
Treatment effectiveness Not available.
Remarks Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations This substance is consumed during use and no waste of the substance is generated.
Treatment effectiveness Not available.
Remarks Not available.

Additional good practice advice beyond the REACH CSA Additional information on the basis for the allocation of the identified OCs and RMMs is contained in the PETRORISK file.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
Use in closed batch process (synthesis or formulation).
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
Use as laboratory reagent.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product Liquid
Vapour pressure Liquid, vapour pressure 0,5 - 10 kPa at STP.

Process temperature

Assumes use at not more than 20°C above ambient temperature, unless stated differently.;
Assumes a good basic standard of occupational hygiene is implemented.

Amounts used

Not available.

Frequency and duration of use

| Duration | Frequency of use | Remarks |
|----------|------------------|---|
| 8 | 1 day | Covers daily exposures up to 8 hours (unless stated differently). |

Human factors not influenced by risk management**Exposed skin areas**

Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

| Area of use | Room size | Temperature | Ventilation rate | Remarks |
|-------------|-----------|-------------|------------------|---------|
|-------------|-----------|-------------|------------------|---------|

Other relevant operational conditions

Not available.

Risk management measures (RMM)**Technical conditions and measures at process level (source) to prevent release**

General exposures (closed systems);
Handle substance within a closed system.
Sample via a closed loop or other system to avoid exposure.

Bulk closed unloading, Outdoor;
Transfer via enclosed lines.

Bulk product storage;
Handle substance within a closed system.

Equipment cleaning and maintenance;
Drain down and flush system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

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

General exposures (closed systems) and Product sampling;
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).

Drum/batch transfers;
Ensure material transfers are under containment or extract ventilation.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Operation of solids filtering equipment;
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Bulk product storage;
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Organizational measures to prevent/limit releases, dispersion and exposure

General measures (carcinogens);
Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

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

General exposures (closed systems);
 Avoid carrying out activities involving exposure for more than 4 hours.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

General exposures (closed systems) and Product sampling;
 Avoid carrying out activities involving exposure for more than 1 hour.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Bulk closed unloading, Outdoor;
 Avoid carrying out activities involving exposure for more than 1 hour.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Drum/batch transfers;
 Avoid carrying out activities involving exposure for more than 1 hour.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Operation of solids filtering equipment;
 Avoid carrying out activities involving exposure for more than 4 hours.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Bulk product storage;
 Avoid carrying out activities involving exposure for more than 4 hours.
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Use as a fuel, (closed systems);
 Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Equipment cleaning and maintenance;
 Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

| | Exposure level | RCR | Method | Remarks |
|--|--------------------------|------------|---------------|---------------------|
| General exposures (closed systems) | 0,01 mg/m ³ | 0.058 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| General exposures (closed system) + Process sampling | 0,5 mg/m ³ | 0.625 | ** | All routes |
| | 0,5 mg/m ³ | 0.250 | ** | Inhalation Exposure |
| General exposures (closed systems) | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,064 mg/m ³ | 0.817 | ** | All routes |
| General exposures (closed systems) | 0,064 mg/m ³ | 0.250 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Bulk closed unloading + Outdoor | 0,064 mg/m ³ | 0.887 | ** | All routes |
| | 0,064 mg/m ³ | 0.283 | ** | Inhalation Exposure |
| Bulk closed unloading + Outdoor | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.887 | ** | All routes |
| Drum/batch transfers | 0,17 mg/m ³ | 0.283 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Drum/batch transfers | 0,34 mg/kg bw/day | 0.850 | ** | All routes |
| | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| Operation of solids filtering equipment | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,34 mg/kg bw/day | 0.887 | ** | All routes |
| Bulk product storage (closed systems) | 0,064 mg/m ³ | 0.320 | ** | Inhalation Exposure |
| | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| Bulk product storage (closed systems) | 0,064 mg/m ³ | 0.887 | ** | All routes |
| | 0,01 mg/m ³ | 0.083 | ** | Inhalation Exposure |
| Equipment cleaning and maintenance | 0,34 mg/kg bw/day | 0.567 | ** | Dermal Exposure |
| | 0,0024 mg/m ³ | 0.650 | ** | All routes |
| Equipment cleaning and maintenance | 0,0024 mg/m ³ | 0.020 | ** | Inhalation Exposure |
| | 0,2 mg/kg bw/day | 0.833 | ** | Dermal Exposure |
| | | 0.853 | ** | All routes |

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Available hazard data do not support the need for a DNEL to be established for other health effects. Risk Management Measures are based on qualitative risk characterisation.