SAFETY DATA SHEET
Carbon Black Feed Stock/D8.(CBF)
According to Regulation (EU) No 453/2010

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier
Product name Carbon Black Feed Stock/D8.(CBF)
Product No. 00228268, 1385600, 1380500
Synonyms, Trade Names Carbon Black Feedstock, Anthracene Oil Heavy, Carbon Black Oils.
REACH Registration number 01-2119539472-38-0000
CAS-No. 90640-86-1
EU Index No. 648-044-00-5
EC No. 292-607-4

1.2. Relevant identified uses of the substance or mixture and uses advised against
Identified uses Component used in the manufacture of carbon black.
Uses advised against No specific uses advised against are identified.

1.3. Details of the supplier of the safety data sheet
Supplier KOPPERS INTERNATIONAL BV.
Carbon Materials and Chemicals.
Molenlaan 30
P O Box 9
1420 AA Uithoorn
Netherlands
Tel +44(0)1724 281555, Technical Enquiry.
Tel +45(0)63313100, Tel+31(0)297 545533
E mail euorguksds@koppers.eu

1.4. Emergency telephone number
NCEC +44(0)1865 407333

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture
Classification (EC 1272/2008)
| Physical and Chemical Hazards | Not classified. |
| Human health | Skin Irrit. 2 - H315; Skin Sens. 1 - H317; Muta. 1B - H340; Carc. 1B - H350; Rep. 2 - H361fd |
| Environment | Aquatic Chronic 3 - H412 |

Classification (67/548/EEC)
| Carc. Cat. 2; R45, Muta. Cat. 2; R46, Rep. Cat. 3; R62, R63, Xi; R38, R43, R52/53 |

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Classification Notes
Classification is based on information from the REACH dossier and not the conventional method based on the classification of the individual components.

2.2. Label elements
EC No. 292-607-4
Contains DISTILLATE (COAL TAR), HEAVY OILS; HEAVY ANTHRACENE OIL
BENZO[A]PYRENE

Label In Accordance With (EC) No. 1272/2008
Signal Word Danger

Hazard Statements

- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H340 May cause genetic defects.
- H350 May cause cancer.
- H361fd Suspected of damaging fertility or the unborn child.
- H412 Harmful to aquatic life with long lasting effects.

Precautionary Statements

- P201 Obtain special instructions before use.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P281 Use personal protective equipment as required.
- P308+313 IF exposed or concerned: Get medical advice/attention.
- P501 Dispose of contents/container in accordance with regional regulations.

Supplemental label information

- RCH002 Restricted to professional users.

2.3. Other hazards

This product contains a substance classified as PBT. May cause photosensitivity.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

<table>
<thead>
<tr>
<th>Substance Description</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISTILLATE (COAL TAR), HEAVY OILS; HEAVY ANTHRACENE OIL</td>
<td>60-100%</td>
</tr>
<tr>
<td>CAS-No.: 90640-86-1</td>
<td>EC No.: 292-607-4</td>
</tr>
<tr>
<td>Registration Number: 01-2119539472-38-000</td>
<td></td>
</tr>
<tr>
<td>This is a complex mixture of constituents, a UVCB substance of variable composition. Candidate listed, vPvB and PBT.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classification (EC 1272/2008)</th>
<th>Classification (67/548/EEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Irr. 2 - H315</td>
<td>Carc. Cat. 2; R45,</td>
</tr>
<tr>
<td>Skin Sens. 1 - H317</td>
<td>Muta. Cat. 2; R46,</td>
</tr>
<tr>
<td>Muta. 1B - H340</td>
<td>Repr. Cat. 3; R62,R63,</td>
</tr>
<tr>
<td>Carc. 1B - H350</td>
<td>Xi; R38,</td>
</tr>
<tr>
<td>Repr. 2 - H361fd</td>
<td>R43,R52/53,</td>
</tr>
<tr>
<td>Aquatic Chronic 3 - H412</td>
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</table>

<table>
<thead>
<tr>
<th>PHENANTHRENE</th>
<th>5-20%</th>
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<tr>
<td>CAS-No.: 85-01-8</td>
<td>EC No.: 201-581-5</td>
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<tr>
<th>Classification (EC 1272/2008)</th>
<th>Classification (67/548/EEC)</th>
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<tbody>
<tr>
<td>Acute Tox. 4 - H302</td>
<td>Xn; R22,</td>
</tr>
<tr>
<td>Skin Irr. 2 - H315</td>
<td>Xi; R36/37/38,</td>
</tr>
<tr>
<td>Eye Irrit. 2 - H319</td>
<td>N; R50,</td>
</tr>
<tr>
<td>STOT SE 3 - H335</td>
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<tr>
<td>Aquatic Acute 1 - H400</td>
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<td>--------------------------</td>
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<tr>
<td>Fluoranthene</td>
<td>206-44-0</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Pyrene</td>
<td>129-00-0</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Anthracene</td>
<td>120-12-7</td>
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<td></td>
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</tr>
<tr>
<td>Benzo[a]pyrene</td>
<td>50-32-8</td>
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</table>

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

**REACH Registration number**
01-2119539472-38-0000

**CAS-No.**
90640-86-1

**EU Index No.**
648-044-00-5

**EC No.**
292-607-4

**Ingredient notes**
Anthracene oil (CAS 90640-86-1) was listed on 13 January 2010 as an authorisation candidate according to Art. 59(1, 10) of the REACH Regulation No. 1907/2006 after classification as a PBT substance. The legality of the PBT classification is challenged by industry and is currently being reassessed by the General Court, Luxembourg (Case T-96/10).

**Composition Comments**
This is a complex mixture of constituents, a UVCB substance of variable composition.

### SECTION 4: FIRST AID MEASURES

**4.1. Description of first aid measures**
Carbon Black Feed Stock/D8.(CBF)

General information
CAUTION! First aid personnel must be aware of own risk during rescue! General first aid, rest, warmth and fresh air. Burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital.

Inhalation
Remove victim immediately from source of exposure. Provide fresh air, warmth and rest, preferably in a comfortable upright sitting position. If breathing stops, provide artificial respiration. Get medical attention if any discomfort continues.

Ingestion
NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! DO NOT INDUCE VOMITING! If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Rinse mouth thoroughly. Get medical attention immediately!

Skin contact
The molten product can cause serious burns. Remove contaminated clothing immediately and wash skin with soap and water. Continue to rinse for at least 15 minutes. Get medical attention promptly if symptoms occur after washing.

Eye contact
The molten product can cause serious burns. Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention immediately. Continue to rinse.

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

General information
The severity of the symptoms described will vary dependant of the concentration and the length of exposure.

Inhalation
No specific symptoms noted.

Ingestion
May cause discomfort if swallowed. Nausea, vomiting.

Skin contact
May cause sensitisation by skin contact.

Eye contact
Prolonged contact may cause redness and/or tearing.

4.3. Indication of any immediate medical attention and special treatment needed
No recommendation given, but first aid may still be required in case of accidental exposure, inhalation or ingestion of this chemical. If in doubt, GET MEDICAL ATTENTION PROMPTLY!

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media
Fire can be extinguished using: Foam, carbon dioxide or dry powder. Water spray, fog or mist.

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

Hazardous combustion products
Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

Specific hazards

5.3. Advice for firefighters

Special Fire Fighting Procedures
Keep up-wind to avoid fumes. Move container from fire area if it can be done without risk. Use water SPRAY only to cool containers! Do not put water on leaked material. Keep run-off water out of sewers and water sources. Dike for water control.

Protective equipment for fire-fighters
Leave danger zone immediately. Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Provide adequate ventilation. Avoid contact with eyes and prolonged skin contact.

6.2. Environmental precautions

Do not discharge into drains, water courses or onto the ground. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.
6.3. Methods and material for containment and cleaning up

Wear necessary protective equipment. Stop leak if possible without risk. DO NOT touch spilled material! If material is at an elevated temperature, use sand or earth to make a barrier whilst material solidifies. Collect spillage in containers, seal securely and deliver for disposal according to local regulations. Clean contaminated area with oil-removing material.

6.4. Reference to other sections

For personal protection, see section 8. Collect and dispose of spillage as indicated in section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Provide adequate ventilation. Do not eat, drink or smoke when using the product. Wear protective skin cream on exposed skin before and during work shift. To reduce sun sensitivity a sun-blocking lotion (SPF 15+) can also be applied prior to application of a protective cream. Review risk management measures when product is handled by pregnant or breastfeeding women. Persons susceptible to allergic reactions should not handle this product.

7.2. Conditions for safe storage, including any incompatibilities

Keep in original container. Store at moderate temperatures in dry, well ventilated area. Keep away from food, drink and animal feeding stuffs. Store away from: Oxidising material.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2. For further information see attached Exposure Scenario.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Ingredient Comments
No exposure limits noted. This substance is a UVCB and conventional methods of defining DNEL and PNEC are not appropriate. It is not possible to identify a single representative DNEL and PNEC.

<table>
<thead>
<tr>
<th>DNEL</th>
<th>Dermal</th>
<th>Long Term</th>
<th>3</th>
<th>mg/kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Inhalation.</td>
<td>Long Term</td>
<td>0.57</td>
<td>µg/m³</td>
</tr>
</tbody>
</table>

**BENZO[A]PYRENE (CAS: 50-32-8)**

<table>
<thead>
<tr>
<th>DNEL</th>
<th>Dermal</th>
<th>Long Term</th>
<th>Systemic Effects</th>
<th>0.57 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Inhalation.</td>
<td>Long Term</td>
<td>Local Effects</td>
<td>10 µg/day</td>
</tr>
<tr>
<td>Industry</td>
<td>Dermal</td>
<td>Long Term</td>
<td>Local Effects</td>
<td>0.57 µg/m³</td>
</tr>
</tbody>
</table>

**PHENANTHRENE (CAS: 85-01-8)**

<table>
<thead>
<tr>
<th>DNEL</th>
<th>Dermal</th>
<th>Long Term</th>
<th>Systemic Effects</th>
<th>1.9 mg/kg/day</th>
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</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Inhalation.</td>
<td>Long Term</td>
<td>Local Effects</td>
<td>0.57 µg/m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PNEC</th>
<th>Long Term</th>
<th>1.1 µg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marinewater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STP</td>
<td>1</td>
<td>mg/l</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

**Protective equipment**

**Engineering measures**
Provide adequate general and local exhaust ventilation. All handling to take place in well-ventilated area.

**Respiratory equipment**
In case of inadequate ventilation and work of brief duration, use suitable respiratory equipment. Use respiratory equipment with gas filter, type AX.
**Hand protection**

Wear protective gloves. Use protective gloves made of: Polyethylene/Ethylene Vinyl Alcohol (PE/EVAL). In the molten form wear appropriate heat resistant gloves.

**Eye protection**

Wear full-face visor or shield. For the molten form: A face shield is recommended.

**Other Protection**

Provide eyewash station. Wear full body industrial type work clothing, including chemical resistant boots.

**Hygiene measures**

Promptly remove any clothing that becomes contaminated. Wash promptly if skin becomes contaminated. Wash hands at the end of each work shift and before eating, smoking and using the toilet. When using do not eat, drink or smoke. Contaminated clothing to be placed in closed container until disposal or decontamination. Warn cleaning personnel of chemical's hazardous properties.

**Skin protection**

When handling the product at elevated temperatures: Wear appropriate heat resistant clothing.

**Thermal hazards**

The molten product can cause serious burns.

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**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>Brown - black</td>
</tr>
<tr>
<td>Odour</td>
<td>Coal tar.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Immiscible with water</td>
</tr>
<tr>
<td>Initial boiling point and boiling range (°C)</td>
<td>&gt;270°C 1013 hPa</td>
</tr>
<tr>
<td>Melting point (°C)</td>
<td>&gt;50°C</td>
</tr>
<tr>
<td>Melting point result expressed as crystallising point</td>
<td></td>
</tr>
<tr>
<td>Relative density</td>
<td>1.10 - 1.30 g/cm³ @20°C</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>Not available.</td>
</tr>
<tr>
<td>pH-Value, Conc. Solution</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Decomposition temperature (°C)</td>
<td>&gt;400°C</td>
</tr>
<tr>
<td>Flash point (°C)</td>
<td>&gt;100°C PM Closed cup.</td>
</tr>
<tr>
<td>Auto Ignition Temperature (°C)</td>
<td>&gt;550°C</td>
</tr>
<tr>
<td>Partition Coefficient (N-Octanol/Water)</td>
<td>Highly insoluble in water.</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not considered to be explosive.</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Does not meet the criteria for oxidising.</td>
</tr>
</tbody>
</table>

**9.2. Other information**

No information required.

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**SECTION 10: STABILITY AND REACTIVITY**

**10.1. Reactivity**

There are no known reactivity hazards associated with this product.

**10.2. Chemical stability**

Stable under normal temperature conditions and recommended use.

**10.3. Possibility of hazardous reactions**
Hazardous Polymerisation
Will not polymerise.

10.4. Conditions to avoid
Avoid heat, flames and other sources of ignition.

10.5. Incompatible materials

Materials To Avoid
Strong oxidising substances.

10.6. Hazardous decomposition products

Fire or high temperatures create: Toxic gases/vapours/fumes of: Carbon monoxide (CO), Carbon dioxide (CO2), Hydrocarbons.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Toxicological information
The toxicity of this substance has been assessed during REACH registration.

Acute toxicity:
Acute Toxicity (Oral LD50)
> 2000 mg/kg Rat
Acute Toxicity (Dermal LD50)
> 2000 mg/kg
Acute Toxicity (Inhalation LC50)
Scientifically unjustified.

Skin Corrosion/Irritation:

Dose
0.5ml  4 hr Rabbit
Erythema/eschar score
Well defined erythema (2).
Oedema score
Slight oedema - edges of area well defined by definite raising (2).
Slightly irritating.

Serious eye damage/irritation:
Not Irritating.

Respiratory or skin sensitisation:

Skin sensitisation
Guinea pig maximization test (GPMT): Guinea Pig
Sensitising.

Germ cell mutagenicity:

Genotoxicity - In Vitro
Gene Mutation:
Positive.

Reproductive Toxicity:

Reproductive Toxicity - Fertility
Fertility: NOAEL 25 mg/kg bw/day Oral Rat F1

Aspiration hazard:

Based on available data the classification criteria are not met.

Inhalation
When heated, irritating vapours may be formed.
Ingestion
May cause discomfort if swallowed. May cause stomach pain or vomiting.

Skin contact
Irritating to skin. May cause sensitivity to sunlight. May cause skin disorders if contact is repeated or prolonged. Prolonged contact may cause central nervous system damage, skin cancer or scrotal cancer. The molten product can cause serious burns.

Eye contact
May cause temporary eye irritation.

Health Warnings
Prolonged exposure to the preparation may cause serious health effects. Known or suspected carcinogen for humans.

Route of entry
Skin and/or eye contact.

Target Organs
Skin

Medical Symptoms
No specific symptoms noted, but this chemical may still have adverse health impact, either in general or on certain individuals.

Medical Considerations
Persons with rash are directed to skin expert for examination of allergic eczema.

Specific effects
Contains a substance/a group of substances with possible risk of harm to the unborn child and with possible risk of impaired fertility. May cause heritable damage.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity
The product contains a substance which is harmful to aquatic organisms and which may cause long term adverse effects in the aquatic environment.

Ecotoxicity on ingredients.

BENZO[A]PYRENE (CAS: 50-32-8)

Ecotoxicity
The product contains a substance which is very toxic to aquatic organisms and which may cause long term adverse effects in the aquatic environment.

12.1. Toxicity

Acute Toxicity - Fish
96 hours > 100 mg/l Brachydanio rerio (Zebra Fish) LL50

Acute Toxicity - Aquatic Invertebrates
EL50 48 hours 22.4 mg/l Daphnia magna

Acute Toxicity - Aquatic Plants
EL50 72 hours 48 mg/l Desmodesmus subspicatus

Acute Toxicity - Terrestrial
EC10 21 days ~ 14 mg/kg soil dw Soil Microorganisms
Ecological information on ingredients.

**BENZO[A]PYRENE (CAS: 50-32-8)**

**Acute Toxicity - Fish**
Not available.

**Acute Toxicity - Aquatic Invertebrates**
EC50 48 hours 0.25 mg/l Daphnia magna

**Acute Toxicity - Aquatic Plants**
EC50 72 hours 0.02 mg/l

**PHENANTHRENE (CAS: 85-01-8)**

NOEC 0.011 mg/l Freshwater fish:
NOEC 14 days 50 mg/kg sediment dw

**Chronic Toxicity - Aquatic Invertebrates**
EC10 21 days 0.013 mg/l Daphnia magna

12.2. Persistence and degradability

**Degradability**
The product is not readily biodegradable in water, sediment and soil but contains inherently biodegradable components, e.g. phenanthrene.

**Stability (Hydrolysis)**
Scientifically unjustified.

12.3. Bioaccumulative potential

**Bioaccumulative potential**
Moderate to high bioaccumulation potential.

**Bioaccumulation factor**
BCF > 500

The components of this UVCB substance have individual BCF values in fish above 500.

**Partition coefficient**
Highly insoluble in water.

12.4. Mobility in soil

**Mobility:**
The product has poor water-solubility.

**Adsorption/Desorption Coefficient**
Soil log Koc ~ 4 @20°C

The LogKoc value is calculated from the logPow values of individual components.

12.5. Results of PBT and vPvB assessment

The data show that the properties of the substance do not allow a direct comparison with all the criteria in Annex XIII. The substance is not considered PBT/ vPvB.
12.6. Other adverse effects
No information required.

SECTION 13: DISPOSAL CONSIDERATIONS

General information
When handling waste, consideration should be made to the safety precautions applying to handling of the product.

13.1. Waste treatment methods
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class
EWC - code:05 06 99 (waste from pyrolysis of coal, other non specified waste)

SECTION 14: TRANSPORT INFORMATION

General
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number
No information required.

14.2. UN proper shipping name
No information required.

14.3. Transport hazard class(es)
Transport Labels
No transport warning sign required.

14.4. Packing group
No information required.

14.5. Environmental hazards
Environmentally Hazardous Substance/Marine Pollutant
Not environmentally hazardous.

14.6. Special precautions for user
No information required.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
No information required.

SECTION 15: REGULATORY INFORMATION

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

Authorisations (Title VII Regulation 1907/2006)
No specific authorisations are noted for this product.

Restrictions (Title VIII Regulation 1907/2006)
No specific restrictions of use are noted for this product.

15.2. Chemical Safety Assessment
A chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

| Revision Date | 28/02/2012 |
| Revision | 1 |
| Supersedes date | 10/09/2009 |

Risk Phrases in Full
- R22: Harmful if swallowed.
- R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R36/37/38: Irritating to eyes, respiratory system and skin.
- R38: Irritating to skin.
- R45: May cause cancer.
- R61: May cause harm to the unborn child.
- R46: May cause heritable genetic damage.
- R43: May cause sensitisation by skin contact.
- R60: May impair fertility.
- R63: Possible risk of harm to the unborn child.
- R62: Possible risk of impaired fertility.
- R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R50: Very toxic to aquatic organisms.

Hazard Statements in Full
- H302: Harmful if swallowed.
- H315: Causes skin irritation.
- H317: May cause an allergic skin reaction.
- H319: Causes serious eye irritation.
- H335: May cause respiratory irritation.
- H340: May cause genetic defects.
- H350: May cause cancer.
- H360FD: May damage fertility or the unborn child.
- H361fd: Suspected of damaging fertility or the unborn child.
- H400: Very toxic to aquatic life.
- H410: Very toxic to aquatic life with long lasting effects.
- H412: Harmful to aquatic life with long lasting effects.

Disclaimer
The information set forth in this Safety Data Sheet does not purport to be all-inclusive and should be used only as a guide. Whilst the information and recommendations set forth herein are believed to be accurate, the company makes no warranty regarding such information and recommendations and disclaims all liability from reliance thereon.
Anthracene Oil (High) – benzo[def]chrysene content (BaP) 0.005 % - 0.4%

Summary Exposure Scenarios

Summary Exposure Scenarios have been prepared for use as Annexes for the SDS for use in industrial settings and by professional users. Use by consumers has not been considered.

The full exposure scenarios for each of the use types that were prepared as part of the REACH registration process are available on request.

These summary Exposure Scenarios set out the conditions of handling and use that were applied to estimate the level of exposure in the REACH Chemical Safety Report. These scenarios were used to confirm that projected levels of exposure to workers and the environment were within estimated margins of safety.

To ensure exposure is below levels of concern, risk management measures are necessary. These risk management measures are communicated in the SDS. Any scenarios of use not covered in this annex will need to be checked by the user for onward supplier to confirm that exposure is within the limitations covered in this document.

These summary ES only consider uses of the substance and mixtures and not end use of articles.

Special note on benzo[def]chrysene:
These summary exposure scenarios assume a benzo[def]chrysene (referred to as benzo (a) pyrene or BaP) content of maximum 1%. When using material with lower BaP content, higher exposure may be acceptable, but if greater than 1%, more thorough exposure controls are needed than presented in these Exposure Scenarios.

Special note on phenanthrene
The component phenanthrene has been used as a marker to determine the environmental predicted no effect concentration, based on maximum 31%. When using material with lower phenanthrene content, higher exposure to the environment may be acceptable, but if greater than 31%, more thorough exposure controls are needed than presented in these Exposure Scenarios.

Exposure Scenarios for use covered by CSR (link to Section 1 of SDS):
- Production of Anthracene Oil by distillation of coal tar
- Use of Anthracene Oil in the carbon and carbon and graphite industry.
- Use of Anthracene Oil in the aluminium industry
- Use of Anthracene Oil in the metallurgic smelting industry
- Use of Anthracene Oil in the electro-steel industry
- Use of Anthracene Oil in the refractory supply chain
- Formulation and end-use of coatings, paints, waterproofing material and sealants (adhesives) containing Anthracene Oil
- Use of Anthracene Oil as absorbent for industrial gas cleaning (scrubber) or industrial solvent

Within each of these key uses, a number of Exposure Scenarios were developed to cover generic applications, such as raw material handling as well as some specific applications.

Index of Summary Exposure Scenarios

ES1 Distillation of Anthracene Oil
ES2 Handling of Anthracene Oil, industrial settings
ES3 Transfer and Packaging of Green Products
ES4 Mixing and blending operations
ES5 Forming and pressing into shapes
ES6 Baking into articles at up to 3000°C
ES7 Cleaning and maintenance
Laboratory activities

Use of coatings, paints, waterproofing material adhesives, sealants, etc
ES1 Production of Anthracene Oil by distillation of coal tar

Sector of use – Use of bulk, large scale chemicals, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 1 Distillation of Anthracene Oil</td>
</tr>
</tbody>
</table>

This exposure scenario refers to the distillation of liquid Anthracene Oil in industrial settings, using dedicated equipment and facilities or general non-dedicated equipment. Anthracene oil is a liquid, and sold as such or mixed with coal tar pitch, petroleum pitch and other oils (like anthracene oil). The mixing process is closed; transfer is by closed stationary transfer lines to a closed mixer. From the storage, the Anthracene oil is transferred by temporary hoses to a (heated) truck, rail car or ship. Samples are mainly taken after distillation and analysed in a laboratory.

2. Operational conditions and risk management measures

**Human Health**

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 2: Distillation process</td>
<td>Use in closed, continuous process with occasional controlled exposure (incl. sampling and pumping to storage)</td>
<td></td>
</tr>
<tr>
<td>PROC 3: Distillation process</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td></td>
</tr>
</tbody>
</table>

**Environment (industrial)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC1</td>
<td>Manufacture of substances</td>
<td>Closed process</td>
<td>Indoor and outdoor use</td>
</tr>
</tbody>
</table>

**2.1 Control of workers exposure**

<table>
<thead>
<tr>
<th>Product characteristic</th>
<th>Liquid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amounts used</td>
<td>Daily use maximum 90 000 kg, total 32000 t per annum, 365 days</td>
</tr>
<tr>
<td>Frequency and duration of use/exposure</td>
<td>Covers daily exposures up to 8 hours</td>
</tr>
<tr>
<td>Operational conditions affecting workers exposure</td>
<td>Assumes a good basic standard of occupational hygiene is implemented Process temperature up to 290 °C</td>
</tr>
<tr>
<td>Technical conditions and measures at process level (source) to prevent release</td>
<td>Contained closed processes, with occasional breach for sampling and maintenance</td>
</tr>
<tr>
<td>Technical conditions and measures to control dispersion from source towards the worker</td>
<td>Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of &lt; 11.4 µg/m³ in places where respiratory equipment is provided offering 95% minimum control. Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 µg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.</td>
</tr>
</tbody>
</table>
## Organisational measures to prevent/limit releases, dispersion and exposure

No specific measures identified. Established management systems would include general industrial hygiene practice e.g.:

- Information and training of workers on prevention of exposure/accidents,
- Procedures for control of personal exposure (hygiene measures)
- Regular cleaning of equipment and floors, extended workers instruction-manuals
- Procedures for process control and maintenance, including extraction systems
- Personal protection measures (see below)
- Periodical medical surveys

## Conditions and measures related to personal protection, hygiene and health evaluation

Different levels of control are needed for different operations, in combination with specific activity training, resulting in 95% exposure reduction by inhalation or dermal contact.

As a minimum, provide good forced ventilation (e.g. with air supplied or extracted with powered fan).

- Wear suitable gloves (tested to EN374) and eye protection
- Wear suitable gloves (tested to EN374), coverall and eye protection
- 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
- Wear a respirator conforming to EN140 with Type A filter or better if atmospheric concentrations greater than 0.57 µg/m³

## 2.2 Control of environmental exposure

### Product characteristics

Substance is complex UVCB
- Predominantly hydrophobic
- Not biodegradable

### Amounts used

Daily use maximum 90,000 kg, total 32,000 t per annum, 365 days

### Environment factors not influenced by risk management

Default factors used (10 for freshwater, 100 for marine)

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

Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.

If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%

- Onsite waste water is treated via:
  - Biological treatment – aerobic, and/or
  - Oil-Water Separation

Prevent discharge of undissolved substance to or recover from wastewater.

Treat air emission to provide a typical removal efficiency of: 98% [TCR7].

- Off-gases are treated via:
  - Waste gas treatment - thermal oxidation

### Conditions and measures related to external treatment of waste for disposal

Maximum release to air 27.2 kg/day

- Sludge should be incinerated, contained or reclaimed.
- Prevent environmental discharge consistent with regulatory requirements.
- Maximum loss to waste water 20 kg/day
- Pre-treatment before leaving site = 99% removal (0.2 kg/day)
- Local treatment works 100 m³/day minimum
- Final dilution factor 10 default freshwater
- Final dilution factor 100 default marine

If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.
3 Exposure estimation

Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069 mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment. Long-term local dermal DNEL estimated 10 µg/cm²

Environment:
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES2 Transfer of Anthracene Oil and Mixtures Containing Anthracene Oil

Sector of use – Use of bulk, large scale chemicals, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 2 Transfer of anthracene oil and mixtures containing anthracene oil, unloading and storage operations</td>
</tr>
</tbody>
</table>

2. Operational conditions and risk management measures

**Human Health**

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 8a</td>
<td>Transfer of chemicals</td>
<td>Raw material handling, including discharge from containers and transfer of products. Cleaning and maintenance operations, open or non-dedicated facilities</td>
</tr>
<tr>
<td>PROC 8b</td>
<td>Transfer of chemicals</td>
<td>Raw material handling, including discharge from containers and transfer of products. Cleaning and maintenance operations, controlled and dedicated facilities</td>
</tr>
<tr>
<td>PROC9</td>
<td>Transfer of chemicals</td>
<td>Transfer into small containers (dedicated filling line)</td>
</tr>
</tbody>
</table>

**Environment (industrial)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Open, industrial</td>
<td>Outdoor and indoor use</td>
</tr>
</tbody>
</table>

**2.1 Control of workers exposure**

**Product characteristic**

Liquid

Covers percentage substance in the product up to 25 % of mixture

**Amounts used**

Daily use maximum 106667 kg, total 32000 t per annum, 365 days

**Frequency and duration of use/exposure**

Daily use, up to 8 hrs/day

**Operational conditions affecting workers exposure**

Indoor and outdoor handling, with no limit on room size specified in CSR. Assumes a good basic standard of occupational hygiene is implemented;

Process temperature up to 200 °C

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

No measures identified

**Technical conditions and measures to control dispersion from source**

Handle substance or mixtures within a predominantly closed system provided with controlled (extract) ventilation. Avoid all skin contact with product.

Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations
Towards the worker

of < 11.4 µg/m³ in places where respiratory equipment is provided offering 95% minimum control. Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 µg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.

Organisational measures to prevent /limit releases, dispersion and exposure

Established management systems would include general industrial hygiene practice e.g.:

- information and training of workers on prevention of exposure/accidents,
- procedures for control of personal exposure (hygiene measures)
- regular cleaning of equipment and floors, extended workers instruction-manuals
- procedures for process control and maintenance, including extraction systems
- personal protection measures (see below)
- periodical medical surveys

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

Different levels of control are needed for different operations, in combination with specific activity training, resulting in 95% exposure reduction by inhalation or dermal contact.

As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).

Wear suitable gloves (tested to EN374) and eye protection

Wear suitable gloves (tested to EN374), coverall and eye protection

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

Wear a respirator conforming to EN140 with Type A filter or better if atmospheric concentrations greater than 0.57 µg/m³

2.2 Control of environmental exposure

Product characteristics

Liquid with temperature up to 200°C or solid at environmental temperatures. Low dust content.

Substance is complex UVCB, predominantly hydrophobic.

Not biodegradable

Amounts used

Daily use maximum 106,667 kg, total 32000 t per annum, 365 days

Environment factors not influenced by risk management

Default factors used (10 for freshwater, 100 for marine)

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

Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.

If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%

Onsite waste water is treated via:

- Biological treatment – aerobic, and/or
- Oil-Water Separation

Prevent discharge of undissolved substance to or recover from wastewater.

Treat air emission to provide a typical removal efficiency of: 98% [TCR7].

Off-gases are treated via:

- Waste gas treatment - thermal oxidation

Conditions and measures related to external treatment of waste for disposal

Maximum release to air 27.2 kg/day

Sludge should be incinerated, contained or reclaimed.

Prevent environmental discharge consistent with regulatory requirements.

Maximum loss to waste water 20 kg/day

Pre-treatment before leaving site = 99% removal (0.2 kg/day)

Local treatment works 100 m³ / day minimum

Final dilution factor 10 default freshwater
Final dilution factor 100 default marine
If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.

### 3 Exposure estimation

#### Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)

Dermal systemic exposure estimated 0.069mg/kg/day

Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)

Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment. Long-term local dermal DNEL estimated 10 µg/cm²

#### Environment:
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)

PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);

PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. **Guidance to DU to evaluate whether boundaries set by the ES are being met**

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES3 Transfer and Packaging of Green Products Containing Anthracene Oil

Sector of use – Use of bulk, large scale chemicals, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 3 Transfer and packaging of green products containing anthracene oil</td>
</tr>
</tbody>
</table>

This exposure scenario refers to the handling of green products containing Anthracene Oil or Anthracene Oil mixtures in industrial settings using dedicated equipment and facilities or general non-dedicated equipment.

There is a tendency to have a more open system in cases where the green products have a more solid appearance, e.g. pressed shapes may be transferred openly.

Aluminium industry receives packed ramming paste in e.g. big bags together with the cathodes.

2. Operational conditions and risk management measures

Human Health

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 8a</td>
<td>Transfer of chemicals</td>
<td>Raw material handling, including discharge from containers and transfer of products. Cleaning and maintenance operations, open or non-dedicated facilities</td>
</tr>
<tr>
<td>PROC 8b</td>
<td>Transfer of chemicals</td>
<td>Raw material handling, including discharge from containers and transfer of products. Cleaning and maintenance operations, controlled and dedicated facilities</td>
</tr>
<tr>
<td>PROC9</td>
<td>Transfer of chemicals</td>
<td>Transfer of chemicals into small containers (dedicated filling line)</td>
</tr>
</tbody>
</table>

Environment (industrial)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Open, industrial</td>
<td>Outdoor and indoor use</td>
</tr>
</tbody>
</table>

2.1 Control of workers exposure

Product characteristic

Solids with low dustiness

Covers percentage substance in the product up to 25% of mixture

Amounts used

Daily use maximum 106,667 kg, total 32000 t per annum, 365 days

Frequency and duration of use/exposure

Daily use, up to 8 hrs/day

Operational conditions affecting workers exposure

Indoor and outdoor handling, with no limit on room size specified in CSR.

Assumes a good basic standard of occupational hygiene is implemented;

Process temperature up to 200 °C

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

Semi-automated systems, predominantly enclosed

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

Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of < 11.4 μg/m³ in places where respiratory equipment is provided offering 95% minimum control.

Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 μg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.
| Organisational measures to prevent /limit releases, dispersion and exposure | Established management systems would include general industrial hygiene practice e.g.:
• information and training of workers on prevention of exposure/accidents,
• procedures for control of personal exposure (hygiene measures)
• regular cleaning of equipment and floors, extended workers instruction-manuals
• procedures for process control and maintenance, including extraction systems
• personal protection measures (see below)
• periodical medical surveys |
| Conditions and measures related to personal protection, hygiene and health evaluation | Different levels of control are needed for different operations, in combination with specific activity training, resulting in 95% exposure reduction by inhalation or dermal contact.
As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).
Wear suitable gloves (tested to EN374) and eye protection
Wear suitable gloves (tested to EN374), coverall and eye protection
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
Wear a respirator conforming to EN140 with Type A filter or better if atmospheric concentrations greater than 0.57 µg/m³ |
| 2.2 Control of environmental exposure | |
| Product characteristics | Solid at environmental temperatures. Low dust content. |
| Amounts used | Daily use maximum 106,667 kg, total 32000 t per annum, 365 days |
| Environment factors not influenced by risk management | Default factors used (10 for freshwater, 100 for marine) |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.
If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%
Onsite waste water is treated via:
- Biological treatment – aerobic, and/or
- Oil-Water Separation
Prevent discharge of undissolved substance to or recover from wastewater.
Treat air emission to provide a typical removal efficiency of: 98% [TCR7].
Off-gases are treated via:
- Waste gas treatment - thermal oxidation |
| Conditions and measures related to external treatment of waste for disposal | Maximum release to air 27.2 kg/day
Sludge should be incinerated, contained or reclaimed.
Prevent environmental discharge consistent with regulatory requirements.
Maximum loss to waste water 20 kg/day
Pre-treatment before leaving site = 99% removal (0.2 kg/day)
Local treatment works 100 m³ / day minimum
Final dilution factor 10 default freshwater
Final dilution factor 100 default marine
If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels. |
### 3 Exposure estimation

**Workers:**
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment. Long-term local dermal DNEL estimated 10 µg/cm²

**Environment:**
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

<table>
<thead>
<tr>
<th>4. Guidance to DU to evaluate whether boundaries set by the ES are being met</th>
</tr>
</thead>
</table>
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES4 Mixing and blending operations, PROC 2,3,4,5

Sector of use – Use of bulk, large scale chemicals, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 4 Mixing and blending operations</td>
</tr>
<tr>
<td>Mixing Anthracene oil with pitch and other materials (coke, binder materials, oils, powders, solvents)</td>
</tr>
<tr>
<td>All kinds of products are produced by the carbon and graphite industry varying from specialty graphites to cathodes, pastes and electrodes of different types. However, their basic production process is carbons and very similar; CTP, PP, including Anthracene oil (liquid or solid) is mixed with other materials into green pastes and other preparations.</td>
</tr>
</tbody>
</table>

2. Operational conditions and risk management measures

Human Health

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 2, 3, 4, 5</td>
<td>Blending operations - Mixing preparation (mixture containing Anthracene Oil with coke, binder materials, oils, powders, solvents)</td>
<td>Use of open and closed systems, dedicated or non-dedicated facilities</td>
</tr>
<tr>
<td>PROC 8a, 8b</td>
<td>Transfer of chemicals</td>
<td>Raw material handling, including discharge from containers and transfer of products. Open, closed, dedicated or or non-dedicated facilities. Cleaning and maintenance operations.</td>
</tr>
</tbody>
</table>

Environment (industrial)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Use in open/closed systems</td>
<td>Outdoor and indoor use</td>
</tr>
</tbody>
</table>

2.1 Control of workers exposure

Product characteristic

Mixtures of anthracene with other substances to make solid or liquid products.
Note: characteristics of other components may influence exposure.
Covers percentage substance in the product up to 25 %

Amounts used

Daily use maximum 106,667 kg, total 32000 t per annum, 365 days

Frequency and duration of use/exposure

Covers daily exposures up to 8 hours
Covers frequency up to: daily use

Operational conditions affecting workers exposure

Indoor and outdoor handling, with no limit on room size specified in CSR
Use at temperatures up to 200°C
Assumes a good basic standard of occupational hygiene is implemented;
Process temperature up to 200 °C

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

Handle substance within a predominantly closed system provided with extract ventilation at openings of vessels. Avoid all skin contact with product. Discharge to aquatic environment is restricted

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

Semi-automated systems, predominantly enclosed
Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of < 11.4 μg/m^3 in places where respiratory equipment is provided offering 95% minimum control.
Where there is no respiratory protection, ventilation required to maintain atmospheric conditions...
<table>
<thead>
<tr>
<th>Concentration to below 0.57 µg/m$^3$ anthracene based on 1% BaP (ie. 5.7 ng/m$^3$ BaP) in air inhaled over 8 hours.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Organisational measures to prevent /limit releases, dispersion and exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established management systems would include general industrial hygiene practice e.g.: information and training of workers on prevention of exposure/accidents, procedures for control of personal exposure (hygiene measures) regular cleaning of equipment and floors, extended workers instruction-manuals procedures for process control and maintenance, personal protection measures (see below) periodical medical surveys</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions and measures related to personal protection, hygiene and health evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different levels of control are needed for different operations, resulting in 95% exposure reduction by inhalation or dermal contact. As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan). Wear suitable gloves (tested to EN374), coverall and eye protection Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Wear a respirator conforming to EN149 with Type A filter or better where dust is formed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.2 Control of environmental exposure</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Product characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixtures of anthracene with other substances to make solid or liquid products. Note: characteristics of other components may influence exposure. Covers percentage substance in the product up to 25 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amounts used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily use maximum 106,667 kg, total 32000 t per annum, 365 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environment factors not influenced by risk management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default factors used (10 for freshwater, 100 for marine)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible. If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99% Onsite waste water is treated via: - Biological treatment – aerobic, and/or - Oil-Water Separation Prevent discharge of undisssolved substance to or recover from wastewater. Treat air emission to provide a typical removal efficiency of: 98% [TCR7]. Off-gases are treated via: - Waste gas treatment - thermal oxidation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions and measures related to external treatment of waste for disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum release to air 27.2 kg/day Sludge should be incinerated, contained or reclaimed. Prevent environmental discharge consistent with regulatory requirements. Maximum loss to waste water 20 kg/day Pre-treatment before leaving site = 99% removal (0.2 kg/day) Local treatment works 100 m$^3$ / day minimum Final dilution factor 10 default freshwater Final dilution factor 100 default marine If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.</td>
</tr>
</tbody>
</table>
Exposure estimation

Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069 mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment.
Long-term local dermal DNEL estimated 10 µg/cm²

Environment:
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES 5 Forming and pressing into blocks and other articles

**Sector of use – Use of bulk, large scale chemicals, industrial**

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 5 Forming and pressing into blocks and other articles.</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**2. Operational conditions and risk management measures**

**Human Health**

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proc 2/3</td>
<td>Storage</td>
<td>storage</td>
</tr>
<tr>
<td>Proc 8A/21</td>
<td>Installation</td>
<td>adding to electrode, installation, incl. Preheating Lining with gunning, ramming etc</td>
</tr>
<tr>
<td>Proc 5/19</td>
<td>Mixing/blending</td>
<td>Mixing of the unshaped refractory products with water</td>
</tr>
<tr>
<td>Proc 13</td>
<td>Treatment of articles</td>
<td>Impregnation of shaped products</td>
</tr>
<tr>
<td>Proc 8b</td>
<td>Transfer of chemicals</td>
<td>Dedicated transfer of anthracene oil containing materials</td>
</tr>
<tr>
<td>Proc 14</td>
<td>Pressing of green products</td>
<td>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</td>
</tr>
<tr>
<td>Proc 24</td>
<td>Shot blasting</td>
<td>High (mechanical) energy work-up of substances bound in materials and/or articles</td>
</tr>
</tbody>
</table>

(PROC5 used for exposure assessment instead of PROC21)

**Environment (industrial)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Open and Closed systems</td>
<td>Indoor/Outdoor use</td>
</tr>
<tr>
<td>ERC 5</td>
<td>Industrial use resulting in inclusion into a matrix</td>
<td>Open and Closed systems</td>
<td>Indoor/Outdoor</td>
</tr>
</tbody>
</table>

**2.1 Control of workers exposure**

**Product characteristic**

- Liquid, vapour pressure < 0.5 - 10 kPa at STP or solid with low dustiness
- Covers percentage substance in the product up to 25 %
- Substance is complex UVCB, Predominantly hydrophobic, Not biodegradable.

**Amounts used**

- 32000 tpa, 300 emission days/year, continuous release

**Frequency and duration of use/exposure**

- Covers daily exposures up to 8 hours (unless stated differently)
- Covers frequency up to: daily use
**Operational conditions affecting workers exposure**

Indoor and outdoor handling, with no limit on room size specified in CSR. Assumes a good basic standard of occupational hygiene is implemented. Process temperature up to 150 °C.

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

No measures identified.

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

Handle substance within a predominantly closed system provided with extract ventilation at material transfer points and other openings of vessels. Avoid all skin contact with product. Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of < 11.4 µg/m³ in places where respiratory equipment is provided offering 95% minimum control. Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 µg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.

**Organisational measures to prevent /limit releases, dispersion and exposure**

Ensure the ventilation system is regularly maintained and tested. Management systems should include general industrial hygiene practice e.g.:

- information and training of workers on prevention of exposure/accidents,
- procedures for control of personal exposure (hygiene measures)
- regular cleaning of equipment and floors, extended workers instruction-manuals
- procedures for process control and maintenance,
- personal protection measures (see below)
- periodical medical surveys

**Conditions and measures related to personal protection, hygiene and health evaluation**

Different levels of control are needed for different operations, resulting in 95% exposure reduction by inhalation or dermal contact.

As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).

Wear suitable gloves (tested to EN374), coverall and eye protection. Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Wear a full face respirator conforming to EN140 with Type A/P2 filter or better where dust is formed.

### 2.2 Control of environmental exposure

**Product characteristics**

Substance is complex UVCB, Predominantly hydrophobic, Not biodegradable.

**Amounts used**

32000tpa, 300 emission days/year, continuous release

**Environment factors not influenced by risk management**

Default factors used (10 for freshwater, 100 for marine)

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

Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.

If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%

Onsite waste water is treated via:

- Biological treatment – aerobic, and/or
- Oil-Water Separation

Prevent discharge of undissolved substance to or recover from wastewater.

Treat air emission to provide a typical removal efficiency of: 98% [TCR7].

Off-gases are treated via:
<table>
<thead>
<tr>
<th>Conditions and measures related to external treatment of waste for disposal</th>
<th>Waste gas treatment - thermal oxidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum release to air 27.2 kg/day</td>
<td></td>
</tr>
<tr>
<td>Sludge should be incinerated, contained or reclaimed.</td>
<td></td>
</tr>
<tr>
<td>Prevent environmental discharge consistent with regulatory requirements.</td>
<td></td>
</tr>
<tr>
<td>Maximum loss to waste water 20 kg/day</td>
<td></td>
</tr>
<tr>
<td>Pre-treatment before leaving site = 99% removal (0.2 kg/day)</td>
<td></td>
</tr>
<tr>
<td>Local treatment works 100 m³ / day minimum</td>
<td></td>
</tr>
<tr>
<td>Final dilution factor 10 default freshwater</td>
<td></td>
</tr>
<tr>
<td>Final dilution factor 100 default marine</td>
<td></td>
</tr>
<tr>
<td>If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.</td>
<td></td>
</tr>
</tbody>
</table>

3 Exposure estimation

Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069 mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment.
Long-term local dermal DNEL estimated 10 µg/cm²

Environment:
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES 6 Baking pressed shapes, including in situ, PROC 22

Sector of use – Use of large scale mixtures / articles, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baking pressed shapes, including</td>
</tr>
<tr>
<td>briquettes, anodes, active carbon</td>
</tr>
<tr>
<td>blocks etc</td>
</tr>
<tr>
<td>- pre-baking of anodes</td>
</tr>
<tr>
<td>- baking in situ of green shapes,</td>
</tr>
<tr>
<td>collar paste and ramming paste</td>
</tr>
</tbody>
</table>

2. Operational conditions and risk management measures

Human Health
Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 22</td>
<td>Baking of shapes</td>
<td>Use of closed system at up to 3000°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PROC3 has been used for exposure assessment instead of PROC22 where this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>process category is considered more applicable for processes with liquids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at high temperature</td>
</tr>
</tbody>
</table>

Environment (industrial)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance,</td>
<td>Open and Closed</td>
<td>Indoor/outdoor</td>
</tr>
<tr>
<td></td>
<td>including formulating activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERC 5</td>
<td>Industrial use resulting in</td>
<td>Open and Closed</td>
<td>Indoor/outdoor</td>
</tr>
<tr>
<td></td>
<td>inclusion into a matrix</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.1 Control of workers exposure

<table>
<thead>
<tr>
<th>Product characteristic</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Covers percentage substance in the</td>
</tr>
<tr>
<td></td>
<td>product up to 25 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amounts used</th>
<th>32000 tpa, 300 emission days/year, continuous release</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Frequency and duration of use/exposure</th>
<th>Covers daily exposures up to 8 hours (unless stated differently)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Covers frequency up to: daily use</td>
</tr>
</tbody>
</table>

| Operational conditions affecting workers exposure | Assumes a good basic standard of occupational hygiene is implemented; |
|--------------------------------------------------| Process temperature up to 3000°C                             |

<table>
<thead>
<tr>
<th>Technical conditions and measures at process level (source) to prevent release</th>
<th>Semi-automated systems, predominantly enclosed with occasional breach for sampling and maintenance</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Technical conditions and measures to control dispersion from source towards the worker</th>
<th>Handle substance within a predominantly closed system provided with extract ventilation at openings of vessels. Avoid all skin contact with product.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Organisational measures to prevent /limit releases, dispersion and exposure</th>
<th>Established management systems would include general industrial hygiene practice e.g.:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>information and training of workers on prevention of exposure/accidents,</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- procedures for control of personal exposure (hygiene measures)</td>
</tr>
<tr>
<td></td>
<td>- regular cleaning of equipment and floors, extended workers instruction-manuals</td>
</tr>
<tr>
<td></td>
<td>- procedures for process control and maintenance,</td>
</tr>
<tr>
<td></td>
<td>- personal protection measures (see below)</td>
</tr>
<tr>
<td></td>
<td>- periodical medical surveys</td>
</tr>
</tbody>
</table>
Conditions and measures related to personal protection, hygiene and health evaluation

Different levels of control are needed for different operations, resulting in 90% exposure reduction by inhalation or dermal contact.

- As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).
- Wear suitable gloves (tested to EN374), coverall and eye protection
- Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
- Wear a respirator conforming to EN140 with Type A/P2 filter or better if atmospheric concentrations greater than 0.57 µg/m³

2.2 Control of environmental exposure

Product characteristics
Substance is complex UVCB, predominately hydrophobic
Covers percentage substance in the product up to 25 %

Amounts used
32000tpa, 300 emission days/year, continuous release

Environment factors not influenced by risk management
Default factors used (10 for freshwater, 100 for marine)

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.
If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%
Onsite waste water is treated via:
- Biological treatment – aerobic, and/or
- Oil-Water Separation
Prevent discharge of undissolved substance to or recover from wastewater.
Treat air emission to provide a typical removal efficiency of: 98% [TCR7].
Off-gases are treated via:
- Waste gas treatment - thermal oxidation

Conditions and measures related to external treatment of waste for disposal
Maximum release to air 27.2 kg/day
Sludge should be incinerated, contained or reclaimed.
Prevent environmental discharge consistent with regulatory requirements.
Maximum loss to waste water 20 kg/day
Pre-treatment before leaving site = 99% removal (0.2 kg/day)
Local treatment works 100 m³ / day minimum
Final dilution factor 10 default freshwater
Final dilution factor 100 default marine
If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.

3 Exposure estimation

Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment. Long-term local dermal DNEL estimated 10 µg/cm²

Environment:

This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
Sector of use – Use of chemicals, industrial

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES7 Cleaning and maintenance (open and closed systems) PROC 3, 8a</td>
</tr>
<tr>
<td><strong>Scenario</strong> covers Anthracene Oil containing a maximum of 31% phenanphanthrene. Periodic cleaning of containers and equipment that involves breaching of closed systems and handling or disposing of contaminated equipment. Applies to all industrial users of Anthracene Oil products.</td>
</tr>
</tbody>
</table>

### 2. Operational conditions and risk management measures

**Human Health**

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on processes where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 3, 8a</td>
<td>Cleaning and maintenance, Working with equipment at no more than 20°C above</td>
<td></td>
</tr>
</tbody>
</table>

#### Environment (Industrial)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/Outdoor Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Open and closed systems</td>
<td>Indoor/Outdoor Uses</td>
</tr>
<tr>
<td>ERC3</td>
<td>Formulation in materials</td>
<td>Open and closed systems</td>
<td>Indoor/Outdoor Uses</td>
</tr>
<tr>
<td>ERC5</td>
<td>Industrial use resulting in inclusion into a matrix</td>
<td>Open and closed systems</td>
<td>Indoor/Outdoor Uses</td>
</tr>
</tbody>
</table>

#### 2.1 Control of workers exposure

<table>
<thead>
<tr>
<th>Product characteristic</th>
<th>Solids (low dustiness) or Liquid covers substance and mixtures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amounts used</td>
<td>No specific limits on quantity</td>
</tr>
<tr>
<td>Frequency and duration of use/exposure</td>
<td>Covers daily exposure, up to 8 hrs per day</td>
</tr>
<tr>
<td>Operational conditions affecting workers exposure</td>
<td>Assumes a good basic standard of occupational hygiene is implemented; Assumes use at not more than 20°C above ambient temperature, unless stated differently</td>
</tr>
<tr>
<td>Technical conditions and measures at process level (source) to prevent release</td>
<td>Control exposure by maximising containment with a good standard of general ventilation. Drain down systems and transfer lines prior to breaching containment. Ensure relevant staff are informed of the nature of exposure and aware of basic actions to minimise exposures.</td>
</tr>
<tr>
<td>Technical conditions and measures to control dispersion from source towards the worker</td>
<td>Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of &lt; 11.4 µg/m³ in places where respiratory equipment is provided offering 95% minimum control. Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 µg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.</td>
</tr>
</tbody>
</table>
### Organisational measures to prevent /limit releases, dispersion and exposure

Established management systems would include general industrial hygiene practice e.g.:
- information and training of workers on prevention of exposure/accidents,
- procedures for control of personal exposure (hygiene measures)
- regular cleaning of equipment and floors, extended workers instruction-manuals
- procedures for process control and maintenance,
- personal protection measures (see below)
- periodical medical surveys

### Conditions and measures related to personal protection, hygiene and health evaluation

Different levels of control are needed for different operations, resulting in 90% exposure reduction by inhalation or dermal contact.

- As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).
- Wear a full face respirator conforming to EN140 with Type A/P3 filter or better
- Wear suitable gloves (tested to EN374) and eye protection
- Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

### 2.2 Control of environmental exposure

#### Product characteristics
Solid and liquid materials, no more than 20°C higher than ambient.

#### Amounts used
The scenarios do not take into account use levels as this is not relevant for cleaning and maintenance activities.

#### Environment factors not influenced by risk management
Default factors used (10 for freshwater, 100 for marine)

#### Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.
- If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%
  - Onsite waste water is treated via:
    - Biological treatment – aerobic, and/or
    - Oil-Water Separation
  - Prevent discharge of undissolved substance to or recover from wastewater.
  - Treat air emission to provide a typical removal efficiency of: 98% [TCR7].
  - Off-gases are treated via:
    - Waste gas treatment - thermal oxidation

#### Conditions and measures related to external treatment of waste for disposal
Maximum release to air 27.2 kg/day
Sludge should be incinerated, contained or reclaimed.
- Prevent environmental discharge consistent with regulatory requirements.
- Maximum loss to waste water 20 kg/day
- Pre-treatment before leaving site = 99% removal (0.2 kg/day)
- Local treatment works 100 m³ / day minimum
- Final dilution factor 10 default freshwater
- Final dilution factor 100 default marine
- If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.

### 3 Exposure estimation

#### Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.
<table>
<thead>
<tr>
<th>Environmental Exposure</th>
<th>Estimated Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term DNEL inhalation</td>
<td>0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)</td>
</tr>
<tr>
<td>Dermal systemic exposure</td>
<td>0.069 mg/kg/day</td>
</tr>
<tr>
<td>Long term DNEL dermal systemic</td>
<td>1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)</td>
</tr>
<tr>
<td>Dermal local exposure</td>
<td>10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment</td>
</tr>
<tr>
<td>Long-term local dermal DNEL</td>
<td>10 µg/cm²</td>
</tr>
</tbody>
</table>

**Environment:**

This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine).

PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);

PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

**4. Guidance to DU to evaluate whether boundaries set by the ES are being met**

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
### ES8 Laboratory activities, PROC 15

**Sector of use – Use of small scale chemicals, industrial / professional**

<table>
<thead>
<tr>
<th>Exposure Scenario Format - Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ES 8</strong></td>
</tr>
<tr>
<td>Laboratory activities</td>
</tr>
<tr>
<td>May be handled on its own or in mixtures as part of quality control and development research. Typically small quantities being handled under controlled and supervised conditions.</td>
</tr>
</tbody>
</table>

#### 2. Operational conditions and risk management measures

**Human Health**

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
<thead>
<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 15</td>
<td>Laboratory activities</td>
<td>Typically small quantities being handled under controlled and supervised conditions.</td>
</tr>
</tbody>
</table>

**Environment (industrial)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 2</td>
<td>Industrial use of substance, including formulating activities</td>
<td>Open, industrial</td>
<td>Indoor processes</td>
</tr>
<tr>
<td>ERC3</td>
<td>Formulation in materials</td>
<td>Open, industrial</td>
<td>Indoor processes</td>
</tr>
<tr>
<td>ERC5</td>
<td>Industrial use resulting in inclusion into a matrix</td>
<td>Open, industrial</td>
<td>Indoor processes</td>
</tr>
</tbody>
</table>

#### 2.1 Control of workers exposure

**Product characteristic**

Supplied in various forms in small samples. Liquids or solids with low dustiness. Covers percentage substance in the product up to 25% [G12].

**Amounts used**

Daily use maximum 10 kg, 365 days

**Frequency and duration of use/exposure**

Covers daily exposures up to 8 hours (unless stated differently)

**Operational conditions affecting workers exposure**

Assumes a good basic standard of occupational hygiene is implemented [G1]. Indoor handling, with no limit on room size specified in CSR

Handling at ambient conditions

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

Handle substance with extract ventilation, such as fume cupboard

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

Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Make sure work area has a properly sited receiving hood with 95% minimum control

**Organisational measures to prevent /limit releases, dispersion and exposure**

Established management systems would include general industrial hygiene practice e.g.: information and training of workers on prevention of exposure/accidents,

- procedures for control of personal exposure (hygiene measures)
- regular cleaning of equipment and floors, extended workers instruction-manuals
- procedures for process control and maintenance,
- personal protection measures (see below)
- periodical medical surveys

**Conditions and measures related to personal protection, hygiene and health evaluation**

Different levels of control are needed for different operations, resulting in 90% exposure reduction by inhalation or dermal contact.

As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan).
Wear suitable gloves (tested to EN374), coverall and eye protection.
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

### 2.2 Control of environmental exposure

#### Product characteristics
- Molten liquid, predominately hydrophobic. > 160°C.
- Solid at environmental temperatures.

#### Amounts used
The scenarios are based on maximum daily use 10 kg/day, with activity 365 days per annum on any one site.

#### Environment factors not influenced by risk management
Default factors used (10 for freshwater, 100 for marine)

#### Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Dispose of waste water (including washings, surface water etc) as hazardous chemical waste where possible.
If not possible to contain all waste water, treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of 99%
Onsite waste water is treated via:
- Biological treatment – aerobic, and/or
- Oil-Water Separation

Prevent discharge of undissolved substance to or recover from wastewater.
Treat air emission to provide a typical removal efficiency of: 98% [TCR7].
Off-gases are treated via:
- Waste gas treatment - thermal oxidation

#### Conditions and measures related to external treatment of waste for disposal
Maximum release to air 27.2 kg/day
Sludge should be incinerated, contained or reclaimed.
Prevent environmental discharge consistent with regulatory requirements.
Maximum loss to waste water 20 kg/day
Pre-treatment before leaving site = 99% removal (0.2 kg/day)
Local treatment works 100 m³ / day minimum
Final dilution factor 10 default freshwater
Final dilution factor 100 default marine
If site dilution factors are higher, or loss to waste water is lower, discharge is within the accepted levels.

### 3 Exposure estimation

#### Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 10 µg/cm² skin Anthracene Oil with 95% minimum control through personal protective equipment.
Long-term local dermal DNEL estimated 10 µg/cm²
Environment:
This scenario leads to an estimated local PEC sewage 1 mg/l and surface water of 0.1 mg/l (freshwater) and 0.01 mg/l (marine)
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil);
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.
ES 9 Use of coatings, paints, waterproofing material adhesives, sealants, etc

Sector of use – Use of small scale chemicals, professional

<table>
<thead>
<tr>
<th>Exposure Scenario Format – Industrial and Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 9</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

2. Operational conditions and risk management measures

Human Health

Only selected procedures are included in this summary exposure scenario. The inclusion of key tasks is based on process where the risk of exposure is considered highest and where control measures are needed.

<table>
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<tr>
<th>Involved PROCs</th>
<th>Description</th>
<th>Involved tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC 4</td>
<td>film formation</td>
<td>air drying</td>
</tr>
<tr>
<td>PROC 5, 8</td>
<td>Blending/dissolving/dispersion: mixing, milling, dispersing, completion</td>
<td>Mixing paints and products and general handling of materials prior to application by the end user. Professional use only.</td>
</tr>
<tr>
<td>PROC 7</td>
<td>manual spray application</td>
<td>Spray of surfaces, typically outdoors</td>
</tr>
<tr>
<td>PROC 10</td>
<td>application by roller, spreader, flow coating large scale (open equipment)</td>
<td>Use of liquid mixtures on surfaces, liquid mixtures or molten at up to 150°C</td>
</tr>
<tr>
<td>PROC 13</td>
<td>fluidised-bed application (manual/open)</td>
<td>Industrial usage</td>
</tr>
</tbody>
</table>

Environment (industrial)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Level of containment</th>
<th>Indoor/outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC 5</td>
<td>Industrial use resulting in inclusion into or onto a matrix</td>
<td>Open, industrial</td>
<td>Indoor processes</td>
</tr>
<tr>
<td>ERC 8f</td>
<td>Wide dispersive outdoor use resulting in inclusion into or onto a matrix</td>
<td>Open, industrial and skilled use</td>
<td>Outdoor</td>
</tr>
<tr>
<td>ERC 10a</td>
<td>Wide dispersive outdoor use of long-life articles and materials with low release</td>
<td>Open, skilled use</td>
<td>Outdoor</td>
</tr>
</tbody>
</table>

2.1 Control of workers exposure

<table>
<thead>
<tr>
<th>Product characteristic</th>
<th>Covers percentage substance in the product up to 7% Solid and liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amounts used</td>
<td>Daily handling maximum 100 000 kg, total 30 000 t per annum, 365 days for industrial uses. Limits 175 kg/day professional use</td>
</tr>
<tr>
<td>Frequency and duration of use/exposure</td>
<td>Maximum shift duration on any other process up to 8 hours</td>
</tr>
<tr>
<td>Operational conditions affecting workers exposure</td>
<td>Indoor and outdoor handling, with no limit on room size specified in CSR Use at ambient temperatures (mixtures) or process temperatures up to 100°C</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Technical conditions and measures at process level (source) to prevent release</td>
<td>Open systems in areas with good ventilation or forced ventilation. Outdoor use for joint sealants, anti-corrosion paints, waterproof coating etc,</td>
</tr>
<tr>
<td>Technical conditions and measures to control dispersion from source towards the worker</td>
<td>Handle substance within a predominantly closed system provided with extract ventilation at openings of vessels. Avoid all skin contact with product. Provide extract ventilation to points where emissions occur to ensure atmospheric concentrations of &lt; 11.4 µg/m³ in places where respiratory equipment is provided offering 95% minimum control. Where there is no respiratory protection, ventilation required to maintain atmospheric concentration to below 0.57 µg/m³ anthracene based on 1% BaP (ie. 5.7 ng/m³ BaP) in air inhaled over 8 hours.</td>
</tr>
</tbody>
</table>
| Organisational measures to prevent /limit releases, dispersion and exposure | Established management systems would include general industrial hygiene practice e.g.:  
  - information and training of workers on prevention of exposure/accidents,  
  - procedures for control of personal exposure (hygiene measures)  
  - regular cleaning of equipment and floors, extended workers instruction-manuals  
  - procedures for process control and maintenance,  
  - personal protection measures (see below)  
  - periodical medical surveys |
| Conditions and measures related to personal protection, hygiene and health evaluation | Different levels of control are needed for different operations  
As a minimum, provide good forced ventilation (eg with air supplied or extracted with powered fan). Wear suitable gloves (tested to EN374), coverall and eye protection  
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.  
Wear a full face respirator conforming to EN140 with Type A/P2 filter or better when using as joint sealants, anti-corrosion paints, waterproof coating etc. |

### 2.2 Control of environmental exposure

| Product characteristics | Substance is complex UVCB  
Predominantly hydrophobic  
Not biodegradable |
|-------------------------|------------------------------------------------------------------|
| Amounts used            | 32000tpa regional use, 300 emission days per year.  
For skilled professional use, |
| Environment factors not influenced by risk management | Local dilution factor used for CSR, 10 default |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | No process water used. |
| Conditions and measures related to external treatment of waste for disposal | Waste needs to be disposed via Hazardous Waste Incineration  
No release to the environment should take place  
Default factors used for assessment are:  
Local treatment works 2000 m³ day (default) from industrial use  
Final dilution factor 10 default freshwater |
3 Exposure estimation

Workers:
Atmospheric concentration must not exceed 11.4 µg/m³ over 8 hour working period in contact with vapours, with 95% minimum control through personal protective equipment, leading to maximum exposure of 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP) in air inhaled over 8 hours.

Long term DNEL inhalation estimated to be 0.57 µg/m³ based on 1% BaP (5.7 ng/m³ BaP)
Dermal systemic exposure estimated 0.069 mg/kg/day
Long term DNEL dermal systemic estimated to be 1.9 mg/kg bw/day (based on 0.63 mg/kg bw/day for phenanthrene and maximum 31% phenanthrene content)
Dermal local exposure estimated 0.0022 mg/cm² skin phenanthrene (0.0071 mg/cm² skin anthracene oil), with 95% minimum control through personal protective equipment.

Environment:
These defaults lead to an estimated local PEC sewage 1.39 mg/kg dw and surface water of 4.3 x 10⁻⁷ mg/l
PNEC sewage 3.23 mg/l based on PNEC for Phenanthrene of 1 mg/l (31% of Anthracene Oil)
PNEC freshwater 3.55 µg/l based on PNEC for Phenanthrene of 1.1 µg/l (31% of Anthracene Oil)

4. Guidance to DU to evaluate whether boundaries set by the ES are being met
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate.