# Guidance on information requirements and chemical safety assessment

## Appendix to Part F
## CSR Template with explanation

**July 2008**

Guidance for the implementation of REACH

**Guidance on Information Requirements and Chemicals Safety Assessment**

**Appendix to Guidance Part F**

# CSR Template

# CHEMICAL SAFETY REPORT

**Substance Name:**

**EC Number:**

**CAS Number:**

**Registrant's identity**

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# PART A

## 1 SUMMARY OF RISK MANAGEMENT MEASURES

*The goal of this section is to present a compact overview of the relevant risk management measures for the identified use(s), based on the exposure scenario(s) that are in the CSR.*

*Compile an overview on the measures needed to control risk as i) implemented with regard to manufacture and own use and/or ii) as communicated to downstream users in the annex to the extended SDS. The summary should reflect all the risk management measures and operational conditions that are included in the exposure scenarios in chapter 9.1. The declarations under no 2 and 3 of Part A refer to the summary of risk management measures under point 1.*

*The registrant may choose to make reference to the RMM described in the Exposure Scenarios under Chapter 9 or to copy these RMM into the summary. He may also choose to make reference to the exposure scenarios annexed in the safety data sheets and attach these to the CSR. In any case it is advisable to keep a link between the RMM and the corresponding exposure scenario(s) also in the summary.*

## 2 DECLARATION THAT RISK MANAGEMENT MEASURES ARE IMPLEMENTED

*This declaration refers to the manufacture of substance and own uses by the registrant.*

*If applicable, a statement that the facility operates under a certified quality control system can be added.*

## 3 DECLARATION THAT RISK MANAGEMENT MEASURES ARE COMMUNICATED

*This declaration refers to the operational conditions and risk management measures communicated by means of the extended safety data sheet to the downstream users.*

# PART B

*Part B of the CSR documents the conclusions of the CSA process according to Annex I of REACH Regulation and the supporting factual information to arrive at these conclusions. For any missing standard information (Annex VI to X), the reason why the information is absent should be stated.*

## 1 IDENTITY OF THE SUBSTANCE AND PHYSICAL AND CHEMICAL PROPERTIES

*Detailed guidance on substance identity is available in the Guidance on substance identification. This section presents a brief overview of the information that is required in this section (cf. REACH Annex VI(2)). It should be clear to which form or forms of substance the registration and the presented information relate. If it is not technically possible or if it does not appear scientifically necessary to give information on one or more of the items below, the reasons shall be clearly stated. Attention should be paid, if applicable and appropriate, to specific additional substance properties, e.g., information on optical activity and typical ratio of (stereo) isomers.*

*For a single substance, the composition is reported as degree of purity, known impurities or additives, for different compositions of the substance when necessary. For multi-constituent substances the composition is reported as percentages or range of percentages of constituents, known impurities or additives, for different compositions of the substance when necessary.*

*The following basic information is required (REACH Annex VI), e.g. in a table format:*

- *Name or other identifier of each substance; Name(s) in the IUPAC nomenclature or other international chemical name(s); Other names (usual name, trade name, abbreviation); EINECS or ELINCs number (if available and appropriate); CAS name and CAS number (if available); Other identity code (if available)*
- *Information related to molecular and structural formula of each substance; Molecular and structural formula; Information on optical activity and typical ratio of (stereo) isomers (if applicable and appropriate); Molecular weight or molecular weight range*
- *Composition of each substance; Degree of purity ( %); Nature of impurities, including isomers and by-products; Percentage of (significant) main impurities; Nature and order of magnitude (… ppm, … %) of any additives (e.g. stabilising agents or inhibitors);*
- *Additional substance properties are available via the technical dossier.*

<Chemical name> is a <Composition> (e.g. multi constituent substance) of <Origin> (e.g. organic) origin having the following characteristics and physical–chemical properties (see the IUCLID dataset for further details).

### 1.1 Name and other identifiers of the substance

Table 1: Substance identity

| | |
|---|---|
| **EC number:** | <EC number> |
| **EC name:** | <EC name> |
| **CAS number (EC inventory):** | <CAS number (EC inventory)> |

| | |
|---|---|
| **CAS number:** | <CAS number> |
| **CAS name:** | <CAS name> |
| **IUPAC name:** | <IUPAC name> |
| **Annex I index number** | <Annex I index number> |
| **Molecular formula:** | <Molecular formula> |
| **Molecular weight range:** | <Molecular weight range> |

**Structural formula:**

Figure 1: Structural formula

<Structural formula> (upload image file)

**Remarks:**

## 1.2 Composition of the substance

**<Name>**

<Brief description > (brief description of the substance when UVCB)

**Degree of purity:** <Degree of purity>

*The information is particularly important for the main constituent(s) and for the constituents (or impurity) which influence hazard profiles of the substance and thereby the chemical safety assessment.*

Table 2: Constituents

| Constituent | Typical concentration | Concentration range | Remarks |
|---|---|---|---|
| <Constituent><br><EC number> | <Typical concentration> | <Concentration range> | <Remarks> |
| | | | |

Table 3: Impurities

| Impurities | Typical concentration | Concentration range | Remarks |
|---|---|---|---|
| | | | |

Table 4: Additives

| Constituent | Function | Typical concentration | Concentration range | Remarks |
|---|---|---|---|---|
| | | | | |

## 1.3 Physico-chemical properties

*At REACH Annex VII levels (substances produced or imported at ≥ 1 t/y) basic physico-chemical properties need to be reported.*

*In addition, at REACH Annex IX levels (substances produced or imported ≥ 100 t/y), the following properties need to be reported as well (if relevant): stability in organic solvents and identity of relevant degradation products (not for inorganic substances), dissociation constant and viscosity. For those endpoints testing proposals, if any, should be reported in the CSR.*

Table 5: Overview of physico- chemical properties

| Property | Value | Remarks |
|---|---|---|
| Physical state at 20°C and 101.3 kPa | <Physical state at 20ºC and 1013 hPa> | <Form><br><Colour><br><Odour> |
| Melting/freezing point | <short description of the key parameter from endpoint summary of section x.x> | <discussion from endpoint summary of section x.x> |
| Boiling point | Idem | Idem |
| Relative density | Idem | Idem |
| Vapour pressure | Idem | Idem |
| Surface tension | Idem | Idem |
| Water solubility | Idem | Idem |
| Partition coefficient n-octanol/water (log value) | Idem | Idem |
| Flash point | Idem | Idem |
| Flammability | Idem | Idem |
| Explosive properties | Idem | Idem |
| Self-ignition temperature | Idem | Idem |
| Oxidising properties | Idem | Idem |
| Granulometry | Idem | Idem |
| Stability in organic solvents and identity of relevant degradation products | Idem | Idem |
| Dissociation constant | Idem | Idem |
| Viscosity | Idem | Idem |
| Auto flammability | Idem | Idem |
| Reactivity towards container material | Idem | Idem |
| Thermal stability | Idem | Idem |
| [enter other property or delete row] | Idem | Idem |

**Remarks:**

*Guidance on how to evaluate physico-chemical data is provided in section R.7.1*

**Data waiving**

**Information requirement:** (e.g. Melting / freezing point)

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**Testing proposal:** *(relevant only for stability in organic solvent (annex IX, 7.15), dissociation constant (Annex IX, 7.16) and viscosity (Annex IX , 7.17))*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

**Information requirement:** (e.g. Dissociation constant)

**Proposed test guideline:** <guideline>

**Planned study period:** <Study period>

**Details on method intended:**

<Any other information on materials and methods incl. tables>

# 2 MANUFACTURE AND USES

## 2.1 Manufacture

*Describe the manufacturing process. This should include a sufficient level of detail to identify any implications on the identity of the substance (see section 1.1 and 1.2 of this template). The description should also support the derivation of information for exposure scenario building in chapter 9, e.g. description of activities and processes covered in the exposure scenario or fraction of substance lost from process via waste, waste water or air.*

*Quantify the amount of substance manufactured, imported and/or the quantity placed on the EU market.*

## 2.2 Identified uses

*List all identified uses of the substance to be registered. Identified uses are uses that the registrant is willing and able to support through an appropriate ES documented in the CSR, and communicated to the DU in the SDS. This is to provide an overview on which uses are covered in the CSA.*

*The section can be completed in different ways, depending e.g. on market structures, internal organisation of business at M/I level or the way in which M/I is going to communicate with sectors further down stream. Also the type of information on uses needed to support the hazard assessment may impact on the way to describe the identified uses.*

*As a starting point, M/I is advised to list all the identified uses based on the descriptor system as contained in section D.4.3 and chapter R.12 of the Guidance. This is*

- *to ensure a minimum level of harmonisation across the EU market when it comes to communication on uses up and down the supply chain*
- *to ensure that all identified uses are taken into account in hazard assessment*
- *to allow for transparent grouping of uses similar in terms of exposure determinants into one exposure scenarios.*
- *to ensure consistency between the information on identified uses and the short titles of the exposure scenarios.*

*Table 6 exemplifies how such an overview may look like, once an analysis of all uses has been carried out. The process, preparation [chemical product] and article categories are closely connected with determinants of exposure (see section 9). Article categories are however only applicable if the substance is incorporated into articles. The sectors of use may be relevant in order to structure the dialogue with customer groups.*

*Please note: It is the choice of the registrant to which level of detail he describes the uses of the substance in the CSR and later on in the exposure scenarios (see section 9). The description of use must be sufficiently detailed support the hazard assessment and to flag the boundaries of the different exposure scenarios covered in the CSR and communicated to the downstream users (see Guidance D.4.3.3).*

Table 6: Description of identified uses

| Identified use | Sector of Use (SU) | Preparation [chemical product] Category (PC) | Process category (PROC) | Article category (AC) |
|---|---|---|---|---|
| IU 2 | SU 17 (General manufacturing) | PC9 (coatings) | PROC 7 – spraying in industrial setting | AC2 – vehicles (cars) |
| IU 3 | | | PROC 10- rolling, brushing | AC2 – vehicles (aircrafts) |
| IU 4 | SU 10 (Formulation of preparations) | PC1 (adhesives), PC9 (coatings), PC32 (polymer preparation) | PROC 5 – mixing, blending in batch process | Not applicable |
| IU 9 | SU 21/22 (private households, public domain) | PC35 (cleaners) | PROC 10 – brushing, wiping | Not applicable |
| IU 5 | SU 9 (Manufacturing of fine chemicals) | Various, not further specified | PROC 2 - Use in closed, continuous process with occasional controlled exposure, industrial setting | Not applicable |
| | | | | |
| | | | | |

## 2.3 Uses advised against

*The uses advised against shall be justified and recorded in the CSR (and communicated via Section 16 of the SDS). This can be an initiative of the M/I or a reaction to uses made known to him. Any downstream user has the right to make a use known to the manufacturer, importer, downstream user or distributor who supplies him with a substance on its own or in a preparation with the aim of making this an identified use. However, the manufacturer can advise against certain uses for reasons of protection of human health or the environment. For such uses, a downstream user still has the option to prepare his own CSR.*

*Describe the "uses advised against" in a wording that is unambiguous to your customers. This information should be consistent with the advice given to downstream users in section 16 of the extended safety data sheet. The descriptor system in Chapter R.12 may help to describe the uses advised against. In addition other phrasing can be used as well.*

# 3 CLASSIFICATION AND LABELLING[1]

*The appropriate classification and labelling developed in accordance with the criteria in Directive 67/548/EEC shall be presented and justified. Where applicable specific concentration limits, resulting from the application of Article 4(4) of Directive 67/548/EEC and Articles 4 to 7 of Directive 1999/45/EC, shall be presented and, if they are not included in Annex I to Directive 67/548/EEC, justified.*

*If the information is inadequate to decide whether a substance should be classified for a particular end-point, the registrant shall indicate and justify the action or decision he has taken as a result. He should also indicate for each endpoint for which no classification is proposed whether this is based*

[1] The template will be updated once the Regulation on Classification, Labelling and Packaging of substances and mixtures (implementing the GHS) will be adopted.

*on conclusive data, inconclusive data or lack of data. More detailed justification on classification (or no classification) should be given in specific endpoint sections.*

*Further guidance on classification and labelling is given in endpoint specific guidance (Chapter R.7).*

*Classification and labelling information in the CSR should be consistent with the labelling and the SDS for the substance.*

### 3.1 Classification and labelling in Annex I of Directive 67/548/EEC

**Classification**

[The substance] is classified [if applicable] :

- for physical - chemical properties: *[mention relevant classification]*
- for health effects: *[mention relevant classification]*
- for the environment: *[mention relevant classification]*

**Labelling**

Indication of danger:

R-phrases:

S-phrases:

Specific concentration limits:

### 3.2 Self classification(s) and labelling

Table 7: Classification according to Directive 67/548/EEC criteria

| Endpoints | Classification | Reason for no classification | Justification for (non) classification can be found in section |
|---|---|---|---|
| Explosiveness | <classification> | < Data lacking\|\| Inconclusive\|\| Classification criteria not met> | 6.1 |
| Oxidising properties | Idem | idem | 6.3 |
| Flammability | Idem | idem | 6.2 |
| Thermal stability | Idem | idem | |
| Acute toxicity | Idem | idem | 5.2 |
| Acute toxicity- irreversible damage after single exposure | Idem | idem | 5.2 |
| Repeated dose toxicity | Idem | idem | 5.6 |

| | | | |
|---|---|---|---|
| Irritation / Corrosion | Idem | idem | 5.3.4 and 5.4.3 |
| Sensitisation | Idem | idem | 5.5.3 |
| Carcinogenicity | Idem | idem | 5.8.3 |
| Mutagenicity - Genetic Toxicity | Idem | idem | 5.7.3 |
| Toxicity to reproduction- fertility | Idem | idem | 5.9.3 |
| Toxicity to reproduction- development | Idem | idem | 5.9.3 |
| Toxicity to reproduction – breastfed babies | Idem | idem | 5.9.3 |
| Environment | Idem | idem | 7.6 |

**Labelling**

Indication of danger:

R-phrases:

S-phrases:

Specific concentration limits:

# 4 ENVIRONMENTAL FATE PROPERTIES

## 4.1 Degradation

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

### 4.1.1 Abiotic degradation

*Report on hydrolysis, photodegradation, or oxidation processes and rates for water and air. Report how the information was obtained (test results or estimated) including a reference to the source or model, and report the degradation rates and calculated half-lives.*

*Interpret the findings and conclude with regard to stability in water, air and soil or sediment.*

*Guidance for evaluation of data for abiotic degradation (stability) in the environment is provided in section R.7.9 and section R.16.4.4.*

#### 4.1.1.1 Hydrolysis

The studies on hydrolysis are summarised in the following table:

Table 8: Overview of studies on hydrolysis

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Guideline><br><Principles of method if other than guideline><br><Estimation method (if used)> | Half-life (DT50):<br>t1/2 (pH <pH>): <Half-life> at <Temp., value> <Temp., unit> (Hydrolysis rate constant: <Hydrolysis rate constant> <Hydrolysis rate constant, unit>)<br>Recovery (in %):<br>pH <pH>: <%Recovery> at <Temp., value> <Temp., unit> after <Duration><br>Transformation products: <Transformation products> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

**<u>Data waiving</u>** *(if applicable)*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**<u>Discussion</u>**

#### 4.1.1.2 Phototransformation/photolysis

##### 4.1.1.2.1 Phototransformation in air

The studies on phototransformation in air are summarised in the following table:

Table 9: Overview of studies on phototransformation in air

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Guideline><br><Principles of method if other than guideline><br><Estimation method (if used)><br>Light source: <Light source><br>Light spectrum: <Light spectrum><br>Rel. light intensity: <Rel. light intensity> | Spectrum of substance:<br><Parameter>: <Value> <Unit> (<Remarks>)<br>Half-life (DT50):<br>t1/2: <DT50> (<Test condition>)<br>% Degradation:<br><%Degr.> after <Sampling time> <Sampling time, unit> (<Test condition>)<br>Quantum yield: <Quantum yield (for direct photolysis)><br>Transformation products: <Transformation products> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

**Data waiving** *(if applicable)*

**Information requirement:** <Test type>

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**Testing proposal**

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

**Proposed test guideline:** <Guideline>

**Planned study period:** <Study period>

**Details on method intended:**

**Discussion**

<discussion in endpoint summary of 5.1.1 phototransformation in air>

The following information is taken into account for any hazard / risk / persistency assessment:

<|Short description of key information endpoint summary of 5.1.1 phototransformation in air>

#### 4.1.1.2.2 Phototransformation in water

The same type of information as what is reported in 4.1.1.2.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 4.1.1.2.3 Phototransformation in soil

The same type of information as what is reported in 4.1.1.2.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 4.1.2 Biodegradation

*Report on biotic degradation by mentioning the type of test(s) employed and the result of the test. Present additional information if you report on multi-constituent substances, UVCBs etc. Justify the applicability of the data.*

*Interpret the findings and conclude with regard to stability in water, and soil or sediment.*

*Guidance for evaluation of the data on biodegradation is provided in section R.7.9*

#### 4.1.2.1 Biodegradation in water

#### 4.1.2.1.1 Estimated data:

The estimated data for biodegradation in water are summarised in the following table:

Table 10: Overview of estimated data for biodegradation in water

| Estimation method | Results | Remarks | Reference |
|---|---|---|---|
| <Study result type><br><Principles of method if other than guideline> | % Degradation of test substance: <% Degradation of test substance><br>Half-life: <Half-life of parent compound / 50% disappearance time (DT50)><br>*[REMARK: if section 5.2.2.]*<br><Interpretation of results><br>*[REMARK: if section 5.2.1.]* | <Reliability><br><Purpose flag><br>Study design: <Details on study design> | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| *Estimation method* | *Results* | *Remarks* | *Reference* |
|---|---|---|---|
| *(Q)SAR*<br>*aerobic*<br>*Multiple Linear Regression (MLR) model* | *readily biodegradable* | *3 (not reliable)*<br>*weight of evidence* | *Degner et al. 1993* |

#### 4.1.2.1.2 Screening tests

The test results are summarised in the following table:

Table 11: Overview of screening tests for biodegradation in water

| Method | Results | Remarks | Reference |
|---|---|---|---|
| < Inoculum: <Inoculum or test system> (<Oxygen conditions>) [REMARK: only if "Oxygen conditions = anaerobic" and "Inoculum" <> "anaerobic ...".] <Guideline> | % Degradation of test substance: <% Degradation of test substance><br><Interpretation of results> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)**>)<br>*[REMARK: only if ID <> Submission subst. ID.]* | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *ready biodegradability activated sludge, non-adapted OECD Guideline 301 F (Ready Biodegradability: Manometric Respirometry Test)* | *36 % degrad. after 28 d 49 % degrad. after 74 d readily biodegradable, but failing 10-day window* | *1 (reliable without restrictions) key study experimental result* | *Smith 1999* |
| *inherent biodegradability activated sludge, adapted OECD Guideline 302 B (Inherent biodegradability: Zahn-Wellens/EMPA Test)* | *97 % degrad. after 4 d inherently biodegradable* | *1 (reliable without restrictions) supporting study experimental result Test material: m-toluidine (read across???)* | *Wellens 1990* |

**Data waiving** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Information requirement:** <Test type>

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

*Example:*

***Information requirement:*** *ready biodegradability*

***Reason:*** *study scientifically unjustified*

***Justification:*** *substance is inorganic.]*

**Discussion (screening testing)**

Biodegradation in water: <biodegradation in water> (Key parameter from 5.2.1 Endpoint summary: biodegradation in water: screening tests)

<short description of key information in endpoint summary of 5.2.1 biodegradation in water: screening tests>

<discussion in endpoint summary of 5.2.1 biodegradation in water: screening tests>

#### 4.1.2.1.3 Simulation tests

Table 12: Overview of simulation tests for biodegradation in water

| Method | Results | Remarks | Reference |
|---|---|---|---|
| Test system: <Inoculum or test system> (<Oxygen conditions><br><Guideline> | Half-life (DT50): <Half-life> in <Compartment><br><% Degradation of test substance><br>Metabolites: <Metabolites><br><Identifier>: <Identity> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)**>)<br>*[REMARK: only if ID <> Submission subst. ID.]* | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *Test system: natural water / sediment (aerobic)*<br>*other guideline: modified ASTM test method E1798-96* | *Half-life (DT50): 2 — 10 d in water*<br>*Half-life (DT50): 15 — 38 d in sediment*<br>*Metabolites: yes*<br>*other: carboxylated biodegradation intermediates* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Nielsen et al. 1997* |
| *Test system: natural water (aerobic)* | *Half-life (DT50): 3.4 — 13.8 d in other: coastal sea water*<br>*Metabolites: not measured* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Vives-Rego, J., Lopez-Amoros, R., Guindulain, T., Garcia, M.T., Comas, J., and Sanchez-Leal, J. 2000* |

**Data waiving** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

*Example:*

***Reason:*** *study scientifically unjustified*

***Justification:*** *the substance is readily biodegradable.]*

**Discussion (simulation testing)**

Half-life (DT50) at <Temperature in kelvin (K)> K: <Half-life> days (Key parameter from 5.2.2 Endpoint summary: biodegradation in water: simulation tests)

Half-life (DT50) at <Temperature in kelvin (K)> K: <Half-life> days *(Key parameter from 5.2.2 Endpoint summary: biodegradation in water: simulation tests)*

<short description of key information in endpoint summary of 5.2.2 biodegradation in water: simulation tests>

<discussion in endpoint summary of 5.2.2 biodegradation in water: simulation tests>

#### 4.1.2.2 Biodegradation in sediments

The test results are summarised in the following table

Table 13: Overview of simulation tests for biodegradation in sediments

| Method | Results | Remarks | Reference |
|---|---|---|---|
| Test system: <Inoculum or test system> (<Oxygen conditions><br><Guideline> | Half-life (DT50):<br><Half-life> in <Compartment><br>% Degradation:<br><% Degradation of test substance> after <Sampling time> <Sampling time, unit><br>Metabolites: <Metabolites><br><Identifier>: <Identity> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)**>)<br>*[REMARK: only if ID <> Submission subst. ID.]* | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *Test system: natural sediment (aerobic)*<br>*OECD Guideline 308 (Aerobic and Anaerobic Transformation in Aquatic Sediment Systems)* | *Half-life (DT50): 45 d in sediment*<br>*Metabolites: not measured* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Wilson 2000* |
| *Test system: natural water / sediment (aerobic)*<br>*other guideline: modified ASTM test method E1798-96* | *Half-life (DT50): 2 — 10 d in water*<br>*Half-life (DT50): 15 — 38 d in sediment*<br>*Metabolites: yes*<br>*other: carboxylated biodegradation intermediates* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Nielsen et al. 1997* |

**<u>Data waiving</u>** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

*Example:*

***Reason:*** *study scientifically unjustified*

***Justification:*** *the substance is readily biodegradable.*

**Discussion**

Half life (DT50) in sediment (<temperature> K) = <half life> days

As appropriate move any sediment-specific information to here.

#### 4.1.2.3 Biodegradation in soil

The test results are summarised in the following table:

Table 14: Overview of studies on biodegradation in soil

| Method | Results | Remarks | Reference |
|---|---|---|---|
| Test type: <Test type><br>Soil type: <Soil type><br>*[REMARK: copy multiple entries, separated by semicolon.]*<br><Guideline> | Half-life (DT50): <Half-life><br><% Degradation of test substance><br>Evaporation of parent compound: <Determination of evaporation of parent compound><br>Volatile metabolites: <Determination of volatile metabolites><br>Residues: <Determination of residues><br>Metabolites: <Metabolites><br><Identifier>: <Identity> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)>)**<br>*[REMARK: only if ID <> Submission subst. ID.]* | <Author> <Year> |

**Data waiving** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**Discussion**

Half life (DT50) in soil (<temperature> K) = <half life> days

<short description of key information in endpoint summary of 5.2.2 biodegradation in soil>

<discussion in endpoint summary of 5.2.2 biodegradation in soil>

#### 4.1.2.4 Summary and discussion on biodegradation

<discussion from 5.2 Endpoint summary : biodegradation>

**Testing proposal**

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

**Information requirement:** ....*[REMARK: Depending on the IUCLID section in which a record with field "Study result type" = "experimental study planned" is provided and whether the relevant IUCLID fields are filled in, either "Simulation testing on ultimate degradation in surface water" or "Sediment simulation testing" or "Soil simulation testing" is inserted. The possible information requirement "Identification of degradation products" cannot be identified automatically. Verify any information copied and update if necessary.]*

**Proposed test guideline:** <Guideline>

**Planned study period:** <Study period>

**Details on method intended:**

Inoculum or test system: <Inoculum or test system>*[REMARK: if section 5.2.2.]* (<Oxygen conditions>)

Source and properties of surface water: <Details on source and properties of surface water> *[REMARK: if section 5.2.2.]*

Source and properties of sediment: <Details on source and properties of sediment> *[REMARK: if section 5.2.2.]*

Soil type: <Soil type> *[REMARK: if section 5.2.3.]*

Study design: <Details on study design> *[REMARK: if section 5.2.2.]*<Details on experimental conditions> *[REMARK: if section 5.2.3.]*

### 4.1.3 Summary and discussion on degradation

*This should include a summary and a discussion of the information available and describe before in section 4.1.1 and 4.1.2 as well as summary tables reporting degradation rates (to be used in the determination of the PEC) for the environmental compartments of concern (water, sediment, soil, air).*

*Guidance on estimation of degradation in the environment is provided in section R.16.4.4.*

| | |
|---|---|
| Degradation rate in water | |
| Degradation rate in sediment | |
| Degradation rate in soil | |
| Degradation rate in air | |

## 4.2 Environmental distribution

*Report the results of the available sorption studies (water-solids). Discuss the partitioning in the light of substance properties, including partitioning coefficients.*

*Describe how the distribution was calculated (see Chapter R.16). Report on the preference for partitioning to soil/sediment, air and water and present information on the mass distribution over the various compartments, preferably in a table format.*

*Interpret the findings and conclude with regard to the distribution of the substance after emissions, e.g. transport to (ground) water (leaching), air or soil/sediment.*

### 4.2.1 Adsorption/desorption

*Guidance on evaluation studies for adsorption/desorption is provided in sections R.7.1.15 as well as under R.16.4.3.3. for discussion related to the distribution in the environment.*

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

The studies on adsorption/desorption are summarised in the following table:

Table 15: Overview of studies on adsorption/desorption

| Method | Results | Remarks | Reference |
|---|---|---|---|
| Study type: <Study type> (<Media>)<br><Type of method><br><Guideline><br><Principles of method if other than guideline> | Adsorption coefficient Koc: <Adsorption coefficient Koc:><br>log Koc: <log Koc><br>Mass balance (in %) at end of adsorption phase:<br><% adsorption> after <Duration> <Unit> (<Sample No.>)<br>Mass balance (in %) at end of desorption phase:<br><% desorption> after <Duration> <Unit> (<Sample No.>) | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

**<u>Data waiving</u>** *(if applicable)*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**<u>Testing proposal</u>**

**Proposed test guideline:** <Guideline>

**Planned study period:** <Study period>

**Details on method intended:**

Study type: <Study type|>(<Media>)

Type of method: <Type of method>

**Discussion**

<Discussion in endpoint summary of 5.4.1 adsorption/desorption >

The following information is taken into account for any environmental exposure assessment:

<Short description of key information in endpoint summary of 5.4.1 adsorption/desorption >

### 4.2.2 Volatilisation

*Guidance on evaluation of volatilisation for environmental distribution is provided in sections R.7.1.22 as well as under R.16.4.3.2.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 4.2.3 Distribution modelling

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

## 4.3 Bioaccumulation

*Report when available bioconcentration factor (BCF) for fish and/or invertebrates and how it was measured or estimated.*

*Report conclusions on the bioaccumulation potential of the substance based on measured or estimated BCF or log $K_{ow}$.*

*Guidance on evaluation of bioaccumulation studies is provided in section R.7.10.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 4.3.1 Aquatic bioaccumulation

*Guidance on evaluation of aquatic bioaccumulation studies is provided in section R.7.10.1*

### 4.3.2 Terrestrial bioaccumulation

*Guidance on evaluation of terrestrial bioaccumulation studies is provided in section R.7.10.12*

### 4.3.3 Summary and discussion of bioaccumulation

*Guidance on bioaccumulation potential discussion is provided in section R.16.4.3.5*

## 4.4 Secondary poisoning

*Report the bioaccumulation and biomagnification factors for the selected food chain and how they were measured or estimated (see Chapter R.16). Interpret the findings with regard to the potential to bio-accumulate in the food chain.*

*Guidance on assessment of the potential for secondary poisoning is provided in sections R.16.4.3.5 and R.16.5.7.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

# 5 HUMAN HEALTH HAZARD ASSESSMENT

*This section reports the outcome of the human health hazard assessment as explained for each endpoint in the guidance chapter B.*

*Present a summary of results for each endpoint to humans under the relevant heading. Relevant (test) results and test conditions should be reported with a reference to their source (preferably in a table format). The key study for a specific endpoint should be indicated. It is recommended to separate animal data, human data and other data/information by subheadings. Justify missing data, e.g., by referring to the lack of legal testing requirements*

*Report the results for each endpoint in a short narrative that identifies the type of adverse effects and conclusive statements that support the results. Address the dose-response relationship and the relevant N(L)OAEL. Interpret the findings in terms of relevance for DNEL derivation, classification and labelling and PBT assessment (if applicable). Whenever tests are referred to, the type of test should be described. In case testing proposals have been made to the Agency, this should be mentioned for the relevant endpoint.*

## 5.1 Toxicokinetics (absorption, metabolism, distribution and elimination)

*Information available on the toxicokinetic profile (i.e. absorption, metabolism, distribution and elimination) should be summarised (in a table format if appropriate) and the impact on specific endpoints should be described here. Key studies should be flagged.*

*Guidance on evaluation of toxicokinetics data is provided in chapter R.7.12*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.1.1 Non-human information

### 5.1.2 Human information

### 5.1.3 Summary and discussion on toxicokinetics

*This section should include a summary and a discussion of the information described in sections 5.1.1 – 5.1.2 as well as conclusions with respect to absorption, metabolism, distribution and elimination of the substance.*

## 5.2 Acute toxicity

*Guidance on evaluation of data on acute toxicity is provided in chapter R.7.4.*

*Guidance on characterisation of the dose-response is provided in Chapter R.8 and specific guidance for acute toxicity in Appendix R.8-8.*

### 5.2.1 Non-human information

#### 5.2.1.1 Acute toxicity: oral

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

The results of experimental studies are summarised in the following table:

Table 16: Overview of experimental studies on acute toxicity after oral administration

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Species> (<Strain>) <Sex><br><Route of administration><br><Guideline><br><Principles of method if other than guideline> | <Endpoint>: <Effect level> (<Sex>) (<Remarks>) | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

The results of estimated data on acute toxicity after oral administration are summarised in the following table:

Table 17: Overview of estimated data on acute toxicity after oral administration

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Principles of method if other than guideline> | <Endpoint>: <Effect level> (<Sex>) (<Remarks>) | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

**Data waiving** *(if applicable)*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

#### 5.2.1.2 Acute toxicity: inhalation

The same type of information as what is reported in 5.2.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 5.2.1.3 Acute toxicity: dermal

The same type of information as what is reported in 5.2.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 5.2.1.4 Acute toxicity: other routes

The same type of information as what is reported in 5.2.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.2.2 Human information

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.2.3 Summary and discussion of acute toxicity

*This section should include a summary and discussion of the information reported in sections 5.2.1 – 5.2.2, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

## 5.3 Irritation

*Guidance for evaluation of the data on irritation is provided in Chapter R.7.2.*

*Guidance on characterisation of the dose-response is provided in Chapter R.8 and specific guidance for irritation/corrosion in Appendix R.8-9.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.3.1 Skin

#### 5.3.1.1 Non-human information

#### 5.3.1.2 Human information

### 5.3.2 Eye

#### 5.3.2.1 Non-human information

#### 5.3.2.2 Human information

### 5.3.3 Respiratory tract

#### 5.3.3.1 Non-human information

#### 5.3.3.2 Human information

### 5.3.4 Summary and discussion of irritation

*This section should include a summary and discussion of the information reported in sections 5.3.1 – 5.3.3, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

## 5.4 Corrosivity

*Guidance for evaluation of the data on corrosion is provided in R.7.2.*

*Guidance on characterisation of the dose-response is provided in Chapter R.8 and specific guidance for irritation/corrosion in Appendix R.8-9.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.4.1 Non-human information

### 5.4.2 Human information

### 5.4.3 Summary and discussion of corrosion

*This section should include a summary and discussion of the information reported in sections 5.4.1 – 5.4.2, including discussion and justification of:*

- *dose-response relationship*

- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

## 5.5 Sensitisation

*Guidance for evaluation of the data on sensitisation is provided in R.7.3.*

*Guidance on characterisation of the dose-response is provided in Chapter R.8 and specific guidance for sensitisation in Appendices R.8-10 and R.8-11.*

### 5.5.1 Skin

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

#### 5.5.1.1 Non-human information

The results of experimental studies on skin sensitisation are summarised in the following table

Table 18: Overview of experimental studies on skin sensitisation

| Method | Results | Remarks | Reference |
|---|---|---|---|
| in vitro study [REMARK: if field "Type of method" = "in vitro".]<br>Species: <Species> (<Strain>) <Sex><br>Local lymph node assay [REMARK: if "Type of study" = "LLNA".]<br><Type of study> [REMARK: if "Type of study" <> "LLNA".]<br>Induction: <Route of induction exposure><br>Challenge: <Route of challenge exposure><br>Vehicle: <Vehicle> [REMARK:VEHICLE_TOX if <> "LLNA"; VEHICLE_LLNA if = "LLNA"..]<br>Guideline: <Guideline><br><Principles of method if other than guideline> [REMARK: if field "Type of method" = "in vitro".] | <Interpretation of results><br>Stimulation index: <Stimulation index> [REMARK: if "Type of study" = "LLNA".]<br>No. with positive reactions: <No. with + reactions> out of <Total no. in group> (<Group>) <Reading> (<Hours after challenge> h after chall.) <Dose level> [REMARK: if "Type of study" <> "LLNA".] | <Reliability><br><Purpose flag><br><Study result type> (read-across)<br>Test material: <Identity> | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *Species: mouse (CBA)*<br>*Local lymph node assay*<br>*Vehicle: acetone/olive oil (4:1 v/v)*<br>*Guideline: OECD Guideline 429 (Skin Sensitisation: Local Lymph Node Assay)* | *sensitising*<br>*Stimulation index: 4.6 (15% in AOO); 4.4 (9%); 3.4 (3%); 4.8 (1%)* | *1 (reliable without restrictions)*<br>*key study*<br>*experimental result* | *Author 2008* |
| *in vitro study*<br>*Species: other: human cell lines THP-1 and U-937*<br>*Human Cell Line Activation Test (h-CLAT)* | *not sensitising* | *2 (reliable with restrictions)*<br>*supporting study*<br>*experimental result* | *Author 2008* |

The results of estimated data on skin sensitisation are summarised in the following table:

Table 19: Overview of estimated data ((Q)SAR) on skin sensitisation

| **Method** | **Results** | **Remarks** | **Reference** |
|---|---|---|---|
| Model based on: <Type of study><br>Guideline: <Guideline><br><Principles of method if other than guideline> | <Interpretation of results><br>Stimulation index: <Stimulation index> | <Reliability><br><Purpose flag> | <Author> <Year> |

**<u>Data waiving</u>** *(if applicable)*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

#### 5.5.1.2 Human information

The exposure-related observations in humans are summarised in the following table:

Table 20: Overview of exposure-related observations in humans

| **Subjects / Study type** | **Results** | **Remarks** | **Reference** |
|---|---|---|---|
| Study type: <Study type> *[REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]*<br>Study type: <Type of information> *[REMARK: if 7.10.5]*<br><Type of population> *[REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]*<br>Subjects: <Details on study design> *[REMARK: if 7.10.1, 7.10.2, 7.10.4 or 7.10.5]*<br>Subjects: <Subjects> *[REMARK: if 7.10.3]* | <Results> *[REMARK: if 7.10.5]*<br><Results of examinations> *[REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]*<br>Outcome of incidence: <Outcome of incidence> *[REMARK: if 7.10.3]* | <Reliability><br><Purpose flag> | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| **Study type / Subjects** | **Results** | **Remarks** | **Reference** |
|---|---|---|---|
| *Study type: study with volunteers*<br>*Population: general*<br>*Subjects: 58 dermatitis patients,* | *63.8 % (37) of the patients showed positive reactions ...* | *3 (not reliable)* | *Kleniewska 1975* |

| | | | |
|---|---|---|---|
| *known to be hypersensitive to p-phenylene diamine, were patch tested with 2 % p-toluidine in yellow paraffin....* | | | |
| *Study type: case report*<br>*Population: general; occupational*<br>*Subjects: 45-year-old woman received a dental prostheses containing ....* | *No visible clinical evidence of allergic stomatitis.....* | *3 (not reliable)* | *Smith 2007* |

### 5.5.2 Respiratory system

#### 5.5.2.1 Non-human information

The results of experimental studies on respiratory sensitisation are summarised in the following table:

Table 21: Overview of studies on respiratory sensitisation

| Method | Results | Remarks | Reference |
|---|---|---|---|
| in vitro study *[REMARK: if field "Type of method" = "in vitro".]*<br>Species: <Species> (<Strain>) <Sex><br>Induction: <Route of induction exposure><br>Challenge: <Route of challenge exposure><br>Vehicle: <Vehicle><br>Guideline: <Guideline><br><Principles of method if other than guideline> | <Interpretation of results><br><Results> | <Reliability><br><Purpose flag><br><Study result type> (read-across)<br>**Test material:** <Identity> | <Author> <Year> |

***Example table*** *(Note: prompts are only inserted if any information is available for a given item):*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *Species: mouse (C57BL)*<br>*Induction: dermal*<br>*Vehicle: acetone/olive oil (4:1 v/v)* | *sensitising*<br>*The concentration of total IgE increased significantly compared with levels measured in sera prepared for mice treated cocurrently with vehicle alone ...* | *4 (not assignable)*<br>*experimental result* | *Author 2008* |

The results of estimated data on respiratory sensitisation are summarised in the following table

Table 22: Overview of estimated data ((Q)SAR) on respiratory sensitisation

| Method | Results | Remarks | Reference |
|---|---|---|---|
| *Guideline: <Guideline>*<br>*<Principles of method if other than guideline>* | *<Results>* | *<Reliability>*<br>*<Purpose flag>* | *<Author>*<br>*<Year>* |

**Data waiving** *(if applicable)*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

#### 5.5.2.2 Human information

The exposure-related observations in humans are summarised in the following table:

Table 23: Overview of exposure-related observations in humans

| Subjects / Study type | Results | Remarks | Reference |
|---|---|---|---|
| Study type: <Study type> [REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]<br>Study type: <Type of information> [REMARK: if 7.10.5]<br><Type of population> [REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]<br>Subjects: <Details on study design> [REMARK: if 7.10.1, 7.10.2, 7.10.4 or 7.10.5]<br>Subjects: <Subjects> [REMARK: if 7.10.3] | <Results> [REMARK: if 7.10.5]<br><Results of examinations> [REMARK: if 7.10.1, 7.10.2, 7.10.3 or 7.10.4.]<br>Outcome of incidence: <Outcome of incidence> [REMARK: if 7.10.3] | <Reliability><br><Purpose flag> | <Author> <Year> |

### 5.5.3 Summary and discussion of sensitisation

*This section should include a summary and discussion of the information reported in sections 5.5.1 – 5.5.2, including discussion and justification of:*

- *dose-response relationship*
- *information on potency*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s), when relevant*
- *correction of dose descriptors*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

*When exposure through one route might trigger sensitisation via another route, this should be explained under the relevant subheadings below.*

**Skin sensitisation**

The substance is <key parameter for skin sensitisation in the endpoint summary of Section 7.4 sensitisation>. *(e.g. "not sensitising" or "sensitising")*

<Short description of key information for skin sensitisation from endpoint summary of Section 7.4 sensitisation > *(Clear any redundancies with the preceding key parameter as appropriate.)*

**Discussion:**

<Discussion for skin sensitisation from endpoint summary of Section 7.4 sensitisation (part skin sensitisation>

**Respiratory sensitisation**

The substance is <key parameter for respiratory sensitisation in the endpoint summary of Section 7.4 sensitisation>. *(e.g. "not sensitising" or "sensitising")*

<Short description of key information for respiratory sensitisation from endpoint summary of Section 7.4 sensitisation> *(Clear any redundancies with the preceding key parameter as appropriate.)*

**Discussion:**

<Discussion for respiratory sensitisation from endpoint summary of Section 7.4 sensitisation (part respiratory sensitisation>

**Justification for classification or non classification**

<Discussion for justification for classification or non classification from endpoint summary of Section 7.4 sensitisation >

## 5.6 Repeated dose toxicity

*Guidance for evaluation of the data on repeated dose toxicity is provided in R.7.5. Guidance on characterisation of the dose-response is provided in Chapter R.8.*

### 5.6.1 Non-human information

#### 5.6.1.1 Repeated dose toxicity: oral

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

The results of experimental studies are summarised in the following table:

Table 24: Overview of experimental studies on repeated dose toxicity after oral administration

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Species> (<Strain>) <Sex><br><Test type> (<Route of administration>)<br>Doses/conc.: <Doses / concentrations> (Vehicle: <Vehicle>) | <Endpoint>: <Effect level> (<Sex>) (<Basis for effect level / Remarks>)<br>Adverse effects observed in any test group: [clinical signs and mortality; body weight | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-** | <Author> <Year> |

| | | | |
|---|---|---|---|
| Duration/frequency of exposure: <Duration of treatment / exposure> (<Frequency of treatment>)<br><Guideline><br><Principles of method if other than guideline> | and weight gain; food consumption and compound intake (if feeding study); food efficiency; water consumption and compound intake (if drinking water study); ophthalmoscopic examination; haematology; clinical chemistry; urinalysis; neurobehaviour; organ weights; gross pathology; histopathology: non-neoplastic; histopathology: neoplastic] | **across)** | |

*[REMARK: Example table:*

| ***Method*** | ***Results*** | ***Remarks*** | ***Reference*** |
|---|---|---|---|
| *rat (Wistar) male/female*<br>*subacute (oral: gavage)*<br>*Doses/conc.: 0, 50, 200 or 800 mg/kg bw/d (Vehicle: Polyethylenglycol 400)*<br>*Duration/frequency of exposure: 29 d (daily, 7 d/w)*<br>*OECD Guideline 407 (Repeated Dose 28-Day Oral Toxicity in Rodents)* | *NOAEL: 200 mg/kg bw/day (nominal) (female) (general toxicity)*<br>*Adverse effects observed in any test group: clinical signs and mortality; body weight and weight gain; haematology; urinalysis; organ weights* | *1 (reliable withou restriction)*<br>*key study*<br>*experimental result* | *Company X 2004* |
| *rat (Sprague-Dawley) male/female*<br>*subchronic (oral: gavage)*<br>*Doses/conc.: 0, 50, 200 or 800 mg/kg bw/d in (Vehicle: corn oil)*<br>*Duration/frequency of exposure: 90 d (daily, 7 d/w)*<br>*OECD Guideline 408 (Repeated Dose 90-Day Oral Toxicity in Rodents)* | *NOAEL: 200 mg/kg bw/day (nominal) (female) (general toxicity)*<br>*Adverse effects observed in any test group: urinalysis; organ weights* | *1 (reliable withou restriction)*<br>*key study*<br>*experimental result* | *Company X 2004* |

The results of estimated data on repeated dose toxicity after oral administration are summarised in the following table:

Table 25: Overview of estimated data on repeated dose toxicity after oral administration

| **Method** | **Results** | **Remarks** | **Reference** |
|---|---|---|---|
| <Species><br><Test type> (<Route of administration>)<br><Principles of method if other than guideline> | <Endpoint>: <Effect level> (<Sex>) (<Basis for effect level / Remarks>) | <Reliability><br><Purpose flag><br><Study result type><br>**Test material (<Identifier>): <Identity> (read-across)** | <Author> <Year> |

**Data waiving** *(if relevant)*

**Information requirement (Test type):** short-term toxicity study (28 days)*[REMARK: If <Test type> = "subacute".]*
**Information requirement (Test type):** sub-chronic toxicity study (90 days)*[REMARK: If <Test type> = "subchronic".]*
**Information requirement (Test type):** <Test type>*[REMARK: If <Test type> <>= "subacute" or "subchronic".]*
**Reason:** <Data waiving>
**Justification:** <Justification for data waiving>

#### 5.6.1.2 Repeated dose toxicity: inhalation

The same type of information as what is reported in 5.6.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 5.6.1.3 Repeated dose toxicity: dermal

The same type of information as what is reported in 5.6.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 5.6.1.4 Repeated dose toxicity: other routes

The same type of information as what is reported in 5.6.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.6.2 Human information

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.6.3 Summary and discussion of repeated dose toxicity:

*This section should include a summary and discussion of the information reported in sections 5.6.1 – 5.6.2, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

Testing proposal *(when relevant)*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

*Guidance on integrated testing strategy for repeated dose toxicity is provided in Chapters R.7.5 and R.7.5.6.*

## 5.7 Mutagenicity

*Guidance for evaluation of the data on mutagenicity is provided in R.7.7. Guidance on characterisation of the dose-response is provided in Chapter R.8.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.7.1 Non-human information

#### 5.7.1.1 In vitro data

#### 5.7.1.2 In vivo data

### 5.7.2 Human information

### 5.7.3 Summary and discussion of mutagenicity

*This section should include a summary and discussion of the information reported in sections 5.7.1 – 5.7.2, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)/DMELs*
- *other information on potency when no dose descriptor is available (a more qualitative assessment needs to be done)*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

Testing proposal *(when relevant)*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

*Guidance on integrated testing strategy mutagenicity is provided in Chapter R.7.7, and in particular in R.7.7.6.*

## 5.8 Carcinogenicity

*Guidance for evaluation of the data on carcinogenicity is provided in R.7.7. Guidance on characterisation of the dose-response is provided in Chapter R.8.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.8.1 Non-human information

#### 5.8.1.1 Carcinogenicity: oral

#### 5.8.1.2 Carcinogenicity: inhalation

#### 5.8.1.3 Carcinogenicity: dermal

### 5.8.2 Human information

### 5.8.3 Summary and discussion of carcinogenicity

*This section should include a summary and discussion of the information reported in sections 5.8.1 – 5.8.2, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

Testing proposal *(when relevant)*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

*Guidance on integrated testing strategy carcinogenicity is provided in Chapter R.7.7, in particular in R.7.7.13.*

## 5.9 Toxicity for reproduction

*Guidance for evaluation of the data on reproductive toxicity is provided in Chapter R.7.6. Guidance on characterisation of the dose-response is provided in Chapter R.8 and specific guidance for toxicity for reproduction is provided in Appendix R.8-12.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 5.9.1 Effects on fertility

#### 5.9.1.1 Non-human information

#### 5.9.1.2 Human information

### 5.9.2 Developmental toxicity

#### 5.9.2.1 Non-human information

#### 5.9.2.2 Human information

### 5.9.3 Summary and discussion of reproductive toxicity

*This section should include a summary and discussion of the information reported in sections 5.9.1 5.9.2, including discussion and justification of:*

- *dose-response relationship*
- *C&L*
- *derivation/selection of the relevant dose descriptor(s) to be used in the derivation of endpoint specific DNEL(s)*
- *other information on potency when no dose descriptor is available*
- *correction of dose descriptors, when relevant*
- *the choice of the assessment factors*

*All relevant information should be reported in* Table 30 *and* Table 31 *in section 5.11.1.*

Testing proposal *(when relevant)*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and X justification needs to be provided.*

*Guidance on integrated testing strategy on reproductive toxicity is provided in Chapter R.7.6 (and in particular in R.7.6.6)*

## 5.10 Other effects

### 5.10.1 Non-human information

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

#### 5.10.1.1 Neurotoxicity

The results of experimental studies are summarised in the following table:

Table 26: Overview of experimental studies on neurotoxicity

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Species> (<Strain>) <Sex><br><Test type><br><Route of administration><br>Doses/conc.: <Doses / concentrations> (Vehicle: <Vehicle>)<br><Duration of treatment / exposure> (<Frequency of treatment>)<br><Guideline><br><Principles of method if other than guideline> | <Endpoint> (<Generation (if applicable)>): <Effect level> (<Sex>) (<Basis for effect level / Remarks>)*[REMARK: repeat for each record of the block.]*<br>Adverse effects observed in any test group: [clinical signs and mortality; body weight and weight gain; food consumption and compound intake (if feeding study); food efficiency; water consumption and compound intake (if drinking water study); ophthalmoscopic examination; biochemistry, neurobehavioural results, gross pathology; neuropathology]<br>Adverse development-related effects observed in any test group: [reproductive performance (parental animals), viability (offspring), sexual maturation (offspring), developmental landmarks (offspring)]<br>*[REMARK: Print any of the above stated parameter types if "yes" is indicated in the corresponding IUCLID field(s).]* | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)>)** | <Author> <Year> |

The following estimated data are available that are considered relevant as key information:

**Study "<Author> <Year>":**

<Executive summary>

The following estimated data are available that are considered relevant for weight of evidence assessment:

**Study "<Author> <Year>":**

<Executive summary>

#### 5.10.1.2 Immunotoxicity

The results of experimental studies are summarised in the following table:

Table 27: Overview of experimental studies on immunotoxicity

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Species> (<Strain>) <Sex><br><Test type><br><Route of administration><br><Doses / concentrations> (Vehicle: <Vehicle><br>Duration/frequency of exposure: <Duration of treatment / exposure> (<Frequency of treatment>)<br><Guideline><br><Principles of method if other than guideline> | <Endpoint>: <Effect level> (<Sex>) (<Basis for effect level / Remarks>)*[REMARK: repeat for each record of the block.]*<br>Adverse effects observed in any test group: [clinical signs and mortality; body weight and weight gain; food consumption and compound intake (if feeding study); food efficiency; water consumption and compound intake (if drinking water study); ophthalmoscopic examination; haematology; clinical chemistry; gross pathology; cell viabilities, humoral immunity examinations, specific cell-mediated immunity, non-specific cell-mediated immunity, other functional activity assays, other findings] *[REMARK: Print any of the above stated parameter types if "yes" is indicated in the corresponding IUCLID field(s).]* | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)>)** | <Author> <Year> |

The following estimated data are available that are considered relevant as key information:

**Study "<Author> <Year>":**

<Executive summary>

The following estimated data are available that are considered relevant for weight of evidence assessment:

**Study "<Author> <Year>":**

<Executive summary>

#### 5.10.1.3 Specific investigations: other studies

The results of specific investigations (other studies) are summarised in the following table:

Table 28: Overview of specific investigations: other studies

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Type of effects studied><br><Type of method><br>Endpoint addressed: <Endpoint addressed><br><Species> (<Strain>) <Sex><br><Route of administration><br>Doses/conc.: <Doses / concentrations> (Vehicle: <Vehicle><br>Duration/frequency of exposure: <Duration of treatment / exposure> (<Frequency of treatment>)<br><Guideline><br><Principles of method if other than guideline> | <Details on results> | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across???)>)** | <Author> <Year> |

The following estimated data are available that are considered relevant as key information:

**Study "<Author> <Year>":**

<Executive summary>

The following estimated data are available that are considered relevant for weight of evidence assessment:

**Study "<Author> <Year>":**

<Executive summary>

### 5.10.2 Human information

The exposure-related observations in humans are summarised in the following table:

Table 29: Overview of exposure-related observations on neurotoxicity and/or immunotoxicity

| Subjects / Study type | Results | Remarks | Reference |
|---|---|---|---|
| Study type: <Study type> *[REMARK: if 7.10.1, 7.10.2or 7.10.3]*<br>Study type: <Type of information> *[REMARK: if 7.10.5]*<br><Type of population> *[REMARK: if 7.10.1, 7.10.2or 7.10.3]*<br>Subjects: <Details on study design> *[REMARK: if 7.10.1, 7.10.2or 7.10.5]*<br>Subjects: <Subjects> *[REMARK: if 7.10.3]*<br>Endpoint addressed: <Endpoint addressed> | <Results> *[REMARK: if 7.10.5]*<br><Results of examinations> *[REMARK: if 7.10.1, 7.10.2 or 7.10.3]*<br>Outcome of incidence: <Outcome of incidence> *[REMARK: if 7.10.3]* | <Reliability><br><Purpose flag> | <Author> <Year> |

### 5.10.3 Summary and discussion

**Neurotoxicity**

<Discussion>

The following information is relevant for any hazard / risk assessment:

<Short description of key information>

Justification for classification or non classification

<Justification for classification or non-classification>

**Immunotoxicity**

<Discussion>

The following information is relevant for any hazard / risk assessment:

<Short description of key information>

Justification for classification or non classification

<Justification for classification or non-classification>

**Specific investigations: other studies**

<Discussion>

The following information is relevant for any hazard / risk assessment:

<Short description of key information>

## 5.11 Derivation of DNEL(s) /DMELs[2]

*Guidance for derivation of DN(M)EL(s) is provided in Chapter R.8.*

*In order to select the leading DNEL in the next CSR chapter, end-point specific DNELs need to be set (if applicable). Endpoint-specific DNELs are needed to derive only one DNEL per target group and exposure route and duration.*

*This section reports how the DNEL for the leading health effect is derived. This should follow from a summary of the health effects and end-point specific DNELs, and the derived DNELs for each relevant exposure pattern (duration, frequency, route and exposed human population) that result from the exposure scenarios. The assessment factors that are used need to be justified in this section based on the guidance in Section B.7.1 and Chapter R.8.*

*In those cases where a DNEL cannot be derived, the reason for this shall be clearly stated and justified, e.g.*

*[The available data do not allow to reliably identify the threshold]*

*[A substance exerts its effect by a non-threshold mode of action]*

*[Test data or other relevant information are absent]*

*Specifically for non-threshold mutagens/carcinogens, a DMEL (derived minimal effect level) may be derived if the available data are judged of sufficient quality. Report the derivation of the DMEL in the required detail according to Section R.8.9).*

### 5.11.1 Overview of typical dose descriptors for all endpoints

*The following table is extracted from Chapter R.8, Appendix R.8.1, Table R.8.14*

[2] The heading has been slightly modified compared to the format given in Annex I of the REACH Regulation (section 7) to clarify the content of the section. Inclusion of DMELs may facilitate risk characterisation according to Annex 1, section 6.5.

Table 30: Available dose-descriptor(s) per endpoint for a certain substance as a result of its hazard assessment.

| **Endpoint** | | **Quantitative dose descriptor[3] (appropriate unit) or qualitative assessment** | | **Associated relevant effect[4]** | **Remarks on study[5]** |
|---|---|---|---|---|---|
| | | Local[6] | Systemic[7] | | |
| Acute toxicity[8] | Oral | | | | |
| | Dermal | | | | |
| | Inhalation | | | | |
| Irritation/Corrosivity | Skin | | NA[9] | | |
| | eye | | NA | | |
| | resp. tract | | NA | | |
| Sensitisation | skin | | NA | | |
| | resp. tract | | NA | | |
| Repeated dose toxicity sub-acute/ sub-chronic/ chronic | oral | | | | |
| | dermal | | | | |
| | inhalation | | | | |
| Mutagenicity | in vitro | | | | |
| | in vivo | | | | |
| Carcinogenicity | oral | | | | |
| | dermal | | | | |
| | inhalation | | | | |
| Reproductive toxicity[10] Fertility impairment | oral | NA | | | |
| | dermal | NA | | | |
| | inhalation | NA | | | |
| Reproductive toxicity developmental tox | oral | NA | | | |
| | dermal | NA | | | |
| | inhalation | NA | | | |

3 NOAEL (NOAEC), LOAEL , T25, BMD(L)10 or any other dose descriptor; indicate whether this concerns a no or lowest observed effect level etc
4 In this column the relevant effect for which the dose descriptor is determined is provided
5 This column is for indicating whether data were available, whether the substance is classified for this endpoint, for shortly describing specifics of the study (e.g. 28-d gavage rat, 5 d/wk or 2-gen diet rat, 7 d/wk), and for indicating (additional) uncertainty in available data
6 Local exposure: units are mg/m3 for inhalation, and mg/cm2 or ppm for dermal exposure
7 Systemic: units are mg/m3 for inhalation, and mg/kg bw/day for oral and dermal exposure
8 In general, sublethal toxicity is a more rational starting point for acute toxicity than mortality data; information on acute toxicity may also be derived from e.g. repeated dose toxicity studies or reproductive toxicity studies
9 Not Applicable
10 These repeated exposure studies may also show relevant acute effects of the test substance; these should be accounted for under the endpoint acute toxicity

### 5.11.2 Correction of dose descriptors if needed (for example route-to-route extrapolation), application of assessment factors and derivation of the endpoint specific DN(M)EL

*The following table is extracted from Chapter R.8, Appendix R.8.1, Table R.8.15 and R.8.16*

Table 31: Corrected dose descriptor(s) per endpoint and endpoint-specific DNEL(s)/DMEL(s) for the relevant exposure pattern[11]

| **Endpoint** | | **Most relevant quantitative dose descriptor[12] (appropriate unit)** | | **Corrected dose descriptor (appropriate unit)** | | **Overall AF applied** | **Endpoint-specific DNEL/DMEL (appropriate unit)** | |
|---|---|---|---|---|---|---|---|---|
| | | Local[13] | Systemic[14] | Local | Systemic | | Local | Systemic |
| Acute toxicity | oral | | | | | | | |
| | dermal | | | | | | | |
| | inhalation | | | | | | | |
| Irritation/Corrosivity | skin | | NA[15] | | NA | | | NA |
| | eye | | NA | | NA | | | NA |
| | resp. tract | | NA | | NA | | | NA |
| Sensitisation | skin | | NA | | NA | | | NA |
| | resp. tract | | NA | | NA | | | NA |
| Repeated dose toxicity sub-acute/ sub-chronic/ chronic | oral | | | | | | | |
| | dermal | | | | | | | |
| | inhalation | | | | | | | |
| Mutagenicity | In vitro | | | | | | | |
| | In vivo | | | | | | | |
| Carcinogenicity | oral | | | | | | | |
| | dermal | | | | | | | |
| | inhalation | | | | | | | |

[11] Repeat as appropriate for the different populations (workers/general population and eventually specific sensitive population)
[12] NOAEL (NOAEC), LOAEL , T25, BMD10 etc or any other dose descriptor; indicate whether this concerns a no or lowest observed effect level etc
[13] Local exposure: units are $mg/m^3$ for inhalation, and $mg/cm^2$ or ppm for dermal exposure
[14] Systemic: units are $mg/m^3$ for inhalation, and mg/kg bw/day for oral and dermal exposure
[15] Not Applicable

| **Endpoint** | | **Most relevant quantitative dose descriptor[12] (appropriate unit)** | | **Corrected dose descriptor (appropriate unit)** | | **Overall AF applied** | **Endpoint-specific DNEL/DMEL (appropriate unit)** | |
|---|---|---|---|---|---|---|---|---|
| | | Local[13] | Systemic[14] | Local | Systemic | | Local | Systemic |
| Reproductive toxicity fertility impairment | oral | NA | | NA | | | NA | |
| | dermal | NA | | NA | | | NA | |
| | inhalation | NA | | NA | | | NA | |
| Reproductive toxicity developmental tox | oral | NA | | NA | | | NA | |
| | dermal | NA | | NA | | | NA | |
| | inhalation | NA | | NA | | | NA | |

.

### 5.11.3 Selection of the critical DNEL(s)/DMELs and/or qualitative/semi-quantitative descriptor for critical health effects

*Guidance on the selection of the leading health effect(s) and of the critical DN(M)ELs is provided in chapter E and chapter R.8 and in particular in section R.8.7*

The next table exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available[16].

Table 32: DN(M)ELs for workers[17]

| Exposure pattern | Route | Descriptors | DNEL/DMEL (appropriate unit) | Most sensitive endpoint |
|---|---|---|---|---|
| Acute - systemic effects | dermal (mg/kg bw /day) | <DNEL>[18] | <DN(M)EL value> | <most sensitive endpoint> |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |
| Acute - local effects | Dermal (mg/cm$^2$) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |
| Long-term - systemic effects | Dermal (mg/kg bw /day) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |
| Long-term – local effects | Dermal (mg/cm$^2$) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |

**Discussion**

<Discussion from 7 Endpoint summary: Toxicological information>

Table 33: DN(M)ELs for the general population[19]

| Exposure pattern | Route | Descriptors | DNEL/DMEL (appropriate unit) | Most sensitive endpoint |
|---|---|---|---|---|
| Acute - systemic effects | Dermal (mg/kg bw /day) | <DNEL> | <DN(M)EL value> | <most sensitive endpoint> |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |
| | Oral (mg/kg bw /day) | *Idem* | *idem* | *Idem* |
| Acute - local effects | Dermal (mg/cm$^2$) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |
| Long-term - systemic effects | dermal(mg/kg bw /day) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |

16 All information is extracted from 7. Endpoint summary: Toxicological information

17 As the respiration rate is taken into account for the derivation of the DNEL, this table need to be repeated in case different exposure scenarios lead to different respiration rate.

18 Values in IUCLID 5 are DNEL/DMEL/ not quantifiable

19 General population includes consumers and humans via the environment. In rare cases it may also be relevant to derive a DNEL for specific subpopulations, such as children. In this case the table need to be repeated. In addition as the respiration rate is taken into account for the derivation of the DNEL, this table need to be repeated in case different exposure scenarios lead to different respiration rate.

| | | | | |
|---|---|---|---|---|
| | oral(mg/kg bw /day) | *Idem* | *idem* | *Idem* |
| Long-term – local effects | Dermal (mg/cm$^2$) | *Idem* | *idem* | *Idem* |
| | Inhalation (mg/m$^3$) | *Idem* | *idem* | *Idem* |

**Discussion**

<Discussion from 7 Endpoint summary: Toxicological information>

# 6 HUMAN HEALTH HAZARD ASSESSMENT OF PHYSICO-CHEMICAL PROPERTIES

*Report the relevant test result for each property under the appropriate heading. Whenever tests are referred to, the type of test should be described including the test guideline applied.*

*Guidance on how to carry out human health hazard assessment of physico-chemical properties is given in the guidance in guidance Part B Section 6.1, Chapter R9 and Sections R.7.1.9, R7.1.10 and R7.1.13.*

*This section should include the assessment of the potential effects arising from the capacity of hazardous chemicals to cause accidents, in particular fires, explosions or other hazardous chemical reactions covers:*

- *hazards resulting from the physico-chemical nature of the chemical agents,*
- *risk factors identified in their storage and use,*
- *the estimated severity in the event of occurrence and*
- *C&L.*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

## 6.1 Explosivity

## 6.2 Flammability

## 6.3 Oxidising potential

# 7 ENVIRONMENTAL HAZARD ASSESSMENT

*Report the results of the hazard assessment (cf. chapter B) for each environmental sphere in a short narrative that identifies the type of adverse effects, the critical taxonomical group and conclusive statements that support the results.*

*Whenever tests are referred to, the type of test should be described including the test guideline applied. In case testing proposals have been made to the Agency, this should be mentioned for the relevant endpoint.*

*An overview of relevant results can be presented in as summary table, indicating for each relevant study the type of organism, the toxicological endpoint tested, and a reference to its source. It is recommended to separate taxa.*

*Indicate the key study for deriving the PNEC, as well as the reasoning for selecting this study as key study, and interpret the findings (preferably under separate subheadings) with regard to PNEC derivation, classification and labelling and the PBT assessment (only for the aquatic compartment).*

*Present the derivation of the PNEC for each relevant compartment, and provide justification for the value of the assessment factor that is applied to the key study or studies (in case both chronic and acute data are available). Specific guidance is given in Section B.7.2 and Chapter R.10.*

## 7.1 Aquatic compartment (including sediment)

### 7.1.1 Toxicity data

*Guidance on how to evaluate toxicity data for aquatic organisms is provided in sections R.7.8.1 to 7.8.5*

<Discussion from 6.1 Endpoint summary: Aquatic toxicity>]

#### 7.1.1.1 Fish

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

##### 7.1.1.1.1 Short-term toxicity to fish

The results are summarised in the following table:

*Note: Only LC50 values are copied from IUCLID with the following exception: key studies or weight of evidence data in which this endpoint type is not available, any other endpoint types (e.g. LC0) are copied. Consider deleting any values that are not relevant for the CSR.*

Table 34: Overview of short-term effects on fish

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Test organisms (species)> (<Water media type>)<br><Test type><br><Guideline> | <Endpoint> (<Duration>):<br><Effect conc.><br>(<Nominal/Measured>) | <Reliability><br><Purpose flag><br><Study result type><br>**Test material: <Identity> (read-across)** [REM: If the test | <Author> <Year> |

| | | | |
|---|---|---|---|
| | | substance is different than the one for the CSR, an identifier is copied here]. | |

*Example table:*

| Method | Results | Remarks | Reference |
|---|---|---|---|
| *Pimephales promelas (freshwater)*<br>*static*<br>*OECD Guideline 203 (Fish, Acute Toxicity Test)* | *LC50 (96 h ): 8690 mg/L (nominal)*<br>*LC50 (72 h ): 8690 mg/L (nominal)* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Thurston, R.V., Gilfoil, T.A., Meyn, E.L., Zajdel, R.K., Aoki, T.I. and Veith, G.D. 1985* |
| *Pimephales promelas (freshwater)*<br>*static*<br>*other guideline: ASTM D1345-59 (1977)* | *LC50 (96 h ): 10700 mg/L (nominal)* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result*<br>***Test material (IUPAC name): formaldehyde (read-across)*** | *Brooke, L.T., Call, D.J., Geiger, D.L. and Northcott,C.E. (Editors) 1984* |
| *Oryzias latipes (freshwater)*<br>*semi-static* | *LC50 (48 h): >5000mg/L (meas. (initial))* | *2 (reliable with restrictions)*<br>*key study*<br>*experimental result* | *Tonogai, Y., Ogawa, S., Ito, Y., Iwaida, M. 1982* |

**Data waiving** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

*Example:*

***Reason:*** *study scientifically unjustified*

***Justification:*** *a reliable long-term aquatic toxicity study on fish is available*

**Discussion**

<Discussion from Section 6.1.1 Endpoint summary: Short-term toxicity to fish>

*Justification of selection of key result for PNEC derivation. Verify the information copied from the IUCLID endpoint summary and adapt it as appropriate.*

The following data is the one taken into account for acute fish toxicity for the derivation of PNEC: <Short description of key information from Section 6.1.1 Endpoint summary: Short-term toxicity to fish>

#### 7.1.1.1.2 Long-term toxicity to fish

The results are summarised in the following table:

*Note: Only NOEC, LOEC, EC10 and IC10 values are copied from IUCLID with the following exception: key studies or weight of evidence data in which none of these endpoint types is available, any other endpoint types (e.g. LC0) are copied. Consider deleting any values that are not relevant for the CSR.*

Table 35: Overview of long-term effects on fish

| Method | Results | Remarks | Reference |
|---|---|---|---|
| <Test organisms (species)><br><Test type>[REMARK: LIFE_STAGE]<br>(<Water media type>)<br>(<Test type>)<br><Guideline> | <Endpoint> (<Duration>): <RANGE_UNIT: Effect conc.> (<Nominal/Measured>) based on: <Basis for effect> | <Reliability><br><Purpose flag><br><Study result type> (read-across)<br>Test material: <Identity> | <Author> <Year> |

*Example table:*

| *Species* | *Results* | *Remarks* | *Reference* |
|---|---|---|---|
| *Pimephales promelas*<br>*early-life stage: reproduction, (sub)lethal effects*<br>*(freshwater)*<br>*(semi-static)*<br>*OECD Guideline 210 (Fish, Early-Life Stage Toxicity Test)* | *NOEC (28 d): 1.9 mg/L (meas. (arithm. mean)) based on: length* | *1 (reliable without restriction)*<br>*key study*<br>*experimental result* | *Van Leeuwen, Adema, and Hermens 1990* |

**Data waiving** *(if applicable)*

*If the data waiving is based on "exposure considerations", appropriate reference to sections 9 and 10 should be made.*

**Reason:** <Data waiving>

**Justification:** <Justification for data waiving>

**Testing proposal** *(if applicable)*

*A testing proposal should have the following elements: specifications of the testing proposals and the timetable. In case of deviation from standard requirement according to REACH Annexes IX and*

*X justification needs to be provided. Verify the information copied from IUCLID and adapt if necessary.*

**Information requirement:** Long-term toxicity testing on fish (<Test type>) *Depending on the phrase selected in this IUCLID field, one of the following test types are specified: "early-life stage: reproduction, (sub)lethal effects" (or "life cycle: reproduction, (sub)lethal effects"), "embryo and sac-fry stage: (sub)lethal effects", "juvenile fish: growth".*

**Proposed test guideline**: <Guideline>

**Planned study period:** <Study period>

**Details on method intended:**

Species: <Test organisms (species)> (<Water media type>)

Test type: <Test type>

Test conditions: <Details on test conditions>

*Example:*

***Proposed test guideline**: EU Method C.1 (Acute Toxicity for Fish)*

***Planned study period**: May 2008*

***Details on method intended:***

*Species: Pimephales promelas (freshwater)*

*Test type: flow-through*

*Test conditions: Use of emulsifier as auxiliary substance; additional control fish; otherwise according to test guideline*

**Discussion**

<Discussion from Section 6.1.2 Endpoint summary: Long-term toxicity to fish>

The following data is the one taken into account for acute fish toxicity for the derivation of PNEC: <Short description of key parameter from Section 6.1.2 Endpoint summary: Long-term toxicity to fish>

#### 7.1.1.2 Aquatic invertebrates

The same type of information as what is reported in 7.1.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

**7.1.1.2.1** Short-term toxicity to aquatic invertebrates

**7.1.1.2.2** Long-term toxicity to aquatic invertebrates

#### 7.1.1.3 Algae and aquatic plants

The same type of information as what is reported in 7.1.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 7.1.1.4 Sediment organisms

*Guidance on how to evaluate toxicity data on sediment organisms is provided in section R.7.8.12*

The same type of information as what is reported in 7.1.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 7.1.1.5 Other aquatic organisms

The same type of information as what is reported in 7.1.1.1 will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 7.1.2 Calculation of Predicted No Effect Concentration (PNEC)

*Guidance on how to calculate Predicted No Effect Concentration is provided in sections B.7.2 and R.10.*

#### 7.1.2.1 PNEC water

*Guidance on how to calculate Predicted No Effect Concentration for pelagic organisms is provided in sections B.7.2.2, B.7.2.3 and R.10.3.1.*

This section exemplifies what data fields will be automatically retrieved by the IUCLID 5 plug-in once available.

Table 36: PNEC aquatic

| | **Value** | **Assessment factor** | **Remarks/Justification** |
|---|---|---|---|
| PNEC aqua – freshwater (mg/l) | <PNEC> | <AF> | <extrapolation method> (if statistical extrapolation reported)<br><justification of PNEC freshwater derivation from 6. Endpoint summary: Ecotoxicological information> |
| PNEC aqua - marine water (mg/l) | Idem | Idem | Idem |
| PNEC aqua – intermittent releases (mg/l) | Idem | Idem | Idem |

#### 7.1.2.2 PNEC sediment

*Guidance on how to calculate Predicted No Effect Concentration for sediment dwelling organisms is provided in sections B.7.2.4 and R.10.5*

Table 37: PNEC sediment

| | Value | Assessment factor | Remarks/Justification |
|---|---|---|---|
| PNEC sediment ( mg/kg d.w.) | <PNEC> | <AF> | <extrapolation method> (if statistical extrapolation reported)<br><justification of PNEC sediment derivation from 6. Endpoint summary: Ecotoxicological information> |

*A PNEC for sediment can also be obtained by equilibrium partitioning and both values can be compared.*

*The above table can also be expended to report a PNEC marine sediment when relevant.*

## 7.2 Terrestrial compartment

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 7.2.1 Toxicity data

*Guidance on how to evaluate toxicity data for terrestrial organisms is provided in section R.7.11*

#### 7.2.1.1 Toxicity to soil macro organisms

#### 7.2.1.2 Toxicity to terrestrial plants

#### 7.2.1.3 Toxicity to soil micro-organisms

#### 7.2.1.4 Toxicity to other terrestrial organisms

### 7.2.2 Calculation of Predicted No Effect Concentration (PNEC_soil)

*Guidance on how to calculate Predicted No Effect Concentration for soil organisms is provided in sections B.7.24 and R.10.6*

Table 38: PNEC soil

| | Value | Assessment factor | Remarks/Justification |
|---|---|---|---|
| PNEC soil ( mg/kg.w.) | <PNEC> | <AF> | <extrapolation method> (if statistical extrapolation reported)<br><justification of PNEC soil derivation from 6. Endpoint summary: Ecotoxicological information> |

### 7.3 Atmospheric compartment

*Guidance on how to assess biotic and abiotic effects is provided in section R.10.7*

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

### 7.4 Microbiological activity in sewage treatment systems

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 7.4.1 Toxicity to aquatic micro-organisms

*Guidance on how to evaluate toxicity data on micro-organisms is provided in section R.7.8.19*

#### 7.4.2 PNEC for sewage treatment plant

*Guidance on how to calculate Predicted No effect Concentration for STP is provided in sections B.7.2.5 and R.10.4*

Table 39: PNEC sewage treatment plant

| | Value | Assessment factor | Remarks/Justification |
|---|---|---|---|
| PNEC stp ( mg/l.) | <PNEC> | <AF> | <extrapolation method> (if statistical extrapolation reported)<br><justification of PNEC stp derivation from 6. Endpoint summary: Ecotoxicological information> |

### 7.5 Non compartment specific effects relevant for the food chain (secondary poisoning)[20]

The same type of information as what is reported in other sections will be extracted from IUCLID 5 here but this is not exemplified in this document.

#### 7.5.1 Toxicity to birds

*Guidance on how to evaluate toxicity data on birds is provided in section R.7.10.18 to 7.10.23*

#### 7.5.2 Toxicity to mammals

#### 7.5.3 Calculation of PNECoral (secondary poisoning)

*Guidance on how to calculate Predicted No Effect Concentration in food is provided in sections B.7.2.7 and R.10.8.2*

[20] The effects via food chain accumulation have to be evaluated (see Annex I of REACH Regulation, section 3.0.2). It is suggested to report the effect assessment relevant for that purpose under this heading, although the format given in Annex I of REACH Regulation, section 7 does not include such heading.

Table 40: PNEC oral

| | Value | Assessment factor | Remarks/Justification |
|---|---|---|---|
| PNEC oral ( mg/kg food) | <PNEC> | <AF> | <justification of PNEC oral derivation from 6. Endpoint summary: Ecotoxicological information> |

## 7.6 Conclusion on the environmental classification and labelling[21]

[21] The classification and labelling has to be presented and justified (see Annex I REACH Regulation, section 1.3.). For the environment it is suggested to report that assessment under this heading, although the format given in Annex I of REACH Regulation, section 7 does not include such a heading.

# 8 PBT AND VPVB ASSESSMENT

*This section reports the outcome of the PBT and vPvB assessment, as explained in chapter C. Present the outcome of the assessment if this has been done. For each PBT or vPvB property, a comparison with the criteria is needed and a conclusion drawn for each property (See chapter C and chapter R.11)*

*Conclude on whether the substance should be treated as a PBT/vPvB substance. If this is the case, additional reporting is needed in Section 9 of the CSR.*

## 8.1 Assessment of PBT/vPvB Properties – Comparison with the Criteria of Annex XIII

*Guidance on the assessment of PBT/vPvB properties is given in section R.11.1*

### 8.1.1 Persistence Assessment

*Guidance on how to evaluate the P or vP criteria is given in section R.11.1.3.1 and R.11.1.4*

### 8.1.2 Bioaccumulation Assessment

*Guidance on how to evaluate B or vB criteria is given in section R.11.1.3.2 and R.11.1.4*

### 8.1.3 Toxicity Assessment

*Guidance on how to evaluate the T criterion is given in section R.11.1.3.3 and R.11.1.4*

### 8.1.4 Summary and overall Conclusions on PBT or vPvB Properties

*A detailed analysis of the Persistence, Bioaccumulation and Toxicity should be brought together into a clear conclusion on whether the substance is a PBT/vPvB substance or should be treated as a PBT/vPvB substance.*

*Guidance on how to conclude on the PBT/vPvB properties is given in section R.11.1.5*

## 8.2 Emission Characterisation

*Where it is concluded that the substance is a PBT/vPvB substance or should be treated as PBT/vPvB substance an emission characterisation should be conducted. Based on this, appropriate RMM and OCs are to be developed in order to ensure control of risk. These measures are to be documented in the CSR and communicated via the eSDS.*

*Guidance on how to conduct an Emission Characterisation is given in section R.11.2.1 and how to conduct a Risk Characterisation for PBT/vPvB substances is given in section R.11.2.2*

*The emissions should be reported in sections 9.x.2 (in particular in section 9.x.2.4.1 as well as all measured data in the environment) in relation to the operational conditions and risk management measures put in place reported in sections 9.x.1.*

*The justification of the minimisation of emissions and (subsequent) exposures of humans and the environment and conclusions on emission characterisation should be reported in the current section.*

# 9 EXPOSURE ASSESSMENT

**Overview of exposure scenarios**

*Exposure scenarios are required for substances which are either classified as dangerous or are assessed as being PBT or vPvB. Also for other substances exposure scenarios are required, if standard information requirements from Annex VIII to X shall be waived based on exposure considerations (see Appendix XI).*

*Give an overview on the exposure scenarios presented in this chapter and indicate which life cycle stage are covered by each ES. Link the different ES to the identified use as described in section 2.2. The life cycle stage can be identified by a cross in the appropriate column.*

*The coverage of an exposure scenario is not predefined. Therefore the relation(s) between the exposure scenario(s) and identified use(s) can be decided flexibly case by case. In all cases it is important to ensure, firstly, that all identified uses and resulting life-cycle stages are covered by exposure scenario(s) and, secondly, that each exposure scenario includes a clear description on which identified use(s) and resulting life-cycle stage(s) it covers.*

*Only those preparations and articles need to be taken into account in which the substance exceeds the concentration limits of article 14 (2). To identify which exposure scenarios to develop you can start with listing the process categories relevant throughout the life-cycle of the substance(s). Then list the types of preparations (= preparation category = category of chemical product) in which the substance is used.*

*One exposure scenario can cover one identified use and the life cycle stages resulting from that (ES 1 and ES 2 in the table below). Several exposure scenarios may be used to cover one identified use and the resulting life-cycle stages (ES 3, ES 4 and ES 5 in the table below). One exposure scenario can cover several identified uses and life-cycle stages resulting from them (ES 6 and ES 7 in the table below). One exposure scenario for service-life of articles or waste stage can be linked to several identified uses (ES 8 in the table below).*

Table 41: Overview on exposure scenarios and coverage of substance life cycle

| **ES number** | **Volume (tonnes)** | **Manufacture** | **Identified uses** | | | **Resulting life cycle stage** | | **Linked to Identified Use** | **Sector of Use (SU)[22]** | **Preparation [chemical product] Category (PC)** | **Process category (PROC)** | **Article category (AC)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Formulation** | **End use** | **Consumer use** | **Service life (for articles)** | **Waste stage** | | | | | |
| ES 1 | | *X* | | | | | *X* | *M 1* | | | | |
| ES 2 | | | | *X* | | *X* | *X* | *IU 1* | | | | |
| ES 3 | | | | *X* | | | | *IU 2* | | | | |
| ES 4 | | | | | | *X* | | | | | | |
| ES 5 | | | | | | | *X* | | | | | |
| ES 6 | | | *X* | | | | *X* | *IU 3* | | | | |
| | | | | *X* | | | | *IU 4* | | | | |
| | | | | *X* | | *X* | *X* | *IU 5* | | | | |
| | | | | | *X* | *X* | *X* | *IU 6* | | | | |
| ES 7 | | | *X* | | | | | *IU 7* | | | | |
| | | | | *X* | | | | *IU 8* | | | | |
| | | | | *X* | | | | *IU 9* | | | | |
| ES 8 | | | | | | | *X* | *IU 7, IU 8, IU 9* | | | | |

[22] The four descriptors should be consistent with the ones describing the identified use in section 2.2

## 9.1 (Title of Exposure scenario 1)

*Change the heading and insert the title for the exposure scenario to be covered in this section of the CSR (copy from section 9.1.1.1). Note: Each exposure scenario is to be described in a separate section of chapter 9. The title should be consistent with the identified uses in section 2.2 (see Guidance D.4.3 and R.12).*

### 9.1.1 Exposure scenario

*Section D.2.2 of the Guidance provides an overview on the core information to be taken into account in exposure scenario building. Please note: The exposure scenario in the CSR may be different in content and language from the ES that is communicated to the downstream user via the SDS. The ES in the CSR may contain more detailed information than the ES in the SDS, for example regarding judgements made in CSA or background information related to data sources.*

#### 9.1.1.1 Description of activities and processes covered in the exposure scenario

*Briefly explain the activities/tasks covered under the selected categories if needed. Define the related boundaries of the exposure scenario in more detail, if needed. See Guidance section R.12.5 for examples to explain the boundaries of process categories.*

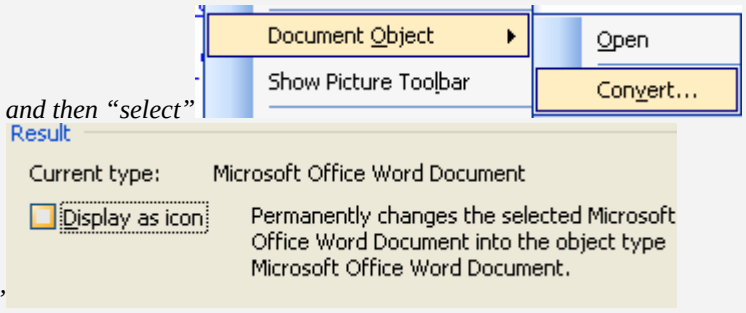
#### 9.1.1.2 Operational conditions related to frequency, duration and amount of use

*Provide information on duration and frequency of use/exposure and the amounts used related to the three targets of exposure. For guidance see section R.13.2.2 to R.13.2.4 and Tables D.5-1 to D.5.4.*

*Example tables have been developed so that information can be reported in a standardised way.*

*To include the relevant table for your case you can:*

- *click right on the icon*
- *select "document object" and then "select"*
- *click on "display as icon"*




*Depending on the coverage of the exposure scenario, different type of information might be needed and therefore several example tables have been developed to cover those different situations. In most situations only one of those table will be necessary for one exposure scenario.*

- *For ES covering industrial sites (point sources), the following example table for reporting information is available:*

9.1.1.2_ Industrial_site

- *For ES covering professional uses[23] outside industrial sites (wide disperse use and emissions), the following example table for reporting information is available. Please note: risks to the environment may be driven by the annual amount of substance supplied into disperse uses, depending on the emission factor relevant for a certain category of preparation or process.*

9.1.1.2_professional_wide_dispersive_use

- *For ES covering consumer uses (wide disperse use and emissions) , the following example table for reporting information is available. Please note: risks to the environment may be driven by the annual amount of substance supplied into disperse uses, depending on the emission factor relevant for a certain category of preparation or process.*

9.1.1.2_consumer

- *For ES covering exposure related to the article service life.*
  *The substance may have been incorporated into the article during industrial use, professional use or consumer use of the substance.*
    - *If the same ES covers both one of the above cited use of the substance and its service life the following example table should be added to the previous selected one.*
    - *If the ES only covers the service life of the article then only the following example table should be used.*

*Please note: risks to the environment may be driven by the annual amount of substance supplied into disperse uses and subsequent service life, depending on the emission factor relevant for a certain category of article*

9.1.1.2_article_service_life

*Please note: The availability refers to the time span for which release and exposure are to be assessed (incidental release). In higher tier assessments the release may be modelled as a function of time.*

#### 9.1.1.3 Operational conditions and risk management measures related to product[24] characteristics

*Provide information on the characteristic of the product used by workers and/or consumers. See Guidance section R.13.2.1.*

[23] Professional use is defined here as non consumer use

[24] "Product" includes substances, preparations and articles

- *For substances used on their own or in preparation, the following example table for reporting information is available:*

9.1.1.3_substance_ preparation

- *For substances incorporated in articles, the following example table for reporting information is available:*

9.1.1.3_article

#### 9.1.1.4 Operational conditions related to available dilution capacity and characteristics of exposed humans

*Provide information related to the respiration volume and the skin contact area of workers and consumers under conditions of use. Include also the body weight related to consumers since this may differ depending on the consumer target group.*

*Provide information on dilution to be expected between initial release from the product in use and the external exposure of workers or consumers.*

*For conditions leading to dilution of initial release for human exposure see guidance sections D.5.4 and R.13.2.3.*

*For conditions leading to dilution of initial release for environment exposure see sections D.5.5 and R.13.2.4.*

- *For exposure scenarios covering worker uses, the following example table for reporting information is available:*

9.1.1.4_workers

- *For exposure scenarios covering consumer uses, the following example table for reporting information is available:*

9.1.1.4_consumers

**<u>Environmental surroundings characteristics</u>**

Available water volume per time for dilution[25] ($m^3/d$):

[25]E.g. flow rate of river receiving waste water (emissions from a site or a sewage treatment plant)

*The default is 2.000 $m^3$ per day in sewage system diluted by the factor of 10 in surface water (see Section R.16.5.6.4 and Table R.16-21 and R.16-23.*

#### 9.1.1.5 Other operational conditions of use

**Process condition**

*Temperature, pH should be indicated when relevant. See Guidance section R.13.2.2 to R.13.2.4*

**Releases to air, water and waste before risk management**

*Provide information needed to calculate the losses of a substance per time from processes (before abatement/emission control). See Guidance section D.5.5.1, R.16.2.1.8 to R.16.2.1.12 and Appendix 1 to chapter R.16.* Figure 2 *indicates three points where emissions of substances may be controlled: Prevention of losses as inherent characteristic of the technical process, onsite measures to limit or avoid emissions, external waste water or waste treatment operations.* Figure 3 *illustrates the points to control emissions for non site related uses.*

- *the following example table for reporting information is available.*

9.1.1.5_releases

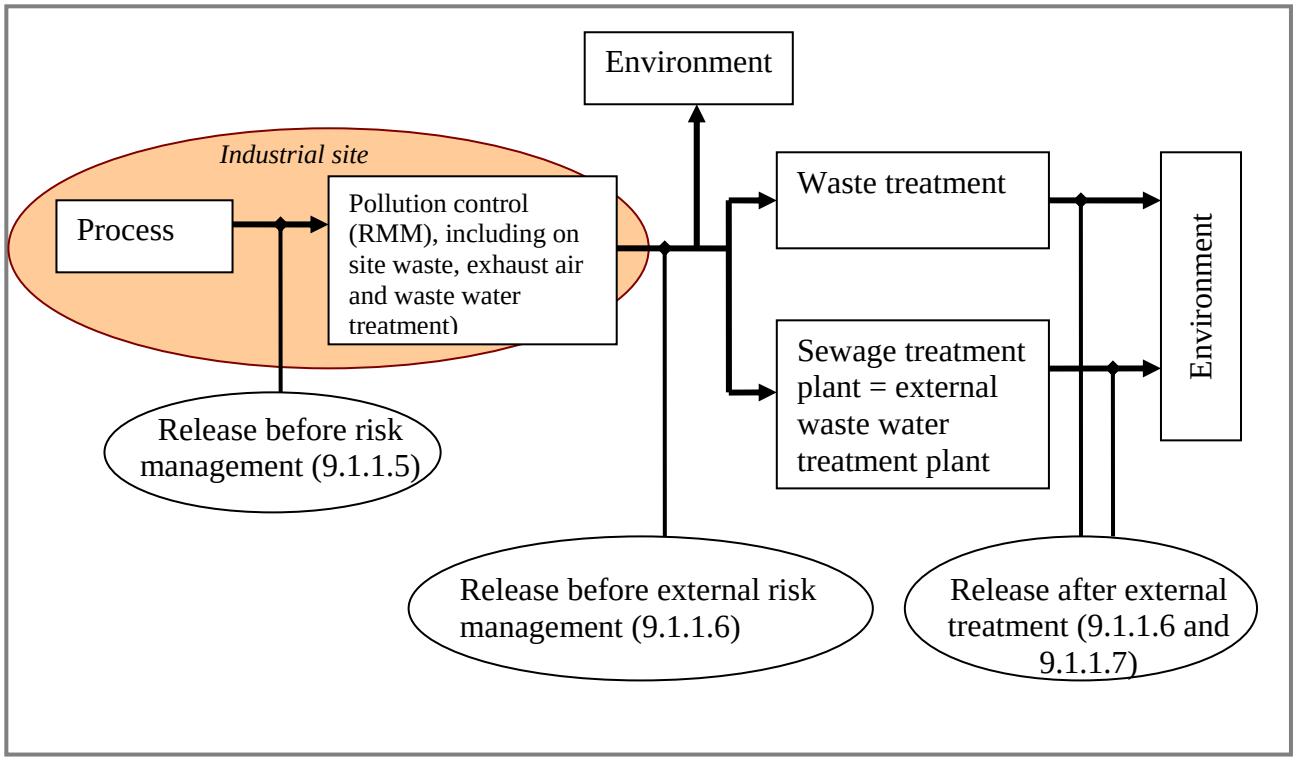



Figure 2: Points for control of site related emissions

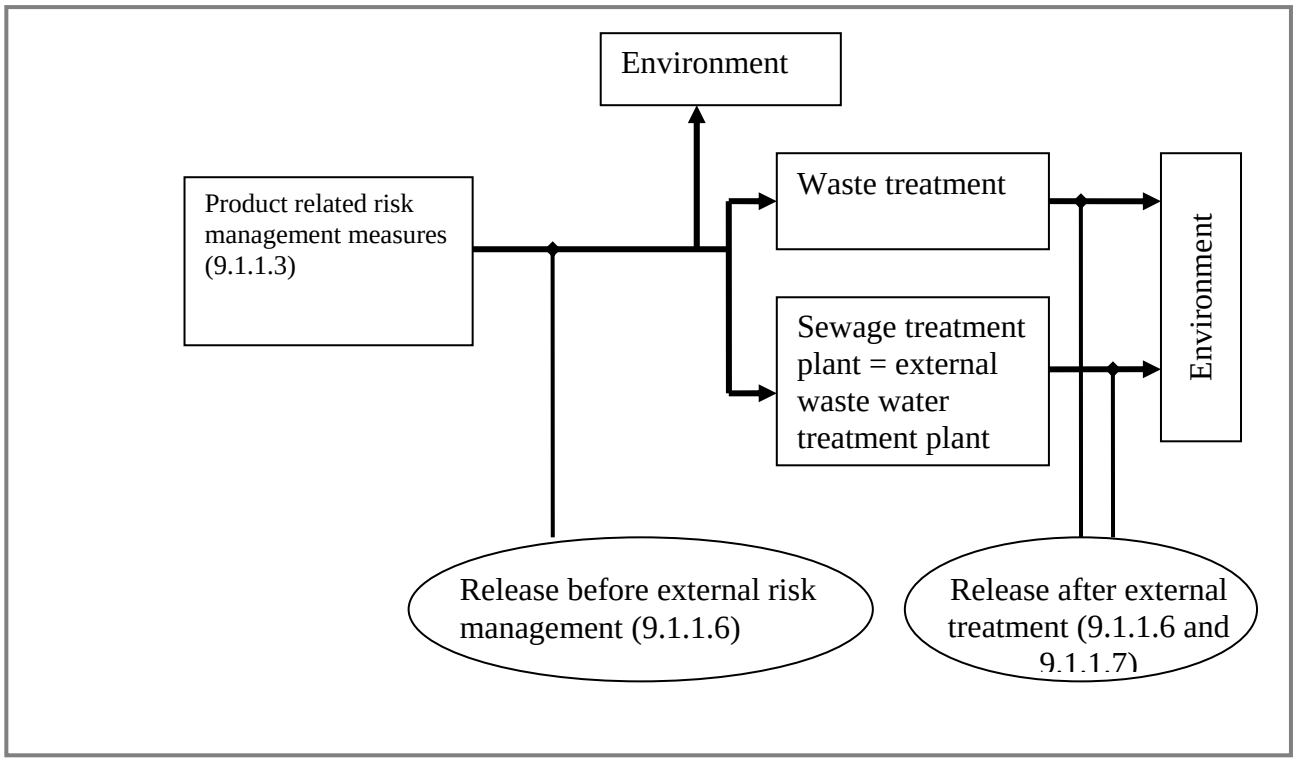



Figure 3: Points of control for non-site related emissions

### 9.1.1.6 Risk management measures

*Provide information on the risk management measures needed to ensure control of risk. See guidance D.4.5 and R13. Please note: The description of the RMM should include information on the required/expected effectiveness in quantitative terms. The guidance for exposure estimation (D.5.3, D.5.4 and D.5.5 as well as R.16.2, R.16.5.5 and R16.6) can be consulted for that purpose.*

*Example tables have been developed so that information can be reported in a standardised way. Depending on the coverage of the exposure scenario, different type of information might be needed and therefore several example tables have been developed to cover those different situations.*

- *For ES covering industrial sites (point sources) the following example table for reporting information is available.*

9.1.1.6_industrial_site

- *For ES covering professional use outside industrial sites (wide disperse use and emissions) the following example table for reporting information is available.*

9.1.1.6_professional_wide_dispersive

- *For ES covering consumer uses (wide disperse use and emissions) the following example table for reporting information is available.*

9.1.1.6_consumer

#### 9.1.1.7 Waste related measures

*The following templates should be used to describe the waste management measures needed to ensure control of risk during the waste life stage of the substance (see Guidance R.13.2.6. and R.18)*

- *the following example table for reporting information is available.*

9.1.1.7_waste

### 9.1.2 Exposure estimation

*The following basic elements are part of the exposure estimation for each exposure scenario:*

- *Document how exposure has been estimated, incl. whether measurements and/or tools have been applied. Report (summaries of) relevant measured data (including a description of number of data point, date of measurements etc).*
- *In case standard tools have been applied, indicate clearly which determinants and values have been used for the estimation (see Chapter D.4). Export files of standard exposure tools can be annexed to the CSR. The information given shall enable the reader to repeat any calculation/estimation.*
- *In case non-standard tools have been used, these need to be carefully introduced.*
- *If quantitative exposure estimates cannot be derived, provide a qualitative evaluation of exposure, e.g. when a case has been made for exposure-based waving due to absence of exposure or exposure that is not significant.*

*If the information is not available, waived or found to be not relevant due to negligible risk, document for each target group and exposure pathway the reasons for not considering it or give a weight-of evidence narrative if appropriate.*

***Human health***

*The exposure estimate should be related to the conditions of use in the ES, e.g. duration and frequency, relevant stage of the life cycle, source of exposure, RMMs. Document where exposure is not expected to occur. The resulting exposure levels should be stated at the end of each section.*

*The outcome of the environmental exposure assessment is needed to calculate human intake via the environment. Report the overall exposure via the environment.*

***Environment***

*The exposure estimate should be related to the conditions of use described in the ES, e.g., emission reduction measures, emissions in relevant stages of the life cycle, frequency and pattern of exposure, RMMs. Document where exposure is not expected to occur based on relevant*

*information. The resulting predicted environmental exposure concentrations (PECs) should be stated at the end of each section.*

*See Guidance D.5.3 and R14.*

#### 9.1.2.1 Workers exposure

##### 9.1.2.1.1 Acute/Short term exposure

*For each route of exposure estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use and selection of measured data is provided in R14.4.3 and R14.4.5.*

*For each type of data a new line should be added to the table.*

Table 42: Acute exposure concentrations to workers

| Routes of exposure | Estimated Exposure Concentrations | | Measured exposure concentrations | | Explanation / source of measured data |
|---|---|---|---|---|---|
| | value | unit | Value | unit | |
| Dermal exposure | | | | | |
| | | | | | |
| Inhalation exposure | | | | | |
| | | | | | |

Summary of the short-term exposure values.

*Only one single value (which could correspond to the upper value of a range) will be reported here which will be used for risk characterisation.*

Table 43: Summary of acute exposure concentrations to workers

| Routes of exposure | Concentrations | Justification |
|---|---|---|
| Dermal local exposure (in mg/cm$^2$)[26] | | |
| Dermal systemic exposure (in mg/kg bw/d) | | |
| Inhalation exposure (in mg/m$^3$)[27] | | |

[26] per day or per event, which ever is more relevant

[27] during short-term exposure, air concentration ate the workplace

#### 9.1.2.1.2 Long-term exposure

*For each route of exposure estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use and selection of measured data is provided in R14.4.3 and R14.4.5.*

*For each type of data a new line should be added to the table.*

Table 44: Long-term exposure concentrations to workers

| Routes of exposure | Estimated Exposure Concentrations | | Measured exposure concentrations | | Explanation / source of measured data |
|---|---|---|---|---|---|
| | value | unit | Value | unit | |
| **Dermal exposure** | | | | | |
| | | | | | |
| **Inhalation exposure** | | | | | |
| | | | | | |

Summary of the long-term exposure values.

*Only one single value (which could correspond to the upper value of a range) will be reported here which will be used for risk characterisation.*

Table 45: Summary of long-term exposure concentration to workers

| Routes of exposure | Concentrations | Justification |
|---|---|---|
| **Dermal local exposure (in mg/cm$^2$)** | | |
| **Dermal systemic exposure (in mg/kg bw/d)** | | |
| **Inhalation exposure (in mg/m$^3$)/8h workday**[28] | | |

### 9.1.2.2 Consumer exposure

*If a specific population (sensitive population) is more at risk for the exposure scenario, then the information below should be repeated in a new section for this population. This could be the case for example fro children where the body weight would be lower than the one for the general population. Appropriate information should be reported in this case.*

[28] air concentration at the workplace

*Guidance for consumer exposure compartment is provided in section D.5.4 and chapter R.15.*

#### 9.1.2.2.1 Acute/Short term exposure

*For each route of exposure estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R15.3.10.22.*

*For each type of data a new line should be added to the table.*

*When several life cycle steps are relevant for the exposure scenario, then exposure at these different stages should be taken into account (e.g. service life of article)*

Table 46: Acute exposure concentrations to consumers

| **Routes of exposure** | **Estimated Exposure Concentrations** | | **Measured exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **Value** | **unit** | |
| **Oral exposure** | | | | | |
| | | | | | |
| **Dermal exposure** | | | | | |
| | | | | | |
| **Inhalation exposure** | | | | | |
| | | | | | |

Summary of the short-term exposure values.

*Only one single value (which could correspond to the upper value of a range) will be reported here which will be used for risk characterisation.*

Table 47: Summary of acute exposure concentrations to consumers

| **Routes of exposure** | **Concentrations** | **Justification** |
|---|---|---|
| **Oral exposure (in mg/kg bw/d)** | | |
| **Dermal local exposure (in mg/cm$^2$)[29]** | | |
| **Dermal systemic exposure (in mg/kg bw/d)** | | |
| **Inhalation exposure (in mg/m$^3$)[30]** | | |

[29] per day or per event, which ever is more relevant

[30] during short-term exposure

#### 9.1.2.2.2 Long-term exposure

*For each route of exposure estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R15.3.10.22.*

*For each type of data a new line should be added to the table.*

Table 48: Long term exposure concentrations to consumers

| **Routes of exposure** | **Estimated Exposure Concentrations** | | **Measured exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Oral exposure** | | | | | |
| | | | | | |
| **Dermal exposure** | | | | | |
| | | | | | |
| **Inhalation exposure** | | | | | |
| | | | | | |

Summary of the long-term exposure values.

*Only one single value (which could correspond to the upper value of a range) will be reported here which will be used for risk characterisation.*

Table 49: Summary of long term exposure concentrations to consumers

| **Routes of exposure** | **Concentrations** | **Justification** |
|---|---|---|
| **Oral exposure (in mg/kg bw/d)** | | |
| **Dermal local exposure (in mg/cm$^2$ /d)** | | |
| **Dermal systemic exposure (in mg/kg bw/d)** | | |
| **Inhalation exposure (in mg/m$^3$)** | | |

### 9.1.2.3 Indirect exposure of humans via the environment (oral)

*Guidance D.5.5 and R.16.*

*For type of food, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, defaults values) and on representativity of measured values should be reported. For each type of data a new line should be added to the table.*

Table 50: Concentration for oral exposure of humans via the environment

| | **Estimated exposure concentrations** | | **Measured exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Wet fish** | | | | | |
| | | | | | |
| **Drinking water** | | | | | |
| | | | | | |
| **Meat** | | | | | |
| | | | | | |
| **Milk** | | | | | |
| | | | | | |
| **Other** | | | | | |

Summary of the exposure concentration in to be used for the risk characterisation of indirect exposure of man via the environment

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for exposure estimation purposes.*

*The regional concentration as estimated in section 9.3 should be added to the local concentration.*

Table 51: Total daily dose for oral exposure of humans via the environment

| **Total daily dose for oral exposure via the environment (mg/kg bw/d)** | | **Justification** |
|---|---|---|
| **Exposed via local concentration** | **Exposed via local and regional concentration** | |
| | | |

### 9.1.2.4 Environmental exposure

***In case the exposure scenario is covering several life stages, the section below has to be repeated to cover those different life stages within this section.***

*See Guidance D.5.5 and R.16*

#### 9.1.2.4.1 Environmental releases

*The releases from local and diffuse sources need to be reported. They can be estimated (based on the information documented in the exposure scenario) or measured (e.g in effluent from industrial processes or in wastewater treatment plants Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R.16.3. Please note: If measured data are used to characterise the environmental releases, the conditions of use corresponding to the measurements are to be documented in the exposure scenario.*

*For each type of data a new line should be added to the table.*

*Guidance on how to estimate environmental releases is provided in section R.16.2.*

Table 52: Releases to the environment

| compartments | Predicted releases (kg/d) | Measured release (kg/d) | Explanation / source of measured data |
|---|---|---|---|
| **Aquatic (without STP)** | [31] | | *These data correspond to release to sewage* |
| | | | |
| **Aquatic (after STP)** | | | *These correspond to release to natural waters after the sewage treatment plant.* |
| **Air (direct + STP)** | | | |
| **Soil (direct only)** | | | |

Summary of the releases taken into account for the exposure estimation.

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for exposure estimation purposes.*

Table 53: Summary of the releases to the environment

| Compartments | Release from point source (kg/d) (local exposure estimation) | Total release for regional exposure estimation (kg/d) | Justification |
|---|---|---|---|
| **Aquatic (without STP)** | | | |
| **Aquatic (after STP)** | | | |
| **Air (direct + STP)** | | | |
| **Soil (direct releases only)** | | | |

### 9.1.2.4.2 Exposure concentration in sewage treatment plants (STP)

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

[31] The predicted release are estimated from the "annual amount used" and the "number emission days" (cf 9.1.1.2 and the "fraction of applied amount released to waste water (if applicable, after onsite risk management measures " (cf 9.1.1.6)

*For each type of data a new line should be added to the table.*

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in STP is provided in section R.16.5.5*

Table 54: Concentrations in sewage

| **Compartments** | **Estimated exposure concentrations** | | **Measured exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Sewage (STP effluent)** | | | | | |
| | | | | | |
| **Sewage sludge** | | | | | |
| | | | | | |

Summary of the exposure concentration in sewage treatment plants taken into account for further exposure estimation (water and soil concentrations) or risk characterisation for micro organisms in the STP

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for soil exposure estimation and sewage treatment plant risk characterisation purposes.*

Table 55: Predicted Exposure Concentrations (PEC) in sewage

| | **Value** | **Justification** |
|---|---|---|
| **Concentration in sewage (PECstp)(in mg/l)** | | |
| **Concentration in sewage sludge (in mg/kg d.w.)** | | |

#### 9.1.2.4.3 Exposure concentration in aquatic pelagic compartment

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in the aquatic pelagic compartment is provided in section R.16.5.6.2 for the freshwater, R.16.5.6.4 for the marine, R.16.5.6.7 for groundwater.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 56: Local concentrations in water

| **Compartments** | **Estimated exposure concentrations** | | **Measured local exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Freshwater** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Marine water** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Intermittent releases to water** | | | | | |

Summary of the Predicted Exposure Concentrations (PEC) in the aquatic pelagic compartment taken into account for risk characterisation

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for risk characterisation purpose.*

*The regional concentration as estimated in section 9.3 should be added to the local concentration.*

Table 57: Predicted Exposure Concentrations (PEC) in aquatic compartment

| **Compartments** | **Local concentration** | **PEC aquatic (local+regional)** | **Justification** |
|---|---|---|---|
| **Freshwater (in mg/l)** | | | |
| **Marine water (in mg/l)** | | | |
| **Intermittent releases to water (in mg/l)** | | | |

#### 9.1.2.4.4 Exposure concentration in sediments

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in the sediment compartment is provided in section R.16.5.6.3 for the freshwater, R.16.5.6.5 for the marine.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 58: Local concentrations in sediment

| **Compartments** | **Estimated exposure concentrations** | | **Measured local exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Freshwater sediments** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Marine water sediments** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |

.

Summary of the exposure concentration in aquatic sediments taken into account for risk characterisation

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for risk characterisation purpose.*

Table 59: Predicted Exposure Concentrations (PEC) in sediments

| **Compartments** | **Local concentration** | **PEC sediment (local+regional)** | **Justification** |
|---|---|---|---|
| **Freshwater sediments (in mg/kg d.w)** | | | |
| **Marine water sediments (in mg/kg d.w.)** | | | |

### 9.1.2.4.5 Exposure concentrations in soil and groundwater

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in soil is provided in section R.16.5.6.6 and R.16.5.6.7 for groundwater.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 60: Local concentrations in soil

| **Compartments** | **Estimated exposure concentrations** | | **Measured local exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Agricultural soil averaged** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Grassland averaged** | | | | | |
| | | | | | |
| **Groundwater** | | | | | |

Summary of the Predicted Exposure Concentration (PEC) in soil taken into account for risk characterisation

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for risk characterisation purpose.*

Table 61: Predicted Exposure Concentrations (PEC) in soil and groundwater

| | **Local concentration** | **PEC soil/groundwater (local+regional)** | **Justification** |
|---|---|---|---|
| **Agricultural soil averaged (mg/kg ww)** | | | |
| **Grassland averaged (mg/kg ww)** | | | |
| **Groundwater(mg/l)** | | | |

### 9.1.2.4.6 Atmospheric compartment

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in the atmospheric compartment is provided in section R.16.5.6.1.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 62: Local concentrations in air

| | **Estimated exposure concentrations** | | **Measured local exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **During emission** | | | | | |
| | | | | | |
| **annual average** | | | | | |
| | | | | | |
| **Annual total deposition** | | | | | |
| | | | | | |

Summary of the Predicted Exposure Concentration in soil taken into account for risk characterisation

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for exposure estimation purposes.*

Table 63: Predicted Exposure Concentration (PEC) in air

| | **Local concentration** | **PEC air (local+regional)** | **Justification** |
|---|---|---|---|
| **During emission (µg/m3)** | | | |
| **annual average (µg/m3)** | | | |
| **Annual deposition (µg/m²/d)** | | | |

**9.1.2.4.7** Exposure concentration relevant for the food chain (Secondary poisoning)

*Both the aquatic food chain (freshwater and marine waters) and terrestrial food chain need to be taken into account when there is a potential for bioaccumulation.*

*Guidance on how to calculate Predicted Exposure Concentration (PEC) in the food of fish eating predator and fish eating top-predator (marine food chain) is provided in section R.16.5.7.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 64: Local concentration relevant for secondary poisoning

| | **Predicted exposure concentrations** | | **Measured local exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Concentration in food of fish eating predator** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Concentration in food of fish eating top-predator (marine)** | | | | | *Estimated local exposure concentration based on…* |
| | | | | | *Estimated predicted exposure concentration (PEC) = estimated local exposure concentration + regional concentration (from Table 66)* |
| | | | | | *Measured concentration in…* |
| **Concentration in earthworm** | | | | | |

.

Summary of the Predicted Exposure Concentration in food for secondary poisoning taken into account for risk characterisation

*Only one single value (which could correspond to the upper value of a range) will be reported here which corresponds to the value selected for risk characterisation purpose.*

Table 65: Predicted Exposure Concentration in food (PECoral) for secondary poisoning

| | **Local concentration** | **PEC oral (local+regional)** | **Justification** |
|---|---|---|---|
| **PECoral predator (in mg/kg w.w)** | | | |
| **PECoral top predator (in mg/kg w.w.)** | | | |
| **Concentration in earthworm (in mg/kg w.w.)** | | | |

## 9.2 (Title of exposure scenario 2)

*Repeat exposure scenario and exposure estimation for exposure scenario n.*

### 9.2.1 Exposure scenario

### 9.2.2 Exposure estimation

…

### 9.3 Regional exposure concentrations[32]

*The regional and continental exposure concentration should be estimated from the releases of all exposure scenarios covered in this report.*

*Measured concentration at a regional scale need to be compared to the estimated concentrations.*

*For each compartment, estimated exposure concentration as well as measured exposure concentration should be reported, when available. Explanations on estimation means (model description, model defaults values) and on representativity of measured values (including a description of number of data point, date of measurements etc) should be reported. Guidance on use of measured data is available in R16.3.*

*For each type of data a new line should be added to the table.*

Table 66: Regional concentrations in the environment

| | **Predicted regional Exposure Concentrations** | | **Measured regional exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **unit** | |
| **Freshwater** | | | | | |
| **Marine water** | | | | | |
| | | | | | |
| **Freshwater sediments** | | | | | |
| | | | | | |
| **Marine sediments** | | | | | |
| | | | | | |
| **Agricultural soil** | | | | | |
| | | | | | |
| **Grassland** | | | | | |
| | | | | | |
| **Air** | | | | | |
| | | | | | |

Table 67: Regional concentrations in food and drinking water

| | **Predicted regional Exposure Concentrations** | | **Measured regional exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **Unit** | |
| **Wet fish** | | | | | |
| | | | | | |
| **Drinking water** | | | | | |

[32] The estimation of regional exposure has to be performed (see section 5.2.4 and section 6.2 of Annex 1)..It is suggested to report the exposure assessment relevant for that purpose under this heading, although the format given in Annex I of REACH Regulation, section 7 does not include this headline.

| | **Predicted regional Exposure Concentrations** | | **Measured regional exposure concentrations** | | **Explanation / source of measured data** |
|---|---|---|---|---|---|
| | **value** | **unit** | **value** | **Unit** | |
| | | | | | |
| **Meat** | | | | | |
| | | | | | |
| **Milk** | | | | | |
| | | | | | |

# 10 RISK CHARACTERISATION

*Report the outcome of the risk characterisation for the target groups and exposure pathways mentioned in Annex I (7) of REACH, and for each exposure scenario that was developed in the CSA. A quantitative risk characterisation is required for substances for which DNELs or PNECs can be derived. Discuss the outcome of the risk characterisation due to the uncertainties in hazard and exposure estimation. If applicable, report the results of an uncertainty analysis (see Chapter R.19).*

*Systematically go through the risk characterization ratios (Exposure / DNEL) for each population and exposure pathways relevant to the ES, and report the risk characterization ratios for these pathways or the relevant combined pathways.*

*For those human effects and those environmental spheres for which it was not possible to determine a DNEL or a PNEC, a risk characterization ratio cannot be derived. In those cases, a qualitative assessment of the likelihood that effects are avoided when implementing the exposure scenario shall be carried out. A qualitative comparison of information on hazard and effects with exposure data should be made and interpreted.*

*Document the outcome of the combined risk via all pathways for the different populations separately, and combined (i.e., cumulative for workplace, exposure from consumer products and via the environment). If such combinations are considered unrealistic, justify the relevant combinations of exposure.*

*Guidance for Risk Characterisation is provided in Part E.*

## 10.1 (Title of exposure scenario 1)

### 10.1.1 Human health

#### 10.1.1.1 Workers

*Guidance for (semi) quantitative risk characterisation is provided in Part E.3.3.*

*Guidance on combined exposure via different routes is provided in Part E.3.5.1.*

*Risk characterisation for humans exposed via the environment should be added when relevant.*

Table 68: (Semi) Quantitative risk characterisation for workers

| | Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | DN(M)EL[33] | Risk characterisation ratio[34] |
|---|---|---|---|---|---|
| **Acute - systemic effects** | **Dermal** | mg/kg bw/d | | | |
| | **Inhalation** | mg/m$^3$ | | | |
| **Acute - local effects** | **Dermal** | mg/cm$^2$* | | | |
| | **Inhalation** | mg/m$^3$ ** | | | |
| | **Combined routes** | | | | *RCR Inhalation- systemic + RCR Dermal- systemic* |
| **Long-term - systemic effects** | **Dermal** | mg/kg bw/d | | | |
| | **Inhalation** | mg/m$^3$ | | | |
| | **Combined routes** | | | | *RCR Inhalation- systemic + RCR Dermal- systemic* |
| **Long-term – local effects** | **Dermal** | mg/cm$^2$/d | | | |
| | **Inhalation** | mg/m$^3$ *** | | | |

* per day or event, which ever is more relevant

** same value as "Acute systemic effects-inhalation exposure concentration"

*** same value as "Long-term systemic effects-inhalation exposure concentration"

*Guidance for Qualitative risk characterisation is provided in Part E.3.4.*

Table 69: Qualitative risk characterisation for workers

| | Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | Qualitative risk characterisation |
|---|---|---|---|---|
| **Acute - systemic effects** | **Dermal** | mg/kg bw/d | | |
| | **Inhalation** | mg/m$^3$ | | |
| **Acute - local effects** | **Dermal** | mg/cm$^2$ * | | |
| | **Inhalation** | mg/m$^3$ ** | | |
| | **Combined routes** | | | |
| **Long-term - systemic effects** | **Dermal** | mg/kg bw/d | | |
| | **Inhalation** | mg/m$^3$ | | |
| | **Combined routes** | | | |
| **Long-term – local effects** | **Dermal** | mg/cm$^2$/d | | |
| | **Inhalation** | mg/m$^3$ *** | | |

* per day or event, which ever is more relevant

** same value as "Acute systemic effects-inhalation exposure concentration"

[33] *The 8 D(M)NELs relevant here can be extracted from IUCLID 5 and are already reported in* Table 32.

[34] *Equal to the ratio of the relevant EC (reported in column 3) to the relevant D(M)NEL (reported in column 5)*

*** same value as "Long-term systemic effects-inhalation exposure concentration"

#### 10.1.1.2 Consumers

*Guidance for (semi) quantitative risk characterisation is provided in Part E.3.3.*

*Guidance on combined exposure via different routes is provided in Part E.3.5.1.*

*Risk characterisation for humans exposed via the environment should be added when relevant.*

Table 70: (Semi) Quantitative risk characterisation for consumers

| | Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | DN(M)EL[35] | Risk characterisation ratio[36] |
|---|---|---|---|---|---|
| **Acute - systemic effects** | **Dermal** | mg/kg bw/d | | | |
| | **Inhalation** | mg/m$^3$ | | | |
| **Acute - local effects** | **Dermal** | mg/cm$^2$ * | | | |
| | **Inhalation** | mg/m$^3$ ** | | | |
| | **Oral** | mg/kg bw/d | | | |
| | **Combined routes** | | | | *RCR Inhalation- systemic + RCR Dermal- systemic* |
| **Long-term - systemic effects** | **Dermal** | mg/kg bw/d | | | |
| | **Inhalation** | mg/m$^3$ | | | |
| | **Oral** | mg/kg bw/d | | | |
| | **Combined routes** | | | | *RCR Inhalation- systemic + RCR Dermal- systemic* |
| **Long-term – local effects** | **Dermal** | mg/cm$^2$/d | | | |
| | **Inhalation** | mg/m$^3$ *** | | | |

* per day or event, which ever is more relevant

** same value as "Acute systemic effects-inhalation exposure concentration"

*** same value as "Long-term systemic effects-inhalation exposure concentration"

*Guidance for Qualitative risk characterisation is provided in Part E.3.4.*

[35] *The 8 D(M)NELs relevant here can be extracted from IUCLID 5 and are already reported in* Table 32.

[36] *Equal to the ratio of the relevant EC (reported in column 3) to the relevant D(M)NEL (reported in column 5)*

Table 71: Qualitative risk characterisation for consumers

| | Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | Qualitative risk characterisation |
|---|---|---|---|---|
| **Acute - systemic effects** | **Dermal** | mg/kg bw/d | | |
| | **Inhalation** | $mg/m^3$ | | |
| **Acute - local effects** | **Dermal** | $mg/cm^2$ * | | |
| | **Inhalation** | $mg/m^3$ ** | | |
| | **Oral** | mg/kg bw/d | | |
| | **Combined routes** | | | |
| **Long-term - systemic effects** | **Dermal** | mg/kg bw/d | | |
| | **Inhalation** | $mg/m^3$ | | |
| | **Oral** | mg/kg bw/d | | |
| | **Combined routes** | | | |
| **Long-term – local effects** | **Dermal** | $mg/cm^2/d$ | | |
| | **Inhalation** | $mg/m^3$ *** | | |

* per day or event, which ever is more relevant

** same value as "Acute systemic effects-inhalation exposure concentration"

*** same value as "Long-term systemic effects-inhalation exposure concentration"

#### 10.1.1.3 Indirect exposure of humans via the environment

Table 72: (Semi) Quantitative risk characterisation for humans exposed via the environment

| Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | DN(M)EL[37] | Risk characterisation ratio[38] |
|---|---|---|---|---|
| **Dermal- systemic[39] (acute or long term)** | mg/kg bw/d | | | |
| **Inhalation- systemic (long term)** | mg/m3 (from Table 63) | | | |
| **Oral- systemic (long term)** | mg/kg bw/d (from Table 51) | | | |
| **Combined routes** | | | | RCR Inhalation-systemic + RCR Oral-systemic |

*Guidance for Qualitative risk characterisation is provided in Part E.3.4.*

37 The 8 D(M)NELs relevant here can be extracted from IUCLID 5 and are already reported in Table 32

38 Equal to the ratio of the relevant EC (reported in column 3) to the relevant D(M)NEL (reported in column 5)

39 Dermal exposure is rarely relevant for exposure of man via the environment (bathing waters)

Table 73: Qualitative risk characterisation for humans exposed via the environment

| Route | ES 1- exposure concentrations (EC) | Leading toxic end point / Critical effect | Qualitative risk characterisation |
|---|---|---|---|
| **Dermal- systemic[40] (acute or long term)** | mg/kg bw/d | | |
| **Inhalation- systemic (long term)** | mg/m3 (from Table 63) | | |
| **Oral- systemic (long term)** | mg/kg bw/d (from Table 51) | | |
| **Combined routes** | | | RCR Inhalation- systemic + RCR Oral-systemic |

### 10.1.2 Environment

*Systematically go through the risk characterization ratios (PEC / PNEC) for each population and exposure pathways relevant to the ES, and report the risk characterization ratios for these pathways or the relevant combined pathways.*

*If it is not possible to derive a risk characterization ratio, a qualitative comparison of effects with exposure data should be made.*

#### 10.1.2.1 Aquatic compartment (including sediment and secondary poisoning)[41]

Table 74: Risk characterisation for the aquatic compartment

| Compartments | PEC | PNEC | PEC/PNEC | Discussion |
|---|---|---|---|---|
| **Freshwater** | *in mg/l (from Table 57)* | *in mg/l (from Table 36)* | | |
| **Marine water** | *idem* | *idem* | | |
| **Sediment** | *in mg/kg (from Table 59)* | *in mg/kg (from Table 37)* | | |
| **Aquatic freshwater food chain** | *in mg/kg (from Table 65)* | *in mg/kg food (from Table 40)* | | |
| **Aquatic marine water food chain** | *idem* | *idem* | | |

[40] Dermal exposure is rarely relevant for exposure of man via the environment (bathing waters)

[41] The heading has been slightly modified compared to the format given in Annex I of the REACH Regulation (section 7) to clarify the content of the section.

#### 10.1.2.2 Terrestrial compartment (including secondary poisoning)[42]

Table 75: Risk characterisation for the terrestrial compartment

| Compartments | PEC | PNEC | PEC/PNEC | Discussion |
|---|---|---|---|---|
| **Agricultural soil** | *in mg/kg (from Table 61)* | *in mg/kg (from Table 38)* | | |
| **Grassland** | *idem* | *idem* | | |
| **Terrestrial food chain** | *in mg/kg (from Table 65)* | *in mg/kg food (from Table 40)* | | |

#### 10.1.2.3 Atmospheric compartment

#### 10.1.2.4 Microbiological activity in sewage treatment systems

| Compartments | PEC | PNEC | PEC/PNEC | Discussion |
|---|---|---|---|---|
| **STP** | *in mg/l (from Table 57)* | *in mg/l (from Table 39)* | | |

### 10.2 (Title of exposure scenario 2)

*Repeat the risk characterization for exposure scenario n.*

### 10.3 Overall exposure (combined for all relevant emission/release sources)

*This section should present an evaluation of the risks due to combined exposure from the uses covered by different exposure scenarios. It is possible that uses of the same substance described in different ESs can lead to combined exposure, e.g. different consumer uses combined with exposure via the environment. In such cases the overall risk needs to be evaluated and presented here.*

#### 10.3.1 Human health (combined for all exposure routes)

*When relevant select the combinations of exposure scenarios which could result in concomitant exposure of humans. Guidance on combined exposure is provided in Part E.3.5.*

[42] The heading has been slightly modified compared to the format given in Annex I of the REACH Regulation (section 7) to clarify the content of the section.

Table 76: Identification of relevant combination of exposure scenarios

| **Exposure scenarios** | **Combination 1** | **Combination 2** | | |
|---|---|---|---|---|
| **ES 1** | | | | |
| **ES 2** | | | | |
| **ES 3** | | | | |
| | | | | |

*For each combination the total risk has to be calculated, summing the risk characterisation ratio for combined routes*

Table 77: Risk characterisation for combined relevant emission

| **Relevant combination of exposure scenario** | **Risk characterisation ratio** |
|---|---|
| **Combination 1** | |
| **Combination 2** | |
| | |

### 10.3.2 Environment (combined for all emission sources)

*Identify whether local exposure could occur through different exposure scenario and estimate the risk for such a situation when relevant.*

*In addition, if several very closely related and similar acting chemical substances the exposure evaluation and risk characterisation should reflect this aspect.*

# REFERENCES

*Although not required in the CSR format of Annex 1, it may be recommended to list all references at the back of the document.*

**ANNEX**

*Although not required in the CSR format of Annex 1, it can be recommended to annex a formatted output of models that were used to derive physical-chemical properties, environmental fate properties or human or environmental exposure. Refrain from attaching all model results in the annex without a proper interpretation in the body of the CSR.*