Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products

PRODUCT ASSESSMENT REPORT OF A BIOCIDAL PRODUCT FAMILY FOR NATIONAL AUTHORISATION APPLICATIONS

(submitted by the evaluating Competent Authority)

Wolmanit CX-10_family

Product type 8

Cu-HDO, basic copper carbonate and boric acid as included in the Union list of approved active substances

Case Number in R4BP: BC-KT019236-22

Evaluating Competent Authority: Austria

05/07/2023 (Final, revised)

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1 CONCLUSION

Austria was the reference member state responsible for evaluation of the biocidal product family (BPF) Wolmanit CX-10_family.

The products contained in the family are liquid formulations (soluble concentrate) which contain 2.80 to 3.50 %(w/w) of the active substance Cu-HDO, 13.04 to 16.30 %(w/w) of the active substance basic copper carbonate and 4.00 to 5.00 %(w/w) of the active substance boric acid. 2-Aminoethanol, 2-Ethylhexanoic acid and Polyethylenimine (50 % in water) were identified as substance of concern.

The assessment considered:

- The conclusions and recommendations of the Assessment Report for the approval of the active substances including the "elements to be taken into account by Member States when authorising products"
- The specific provisions from Inclusion Directives for the active substances

The field of use is as follows:

 # Use 1 - Fungi, wood boring beetles, termites – industrial users – vacuum/oscillating pressure treatment – indoor; UC 1-2;

NOTE : For 19(5) authorisation in Austria, #Use 1 is extended to UC 1-4.

Identity and analytical methods are described in sufficient detail to meet the information requirements as laid down in annex III of regulation (EU) no. 528/2012. The physical-chemical properties and respective characteristics of the biocidal product are considered acceptable for the appropriate use, storage and transport of the biocidal product.

Based on the authorised use including the general directions of use and any possibly defined risk mitigation measures and provided that there will be no misuse, the following can be concluded:

- Data on the biocidal product have demonstrated sufficient efficacy against the target organisms. No resistance is expected.
- The risk characterisation for the biocidal product family indicated acceptable risks with the proposed risk mitigation measures for human health. The assessment of the biocidal product family was conducted according to the common principles set out in Annex VI of Regulation (EC) No 528/2012 and considered the maximum risks to human health.
- Also for the environment, for treatment of wood which is intended for use class 1 and 2 it could be demonstrated that the authorised uses are safe for all exposed environmental compartments and the assessment of secondary poisoning has shown that no adverse effects for birds and mammals are to be expected.

  However, an unacceptable risk for aquatic and soil compartment is identified for use of the biocidal products contained in the biocidal product family for treatment of wood intended for use class 3 and 4.

The product has no significant indications for endocrine-disrupting properties.

The product contains an active substance, which is a candidate for substitution (boric acid).

A comparative assessment draws the conclusion that there are no reasons to prohibit or restrict the making available on the market of products within the BPF „Wolmanit CX-10_family‟.

Analysis of possible authorisation of use #1 for UC 1-4 according to Article 19(5) of regulation (EU) no. 528/2012:

A comparative assessment has shown that in Austria only a limited number of products is available for treatment of wood intended for use in use class 4 (UC4). Some of them are no viable alternative products, as they are oil-based, whereas the products of the BPF „Wolmanit CX-10_family‟ can be used for water-soluble impregnation. The ‟oscillating pressure process treatment” was specifically developed for the impregnation of wet timbers in general, especially for European grown spruce and fir with moisture levels of over 80%.

Regarding mode of action, a non-authorisation would result in a significant loss of ‟available” fungicidal mode of biocidal actions remaining to be used for applications in UC3 and UC4. Chemical diversity of the available active substances in alternative products is inadequate to minimise the occurrence of resistance in the target harmful organisms.

Also concerning diffusion capability into the heartwood zone and with regard to the target organisms *Mastotermes darwiniensis* and *Coptotermes acinaciformis*, the products within the BPF „Wolmanit CX-10_family‟ take a unique position.

In all, not authorising the biocidal products within the family would therefore result in disproportionate negative impacts for society when compared to the risks to human health, animal health or the environment arising from the use of the biocidal product under the conditions laid down in the authorisation.

The conditions of article 19 1)-4) and 6) of regulation (EU) no. 528/2012 are only fulfilled for use of the product for treatment of wood which is intended for use in use class 1 and 2.

However, rMS Austria authorises also the products contained in the biocidal product family ‟Wolmanit CX-10_family” for treatment of wood, which is intended for use in use class 1 to 4 according to Article 19 5) of regulation (EU) no. 528/2012.

The biocidal products contained in the biocidal product family „Wolmanit CX-10_family‟ will be authorised for a period not exceeding **5 years** in accordance with Article 23(6) of Regulation (EU) No 528/2012.

2 ASSESSMENT REPORT

2.1 Summary of the product assessment

2.1.1 Administrative information

2.1.1.1 Identifier of the product family

Identifier[1]	**Country (if relevant)**
Wolmanit CX-10_family	refMS: AT

2.1.1.2 Authorisation holder

Name and address of the authorisation holder	**Name**	Wolman Wood and Fire Protection GmbH
	Address	Dr. Wolman Strasse 31–33 76547 Sinzheim, Germany
Authorisation number	See Authorisation letter	
Date of the authorisation	See Authorisation letter	
Expiry date of the authorisation	See Authorisation letter	

2.1.1.3 Manufacturer of the products of the family

Name of manufacturer	Wolman Wood and Fire Protection GmbH
Address of manufacturer	Dr. Wolman Strasse 31–33 76547 Sinzheim, Germany
Location of manufacturing sites	Dr. Wolman Strasse 31–33 76547 Sinzheim, Germany

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[1] Identifying product name from R4BP

2.1.1.4 Manufacturers of the active substances

Active substance	Cu-HDO
Name of manufacturer	Wolman Wood and Fire Protection GmbH
Address of manufacturer	Dr. Wolman Strasse 31 – 33 76547 Sinzheim, Germany
Location of manufacturing sites	Dr. Wolman Strasse 31 – 33 76547 Sinzheim, Germany

Active substance	Copper(II) carbonate - copper(II) hydroxide (1:1)
Name of manufacturer	Cosaco GmbH
Address of manufacturer	Singapurstrasse 1 20457 Hamburg Germany
Location of manufacturing sites	Cosaco GmbH c/o AURUBIS AG Hovestrasse 50 20539 Hamburg Germany

Active substance	Boric acid
Name of manufacturer	Rio Tinto Iron & Titanium GmbH
Address of manufacturer	6 St. James's Square, London, SW1Y 4AD United Kingdom.
Location of manufacturing sites	US Borax 14486 Borax Road, Boron CA – 93516, USA.

2.1.2 Product family composition and formulation

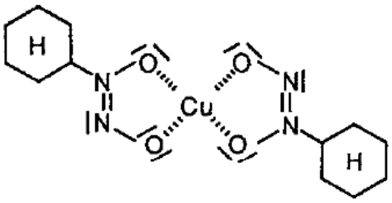
The full composition of the product family is provided in the confidential annex.

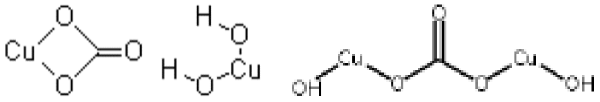
Does the product have the same identity and composition as the product evaluated in connection with the approval for listing of the active substance(s) on the Union list of approved active substances under Regulation No. 528/2012?

Yes ☐

No ☒

2.1.2.1 Identity of the active substances

Main constituent(s) of active substance 1	
ISO name	Cu-HDO
IUPAC or EC name	Bis(N-cyclohexyl-diazenium-dioxy)-copper
EC number	239-703-4
CAS number	312600-89-8
Index number in Annex VI of CLP	-
Minimum purity / content	981 g/kg
Structural formula	

Main constituent(s) of active substance 2	
ISO name	Basic copper carbonate
IUPAC or EC name	Copper(II) carbonate-copper(II) hydroxide (1:1)
EC number	235-113-6
CAS number	12069-69-1
Index number in Annex VI of CLP	-
Minimum purity / content	957g/kg equivalent to 550 g/kg as copper
Structural formula	

Main constituent(s) of active substance 3	
ISO name	Boric acid
IUPAC or EC name	Boric acid
EC number	233-139-2
CAS number	10043-35-3
Index number in Annex VI of CLP	-
Minimum purity / content	990g/kg; 99.0% (w/w) expressed as H_3BO_3
Structural formula	Boric acid consists of H-bonded trigonal $B(OH)_3$ molecules arranged in layers.

2.1.2.2 Candidate(s) for substitution

The active substances Basic Copper Carbonate and Cu-HDO contained in the BPF Wolmanit CX-10 are not considered as "candidates for substitution" according to article 10 of Regulation (EU) No 528/2012.

The active substance Boric acid is classified as toxic for reproduction (Repr. 1B; H360FD) and meets therefore one of the criteria for exclusion according to Article 5 paragraph 1. (c) of the BPR. It is considered a candidate for substitution (cf. chapter 2.2.11. comparative assessment).

2.1.2.3 Qualitative and quantitative information on the composition of the biocidal product family

The full composition of the biocidal product family and the individual products within the family are provided in the confidential annex.

LEVEL 1 - Biocidal product family "Wolmanit CX-10_family"

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**	
					Min	**Max**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*	3.50*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**	16.30**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***	5.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	29.60	42.00
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	0.00	8.00
Polyethylenimine (50 % in water)	Mixture of water and polyethyleneimine 1:1	Non-active substance****	9002-98-6	618-346-1	0.00	8.00
Non-active substances: see confidential annex ****Substance of Concern						

*corresponding to min 2.75%(w/w) and max. 3.43%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to min 12.48%(w/w) and max. 15.60%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to min 3.96%(w/w) and max. 4.95%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

LEVEL 2 – meta SPC 1

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**	
					Min	**Max**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*	2.80*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**	13.04**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***	4.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	29.60	29.60
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	4.90	8.00
Polyethylenimine (50 % in water)	Mixture of water and polyethyleneimine 1:1	Non-active substance****	9002-98-6	618-346-1	8.00	8.00
Non-active substances: see confidential annex ****Substance of Concern						

*corresponding to min 2.75%(w/w) and max. 2.75%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to min 12.48%(w/w) and max. 12.48%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to min 3.96%(w/w) and max. 3.96%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

LEVEL 2 – meta SPC 2

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**	
					Min	**Max**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*	2.80*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**	13.04**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***	4.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	33.60	33.60
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	7.50	7.50
Non-active substances: see confidential annex; ****Substance of Concern						

*corresponding to min 2.75%(w/w) and max. 2.75%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to min 12.48%(w/w) and max. 12.48%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to min 3.96%(w/w) and max. 3.96%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

LEVEL 2 – meta SPC 3

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**	
					Min	**Max**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	3.50*	3.50*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	16.30**	16.30**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	5.00***	5.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	42.00	42.00
Non-active substances: see confidential annex; ****Substance of Concern						

*corresponding to min 3.43%(w/w) and max. 3.43%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to min 15.60%(w/w) and max. 15.60%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to min 4.95%(w/w) and max. 4.95%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

LEVEL 3 – composition of the biocidal products

Meta SPC 1

Wolmanit CX-8

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	29.60
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	8.00
Polyethylenimine (50 % in water)	Mixture of water and polyethyleneimine 1:1	Non-active substance****	9002-98-6	618-346-1	8.00
Non-active substances: see confidential annex ****Substance of Concern					

*corresponding to 2.75%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to 12.48%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to 3.96%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

Wolmanit CX-8N

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	29.60
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	4.90
Polyethylenimine (50 % in water)	Mixture of water and polyethyleneimine 1:1	Non-active substance*	9002-98-6	618-346-1	8.00
Non-active substances: see confidential annex ****Substance of Concern					

*corresponding to 2.75%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to 12.48%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to 3.96%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

Meta SPC 2

Wolmanit CX-8SF (further trade name: Wolmanit CX-8 (9176))

Common name	IUPAC name	Function	CAS number	EC number	Content (%w/w)
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	2.80*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	13.04**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	4.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	33.60
2-Ethylhexanoic acid	2-Ethylhexanoic acid	Non-active substance****	149-57-5	205-743-6	7.50
Non-active substances: see confidential annex; ****Substance of Concern					

*corresponding to 2.75%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to 12.48%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to 3.96%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

Meta SPC 3

Wolmanit CX-10

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%w/w)**
Cu-HDO	Bis(N-cyclohexyl-diazenium-dioxy)-copper	Active substance	312600-89-8	239-703-4	3.50*
Basic copper carbonate	Copper(II) carbonate-copper(II) hydroxide (1:1)	Active substance	12069-69-1	235-113-6	16.30**
Boric acid	Boric acid	Active substance	10043-35-3	233-139-2	5.00***
2-Aminoethanol	2-Aminoethanol; ethanolamine	Non-active substance****	141-43-5	205-483-3	42.00
Non-active substances: see confidential annex; ****Substance of Concern					

*corresponding to 3.43%(w/w) pure active substance based on a purity of 98.1%(w/w) Cu-HDO

**corresponding to 15.60%(w/w) pure active substance based on a purity of 95.7%(w/w) basic copper carbonate

***corresponding to 4.95%(w/w) pure active substance based on a purity of 99.0%(w/w) boric acid

2.1.2.4 Information on technical equivalence

Is the source of the active substances the same as the one evaluated in connection with the approval for listing of the active substance on the Union list of approved active substances under Regulation (EU) No 528/2012?

Yes ☒

No ☐

An assessment of technical equivalence of the active substances is therefore not required.

2.1.2.5 Information on the substance(s) of concern

Based on the harmonised classification of Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation) or the classification as provided in the SDS submitted by the applicant and the concentration in the product, the component listed below were identified as substances of concern in relation to human health for the Wolmanit CX-10_family:

2-Aminoethanol (2-MEA), 2-ethylhexanoic acid (2-EHA) and polyethyleneimine.

In addition for 2-MEA IOELVs of 2.5 mg/m^3 (8-hour TWA) and 7.6 mg/m^3 (15-minute TWA) STEL have been established un-der the 2nd IOELV Directive (2006/15/EC).

Based on the harmonised classification of Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation) or the classification as provided in the SDS submitted by the applicant and the concentration in the product above the specific or generic concentration limits, 2-aminoethanol and polyethylenimine were identified as substances of concern (SoC) with respect to the environment.

For further details concerning the SoC identification please refer to the confidential Annex.

2.1.2.6 Type of formulation

SL – soluble concentrate

2.1.3 Hazard and precautionary statements

Classification and Labelling of the products of the family according to Regulation (EC) No 1272/2008:

Meta SPC 1

Classification	Acute Tox. 4 (o); H302 Acute Tox. 4 (i); H332 Skin Corr. 1B; H314 Eye Dam. 1; H318		STOT SE 3; H335 Repr. 1B; H360FD Aquatic Acute 1; H400 Aquatic Chronic 1; H410	
Labelling	Pictograms			
	GHS05	GHS07	GHS08	GHS09
				
Signal word	Danger			
Hazard statements	H302	Harmful if swallowed		
	H332	Harmful if inhaled		
	H314	Causes severe skin burns and eye damage		
	EUH071	Corrosive to the respiratory tract		
	EUH208	Contains Polyethyleneimine. May produce an allergic reaction.		
	H360FD	May damage fertility. May damage the unborn child.		
	H410	Very toxic to aquatic life with long lasting effects		
Precautionary statements	P201	Obtain special instructions before use		
	P202	Do not handle until all safety precautions have been read and understood.		
	P260	Do not breathe gas/mist/vapours.		
	P264	Wash hands thoroughly after handling.		
	P270	Do not eat, drink or smoke when using this product.		
	P271	Use only outdoors or in a well-ventilated area.		
	P273	Avoid release to the environment		
	P280	Wear protective gloves/protective clothing/eye protection/face protection		

	P301+P330+P331+P310	IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor
	P303+P361+P353+P310	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or doctor
	P305+P351+P338+P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor
	P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
	P308+P313	IF exposed or concerned: Get medical advice/attention
	P391	Collect spillage.
	P405	Store locked up
	P501	Dispose of contents/container to a special waste collection point in accordance with local/national/international requirement.

Meta SPC 2:

Classification	Acute Tox. 4 (o); H302 Acute Tox. 4 (i); H332 Skin Corr. 1B; H314 Eye Dam. 1; H318		STOT SE 3; H335 Repr. 1B; H360FD Aquatic Acute 1; H400 Aquatic Chronic 1; H410	
Labelling	Pictograms			
	GHS05	GHS07	GHS08	GHS09
				
Signal word	Danger			
Hazard statements	H302	Harmful if swallowed		
	H332	Harmful if inhaled		
	H314	Causes severe skin burns and eye damage		
	EUH071	Corrosive to the respiratory tract		

	H360FD	May damage fertility. May damage the unborn child.
	H410	Very toxic to aquatic life with long lasting effects
Precautionary statements	P201	Obtain special instructions before use
	P202	Do not handle until all safety precautions have been read and understood.
	P260	Do not breathe gas/mist/vapours.
	P264	Wash hands thoroughly after handling.
	P270	Do not eat, drink or smoke when using this product.
	P271	Use only outdoors or in a well-ventilated area.
	P273	Avoid release to the environment
	P280	Wear protective gloves/protective clothing/eye protection/face protection
	P301+P330+P331+P310	IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor
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Meta SPC 3

<table>
<tr><td>Classification</td><td colspan="2">Acute Tox. 4 (o); H302
Acute Tox. 4 (i); H332
Skin Corr. 1B; H314
Eye Dam. 1; H318</td><td colspan="2">STOT SE 3; H335
Repr. 1B; H360FD
Aquatic Acute 1; H400
Aquatic Chronic 1; H410</td></tr>
<tr><td rowspan="3">Labelling</td><td colspan="4">Pictograms</td></tr>
<tr><td>GHS05</td><td>GHS07</td><td>GHS08</td><td>GHS09</td></tr>
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<tr><td>P270</td><td colspan="3">Do not eat, drink or smoke when using this product.</td></tr>
<tr><td>P271</td><td colspan="3">Use only outdoors or in a well-ventilated area.</td></tr>
<tr><td>P273</td><td colspan="3">Avoid release to the environment</td></tr>
<tr><td>P280</td><td colspan="3">Wear protective gloves/protective clothing/eye protection/face protection</td></tr>
<tr><td>P301+P330+P331+P310</td><td colspan="3">IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor</td></tr>
</table>

	P303+P361+P353+P310	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or doctor
	P305+P351+P338+P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor
	P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
	P308+P313	IF exposed or concerned: Get medical advice/attention
	P391	Collect spillage.
	P405	Store locked up
	P501	Dispose of contents/container to a special waste collection point in accordance with local/national/international requirement.

P-statements P363, P312 or P321 were not suggested in line with the CLP labelling guidance (ECHA, 2021)

2.1.4 Authorised use

Meta SPC 1, 2 and 3:

2.1.4.1 Use description

 # Use 1 - Fungi, wood boring beetles, termites – industrial users – vacuum/oscillating pressure treatment – indoor; UC 1-2

PRODUCT TYPE(S)	8
WHERE RELEVANT, AN EXACT DESCRIPTION OF THE AUTHORISED USE	---
TARGET ORGANISM (INCLUDING DEVELOPMENTAL STAGE)	Wood destroying fungi (no data): Representative fungi: *Coriolus versicolor, Poria placenta, Coniophora puteana, Gloeophyllum trabeum* (Basidiomycetes causing White rot, brown rot, Soft rot fungi) Wood boring beetles: (larvae) *Hylotrupes bajulus* (representative beetle), *Anobium punctatum, Lyctus brunneus* (Wood destroying beetles) Termites (subterranean termites): (no data) *Reticulitermes spp., Mastotermes darwiniensis, Coptotermes acinaciformis*
FIELD OF USE	Application: indoor use in dedicated treatment plants Preservation of structural timber (hardwood and softwood) for indoor and outdoor use, in particular for timber used in use class 1 – 2.Please mind the restrictions.

APPLICATION METHOD(S)		Vacuum pressure treatment / oscillating pressure process	
APPLICATION RATES **Meta SPC 1&2**	***Without protection against termites***	**UC 1**	**UC 2**
	Product retention[a] [kg/m^3]	3	5.4
	Application Solution [b] [%(w/w)]	*0.5*	*0.9*
	With protection against termites	**UC 1**	**UC 2**
	Product retention[a] [kg/m^3]	13.6	13.6
	Application Solution [b] [%(w/w)]	*2.27*	*2.27*
APPLICATION RATES **Meta SPC 3**	***Without protection against termites***	**UC 1**	**UC 2**
	Product retention[a] [kg/m^3]	2.4	4.8
	Application Solution [b] [%(w/w)]	*0.4*	*0.8*
	With protection against termites	**UC 1**	**UC 2**
	Product retention[a] [kg/m^3]	10.9	10.9
	Application Solution [b] [%(w/w)]	*1.82*	*1.82*
FREQUENCY		Single application	
CATEGORY(IES) OF USER(S)		Industrial user	
PACK SIZES AND PACKAGING MATERIAL		Please see the relevant section.	

[a] This refers to the undiluted product (i.e. concentrate) per volume of treated wood

[b] Based on an average solution uptake of 600 L during vacuum pressure treatment

2.1.4.2 Use-specific instructions for use

Use of the product on wood that is intended for use classes 1 in residential areas is restricted to small-scale and/or static wood constructions that do not have direct contact to the interior space.

2.1.4.3 Use-specific risk mitigation measures

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2.1.4.4 Where specific to the use, the particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

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2.1.4.5 Where specific to the use, the instructions for safe disposal of the product and its packaging

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2.1.4.6 Where specific to the use, the conditions of storage and shelf-life of the product under normal conditions of storage

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2.1.5 General directions for use

Meta SPC 1, 2 and 3

2.1.5.1 Instructions for use

Apply the product via vacuum pressure / oscillating pressure treatment. Dilute the product with tap water via automated dosing. Please take into account the required concentration of the application solution.

Fixation time: the fixation time is at least two days depending on storage and weather conditions. The fixation time at temperatures below 5 °C is at least seven days. Do not use on wood that may come in direct contact with food and feeding stuff or drinking water.

2.1.5.2 Risk mitigation measures

The following personal protective equipment should be worn during product handling phase (application and cleaning):

Wear protective chemical resistant gloves during product handling phase (glove material to be specified by the authorisation holder within the product information). (N78)

A protective coverall (at least type 6, EN 13034) shall be worn. (N10)

Wear suitable protective footwear (EN 13832) when applying the product. (N79)

Wear a face shield when applying the product.

The process of dilution has to be carried out using an automatic dosing system.

Avoid contact with skin and eyes.

Handle product and dry freshly treated wood in areas with good ventilation.

Cleaning of the treatment chamber as well as pressure treatment of wood shall not be performed by the same operator on the same day.

All industrial application processes must be carried out within an area situated on impermeable hard standing with bunding to prevent run-off and a recovery system in place (e.g. sump).

Freshly treated timber must be stored after treatment under shelter or on impermeable hard standing, or both, to prevent direct losses to soil, sewer or water, and that any losses of the product, including any contaminated water/soil must be collected for reuse or disposal in accordance with local/national/international requirements.

2.1.5.3 Particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

First aid instructions:

IF EXPOSED OR CONCERNED: Get medical advice/attention.

IF IN EYES: Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing for at least 15 minutes. Call 112/ambulance for medical assistance.

IF ON SKIN: Immediately wash skin with plenty of water. Thereafter take off all contaminated clothing and wash it before reuse. Continue to wash the skin with water for 15 minutes. Call a POISON CENTRE or a doctor.

IF SWALLOWED: Immediately rinse mouth. Give something to drink, if exposed person is able to swallow. Do NOT induce vomiting. Call 112/ambulance for medical assistance.

Information to Healthcare personnel/doctor: Initiate life support measures if needed, thereafter call a POISON CENTRE

IF INHALED: Move to fresh air and keep at rest in a position comfortable for breathing. If symptoms: Call 112/ambulance for medical assistance. If no symptoms: Call a POISON CENTRE or a doctor.

Information to Healthcare personnel/doctor: Initiate life support measures if needed, thereafter call a POISON CENTRE

Emergency measures to protect the environment:

If the product contaminates lakes, rivers, sewers or soil, inform the appropriate authorities in accordance with local regulations.

Contain and collect spillage with an inert absorbent (e.g. sand, earth etc.). For large amounts: Pump off the product.

Dispose of contents/container to a special waste collection point in accordance with local/national/international requirements.

2.1.5.4 Instructions for safe disposal of the product and its packaging

Product residues, contaminated materials (including sawdust) and empty containers must be collected and disposed of in accordance with the national waste disposal legislation and any regional and/or local authority requirements.

Do not discharge the biocidal product nor the application solution or any spills and residues of the biocidal product into the sewage system or the environment (in particular surface water).

2.1.5.5 Conditions of storage and shelf-life of the product under normal conditions of storage

The product must be stored only in original containers tightly closed and out of reach of unauthorised persons.

Recommended storage temperature range: ≥0°C to + 40°C.[1] Protect from frost.

At low temperatures, crystallisation may occur. Redissolve precipitated ingredients by raising the temperature.

The shelf life of the product is 24 months.

[1] This recommendation is provided by the applicant. The accelerated storage test showed stability up to 54°C.

2.1.6 Other information

Do not use together with other biocidal products.

Fungicidal efficacy was tested according to EN 599-1 for UC 2 and 3 with brown rot species on softwood and for UC 4 with brown rot and white rot species on softwood and hardwood. Thus, the retention values derive from efficacy tests against the respective standard obligatory fungal species on softwood for UC 2 and 3 and on softwood and hardwood for UC 4.

NOT TO BE DISPLAYED IN THE EN master SPC:

The authorisation of Use #1, as it will be authorised in Austria according to Art. 19(5) BPR, is presented in the following sub-sections for information.

2.1.6.1 Use description

 # Use 1 - Fungi, wood boring beetles, termites – industrial users – vacuum/oscillating pressure treatment – indoor; UC 1-4

PRODUCT TYPE(S)	8
WHERE RELEVANT, AN EXACT DESCRIPTION OF THE AUTHORISED USE	---
TARGET ORGANISM (INCLUDING DEVELOPMENTAL STAGE)	Wood destroying fungi (no data): Representative fungi: *Coriolus versicolor, Poria placenta, Coniophora puteana, Gloeophyllum trabeum* (Basidiomycetes causing White rot, brown rot, Soft rot fungi) Wood boring beetles: (larvae) *Hylotrupes bajulus* (representative beetle), *Anobium punctatum, Lyctus brunneus* (Wood destroying beetles) Termites (subterranean termites): (no data) *Reticulitermes spp., Mastotermes darwiniensis, Coptotermes acinaciformis*
FIELD OF USE	Application: indoor use in dedicated treatment plants Preservation of structural timber (hardwood and softwood) for indoor and outdoor use, in particular for timber used in use class 1 – 4, e.g. for horticulture and landscape gardening, posts, fences, palisades, playground equipment and wood paving including use class 4 special application for transmission poles with service live of 25-40 years. Please mind the restrictions. Efficacious against white rot and soft rot in use class 4 only.

APPLICATION METHOD(S)		Vacuum pressure treatment / oscillating pressure process				
APPLICATION RATES Meta SPC 1&2	***Without protection against termites***	**UC 1**	**UC 2**	**UC 3**	**UC 4**	**UC 4 special application[c]**
	Product retention[a] [kg/m³]	3	5.4	5.4 – 9.0	11.8 – 22.5	17.6 – 31.25
	Application Solution [b] [%(w/w)]	*0.5*	*0.9*	*0.9 – 1.5*	*1.97 – 3.75*	*2.93 – 5.21*
	With protection against termites	**UC 1**	**UC 2**	**UC 3**	**UC 4**	**UC 4 special application[c]**
	Product retention[a] [kg/m³]	13.6	13.6	13.6	13.6 – 22.5	17.6 – 31.25
	Application Solution [b] [%(w/w)]	*2.27*	*2.27*	*2.27*	*2.27 – 3.75*	*2.93 – 5.21*
APPLICATION RATES Meta SPC 3	***Without protection against termites***	**UC 1**	**UC 2**	**UC 3**	**UC 4**	**UC 4 special application[c]**
	Product retention[a] [kg/m³]	2.4	4.8	4.8 - 9	9.44 - 18	14.1 - 25
	Application Solution [b] [%(w/w)]	*0.4*	*0.8*	*0.8 – 1.2*	*1.57 - 3*	*2.35 – 4.17*
	With protection against termites	**UC 1**	**UC 2**	**UC 3**	**UC 4**	**UC 4 special application[c]**
	Product retention[a] [kg/m³]	10.9	10.9	10.9	10.9 - 18	14.1 - 25
	Application Solution [b] [%(w/w)]	*1.82*	*1.82*	*1.82*	*1.82 - 3*	*2.35 – 4.17*
FREQUENCY		Single application				
CATEGORY(IES) OF USER(S)		Industrial user				
PACK SIZES AND PACKAGING MATERIAL		Please see the relevant section.				

[a] This refers to the undiluted product (i.e. concentrate) per volume of treated wood

[b] Based on an average solution uptake of 600 L during vacuum pressure treatment

[c] The use class "UC4 special" specifically targets treated timber with applications having an increased service life time (transmission poles). For the intended use class "UC4 special" a service life between 25 and 40 years is to be expected.

2.1.6.2 Use-specific instructions for use

2.1.6.3 Use-specific risk mitigation measures

Meta SPC 1 and 2 products:

UC 4: Only for the treatment of wood, which is handled in an appropriate workplace without the reach of children.

2.1.6.4 Where specific to the use, the particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

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2.1.6.5 Where specific to the use, the instructions for safe disposal of the product and its packaging

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2.1.6.6 Where specific to the use, the conditions of storage and shelf-life of the product under normal conditions of storage

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For the general directions for use, please cf. to chapter 2.1.5.

2.1.7 Packaging of the biocidal product

Type of packaging	Size/volume of the packaging	Material of the packaging	Type and material of closure(s)	Intended user (e.g. professional, non-professional)	Compatibility of the product with the proposed packaging materials (Yes/No)
Jerrycan	30 L	HDPE	Screw cap; HDPE	Industrial	Yes
Drum	60 L	HDPE	Screw cap; HDPE	Industrial	Yes
IBC	600 L	HDPE	Screw cap; HDPE	Industrial	Yes
IBC	1000 L	HDPE	Screw cap; HDPE	Industrial	Yes
Stainless steel bulk container for transport by road*	30.000L	Stainless steel	---	Industrial	Yes

* For transport by road; No commercial packaging. These containers are for transport only and are not intended for long term storage.

2.1.8 Documentation

2.1.8.1 Data submitted in relation to product application

A list of studies for the biocidal product is given in annex 3.1. Furthermore, new human exposure data for refinement of the indicative dermal hand exposure value of handling model 1 are available.

2.1.8.2 Access to documentation

Letters of access for the active substances basic copper carbonate and boric acid areattached to section 13 of the IUCLID-Dossier “Wolmanit CX-10_family”.

2.2 Assessment of the biocidal product family

2.2.1 Intended use(s) as applied for by the applicant

Please confer to the DRAs in the respective IUCLID files, section 13.

2.2.2 Physical, chemical and technical properties

Tests have been performed with Wolmanit CX-10, Wolmanit CX-8 and Wolmanit CX-8N. The results of these tests can also be read-across to Wolmanit CX-8 (9176)

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**	**Remarks**	**Reference**
Physical state at 20 °C and 101.3 kPa	Visual inspection	Wolmanit CX-10: 100 %, batch no. TH 3332; Wolmanit CX-8: 100 %, batch no. TH 3338; Wolmanit CX-8N: 100 %, batch no. TH 3266	Liquid		Anonymous 2014a, Anonymous 2014b, Anonymous 2014c, Anonymous 2016a
Colour at 20 °C and 101.3 kPa	Visual inspection	Wolmanit CX-10: 100 %, batch no. TH 3332; Wolmanit CX-8: 100 %, batch no. TH 3338; Wolmanit CX-8N: 100 %, batch no. TH 3266	Blue		
Odour at 20 °C and 101.3 kPa	Olfactory inspection	Wolmanit CX-10: 100 %, batch no. TH 3332; Wolmanit CX-8:	characteristic		

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**			**Remarks**	**Reference**
		100 %, batch no. TH 3338; Wolmanit CX-8N: 100 %, batch no. TH 3266					
Acidity/alkalinity	CIPAC MT 75	1 % aqueous dilution and concentrates (100 %) of the products	*Product*	*pH (25 °C)*			
				1% sol.	*Conc.*		
			Wolmanit CX-10, batch no. TH 3332	9.6	11.5		
			Wolmanit CX-8, batch no. TH 3338	9.6	10.8		
			Wolmanit CX-8N, batch no. TH 3266	9.5	11.1		
			Wolmanit CX-8 (9176)	9.6	-		
	CIPAC MT 191	100 %	Product	Alkalinity as NaOH [%]			
			Wolmanit CX-10, batch no. 1000325775	24.15			Anonymous 2020a
			Wolmanit CX-8, batch no. 1000250966	16.99			Anonymous 2020b
			Wolmanit CX-8N, batch no. LP18695	17.37			Anonymous 2020c
			Wolmanit CX-8 (9176), batch no. 1000242063	19.37			Anonymous 2020d

<table>
<tr><th>Property</th><th>Guideline and Method</th><th>Purity of the test substance (% (w/w)</th><th colspan="4">Results</th><th>Remarks</th><th>Reference</th></tr>
<tr><td rowspan="5">Relative density / bulk density</td><td rowspan="5">OECD guideline 109</td><td rowspan="5">100 %</td><td colspan="2"><i>Product</i></td><td colspan="2"><i>Density (g/m^3)</i></td><td rowspan="5"></td><td rowspan="5">Anonymous 2014d,
Anonymous 2014e,
Anonymous 2014f,
Anonymous 2016b</td></tr>
<tr><td colspan="2">Wolmanit CX-10, batch no. TH 3332</td><td colspan="2">1.292</td></tr>
<tr><td colspan="2">Wolmanit CX-8, batch no. TH 3338</td><td colspan="2">1.234</td></tr>
<tr><td colspan="2">Wolmanit CX-8N, batch no. TH 3266</td><td colspan="2">1.225</td></tr>
<tr><td colspan="2">Wolmanit CX-8 (9176)</td><td colspan="2">1.22</td></tr>
<tr><td rowspan="3">Storage stability test – accelerated storage</td><td rowspan="3">CIPAC MT 46</td><td rowspan="3">100 %</td><td><i>Product</i></td><td>Start</td><td>End</td><td>Degradation</td><td rowspan="3">Under consideration of all available storage stability tests a long-term storage stability of at least 2 years can be deduced for the products of the Wolmanit CX-10_family.
Due to the similarity of Wolmanit CX-8 (9176) with Wolmanit CX-10 and Wolmanit CX-8 / 8N the results of these studies can also be read across to Wolmanit CX-8 (9176).
A justification why the substances of concern have not been included in the storage stability study is attached.</td><td rowspan="3">Anonymous 2003a,
Anonymous 2014g,
Anonymous 2014h,
Anonymous 2014i,
Anonymous 2015a,
Anonymous 2015b,
Anonymous 2015c</td></tr>
<tr><td colspan="4">Packaging: 100 mL brown glass, fitted with screw caps.
No degradation of a.s. after 2 weeks storage at 54 °C; no significant changes of pH, density, appearance properties, packaging.</td></tr>
<tr><td>Wolmanit CX-10, batch no. TH 3332</td><td>pH: 9.61; Density: 1.292 g/mL; B: 0.88%; Cu: 9.89%; HDO: 2.89%; Cu-HDO: 3.55%</td><td>pH: 9.58; Density: 1.289 g/mL; B: 0.84%; Cu: 9.76%; HDO: 2.85%; Cu-HDO: 3.50%</td><td>B: -4.55%:
Cu: -1.31%;
HDO: -1.31%;
Cu-HDO: -1.41%</td></tr>
</table>

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**				**Remarks**	**Reference**
			Wolmanit CX-8, batch no. TH 3338	pH: 9.59; Density: 1.234 g/mL; B: 0.708%; Cu: 7.98%; HDO: 2.22%; Cu-HDO: 2.71%	pH: 9.51; Density: 1.232 g/mL; B: 0.705%; Cu: 7.87%; HDO: 2.24%; Cu-HDO: 2.74%	B: -0.42%: Cu: -1.38%, HDO: +0.90%, Cu-HDO: +1.11%	Justification CX-10_family-storag	
			Wolmanit CX-8N, batch no. TH 3266	pH: 9.53; Density: 1.225 g/mL; B: 0.664%; Cu: 7.77%; HDO: 2.24%; Cu-HDO: 2.74%	pH: 9.63; Density: 1.223 g/mL; B: 0.720%; Cu: 7.82%; HDO: 2.26%; Cu-HDO: 2.76%	B: +8.43%: Cu: +0.64%, HDO: +0.90%, Cu-HDO: +0.73%		
			Wolmanit CX-8 (9176)	No data				
Storage stability test – **long term storage at ambient temperature**	OPPTS 830.6317	100 %	*Product*	Start	End	Degradation		Anonymous 2002a, Anonymous 2014j, Anonymous 2014k, Anonymous
			Storage conditions: the Wolmanit CX samples are stored in a 5000 mL white screw cap HDPE canister at ambient conditions (in a non-air conditioned storage room with a glass window thereby enabling exposure of the test product to natural daylight) for a period of 24					

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results				Remarks	Reference
			months. No relevant degradation of a.s. after long-term storage at ambient temperatures observed. Storage canister remains intact, no damage of packaging observed, homogenious liquid, no generation of phases observed					2014l, Anonymous 2015d, Anonymous 2015e, Anonymous 2015f
			Wolmanit CX-10, batch no. TH Ch 0532515	pH: 9.53; Density: 1.284 g/mL; B: 0.89% w/w; Cu: 9.60%; HDO: 2.69% w/w; Cu-HDO: 3.29% w/w	pH: 9.49; Density: 1.275 g/mL; B: 0.89% w/w; Cu: 9.60%; HDO: 2.59% w/w; Cu-HDO: 3.16% w/w	Stable solution of 4.2 % in water before and after storage; B: -1.33%; Cu: 0.00%; HDO: -3.72%; CU-HDO: -3.95%		
			Wolmanit CX-8, batch no. TH Ch 0532587	pH: 9.59; Density: 1.226 g/mL; weight: 5742.0 g; B: 0.75% w/w; Cu: 7.73%; HDO: 2.15% w/w; Cu-HDO: 2.63%	pH: 9.65; Density: 1.225 g/mL; weight: 5742.2 g; B: 0.74% w/w; Cu: 7.76%; HDO: 2.11% w/w; Cu-HDO: 2.58%	Stable solution of 5.25 % in water before and after storage; Weight change: +0.2 g;B: -1.33%; Cu: +0.39%; HDO: -		

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results				Remarks	Reference
				w/w	w/w	1.86%; Cu-HDO: -1.90%		
			Wolmanit CX-8N, batch no. TH 3266	pH: 9.53; Density: 1.225 g/mL; weight: 5023.6 g; B: 0.71% w/w; Cu: 7.89%; HDO: 2.30% w/w; Cu-HDO: 2.81% w/w	pH: 9.42; Density: 1.223 g/mL; weight: 5023.6 g; B: 0.75% w/w; Cu: 7.88%; HDO: 2.22% w/w; Cu-HDO: 2.75% w/w	Stable solution of 5.25 % in water before and after storage; Weight change: 0.0 g; B: +5.63%; Cu: -1.01%, HDO: -2.17%, Cu-HDO: 2.14%		
			Wolmanit CX-8 (9176)	No data				
Storage stability test – **low temperature stability test for liquids**			No tests performed; products should be stored frost protected					
Effects on content of the active substance and	OPPTS 830.6317	100 %	Storage conditions: the Wolmanit CX-8 and CX-10 samples are stored in a 5000 mL white screw cap HDPE canister at ambient					Anonymous 2014j, Anonymous

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**	**Remarks**	**Reference**
technical characteristics of the biocidal product - **light**			conditions (in a storage room wih glass window and without climate control) for a period of 24 months. No effect on technical properties (dilution stability, persistence of foam) during long-term storage observed; no change of appearance properties of the formulation; no effect of daylight exposure		2014k, Anonymous 2014l, Anonymous 2015d, Anonymous 2015e, Anonymous 2015f
Effects on content of the active substance and technical characteristics of the biocidal product – **temperature and humidity**	CIPAC MT 46 OPPTS 830.6317	100 %	No effect during accelerated storage and long-term storage observed; no effect of the temperature within the range of 4 – 54 °C; humidity is of no concern because the products are based on water.		
Effects on content of the active substance and technical characteristics of the biocidal product - **reactivity towards container material**	OPPTS 830.6317	100 %	No effect during long-term storage observed; container material remains intact during long-term storage Material of the packaging HDPE canister		Anonymous 2014j, Anonymous 2014k, Anonymous 2014l, Anonymous 2015d, Anonymous 2015e, Anonymous 2015f
Wettability			Not applicable for liquids		
Suspensibility, spontaneity and dispersion stability			Not applicable for non-suspensions		

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**	**Remarks**	**Reference**
Wet sieve analysis and dry sieve test			Not applicable for liquids		
Emulsifiability, re-emulsifiability and emulsion stability			Not applicable for non-emulsions		
Disintegration time			Not applicable		
Particle size distribution, content of dust/fines, attrition, friability			The products of the Wolmanit CX-10_family are liquid formulations and are not applied as powders or granules or in a manner that generates exposure to aerosols, particles or droplets. Furthermore, the diluted formulations are applied to timber in closed systems. A test concerning particle size distribution, content of dust/fines, attrition, friability is therefore considered to be not necessary.		

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results			Remarks	Reference
Persistent foaming	CIPAC-MT 47	Min. and max. application solutions	Foam volume after 1 minute for all products clearly below the limit value of 60 ml			The results of the persistent foam tests confirm that there is no unacceptable risk to operators following use of the Wolmanit CX-products through the appropriate application equipment. Due to the similarity of Wolmanit CX-8 (9176) with the other products of the Wolmanit CX-10_family_the overall result of the studies performed with Wolmanit CX-10, Wolmanit CX-8 and Wolmanit CX-8N– the foam volume after 1 minute is clearly below the limit value of 60 ml - can be read across to Wolmanit CX-8 (9176).	
			Test formulation	*Test sol. %*	*Foam Vol. after 1 min. (ml)*		
			Wolmanit CX-8 (9176)		No data		
			Wolmanit CX-10, batch no. TH 3332	0.70 %	0 ml		Anonymous 2014m
				4.20 %	0 ml		
			Wolmanit CX-8, batch no. TH 3338	0.90%	6.4 ml		Anonymous 2014n
				5.25 %	19.0 ml		
			Wolmanit CX-8N, batch no. TH 3266	0.90 %	12.3 ml		Anonymous 2014o
				5.25 %	14.8 ml		
Flowability/Pourability/Dustability			Not applicable for liquids				
Burning rate — smoke generators			Not applicable; the Wolmanit CX-products are no smoke generators				
Burning completeness — smoke generators			Not applicable				
Composition of smoke — smoke generators			Not applicable				
Spraying pattern —			Not applicable; Wolmanit CX-products will not				

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**	**Remarks**	**Reference**
aerosols			be applied by spraying		
Physical compatibility			Not applicable; use with other products is not intended		
Chemical compatibility			Not applicable; use with other products is not intended		
Degree of dissolution and dilution stability	CIPAC-MT 41	The test has been performed with the maximum in use concentration of the test formulation: 5.25 % w/w Wolmanit CX-8 batch no. TH 3338); 4.2 % w/w Wolmanit CX-10 (batch no. TH 3332); 5.25 % w/w Wolmanit CX-8N (batch no. TH 3266)	No separated material, no precipitation has been observed neither directly after dilution nor after the storage period of 18 h. Wolmanit CX-products are fully dilutable into water	Based on the results of the studies performed with Wolmanit CX-10, Wolmanit CX-8 and Wolmanit CX 8N and based on decades of experience with Wolmanit CX-formulations it is reasonable to assume that Wolmanit CX-8 (9176) is miscible in water in any ratio and forms stable dilutions into water.	Anonymous 2014p, Anonymous 2014q, Anonymous 2014r

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**			**Remarks**	**Reference**
Surface tension	OECD – 115			*Test sol. %*	*Surface tension mN/m*	As worst case it can be assumed that the surface tension of Wolmanit CX-8 (9176) is comparable to the surface tension of Wolmanit CX-8 / 8N i.e. below the threshold value of 60 mN/m under which a substance is regarded as surface active.	
			Wolmanit CX-8 (9176)		No data		
		1 g/L at 20°C	Wolmanit CX-10, batch no. TH 3332	0.1%	72.4		Anonymous 2004a
		42 g/L at 20°C		4.2%	66.4		Anonymous 2015g
		1 g/L at 20°C	Wolmanit CX-8, batch no. TH 3338	0.1%	72.4		
		52 g/L at 20°C		5.2%	36.5		Anonymous 2015h
		1 g/L at 20°C	Wolmanit CX-8N, batch no. TH 3266	0.1%	72.4		
		40 g/L at 20°C		4.0%	36.7		Anonymous 2015i
Viscosity	OECD 114	*Test concentration*	*Test product*	*Temp. °C*	*Viscosity mPa.s*	Viscosities at the maximum shear rate have been reported. As the products are aqueous solutions, it can be expected that the products are Newtonian liquids, and thus viscosity is deemed indepandant from shear stress and shear rates. Out of the products of the Wolmanit CX-10_family Wolmanit CX-8 (9176) is based on the highest water content. It is therefore assumed, that the viscosity of Wolmanit CX-8 (9176) is below the viscosity of the other Wolmanit CX-formulations. However as worst-case the results of the Wolmanit CX-10	
			Wolmanit CX-8 (9176)		No data		
		100 %	Wolmanit CX-10, batch no. TH 3332	20 °C	274		Anonymous 2014s
				40 °C	75		
		100 %	Wolmanit CX-8, batch no. TH 3338	20 °C	109		Anonymous 2014t
				40 °C	42		
		100 %	Wolmanit CX-8N, batch no. TH 3266	20 °C	95		Anonymous 2014u
				40 °C	33		

Property	**Guideline and Method**	**Purity of the test substance** (% (w/w)	**Results**			**Remarks**	**Reference**
						study – the product study with the highest determined viscosity - can be read-across to Wolmanit CX-8 (9176).	

2.2.3 Physical hazards and respective characteristics

The tests concerning physical hazards have been performed with Wolmanit CX-10. The results can be read across to all other Wolmanit CX-8-formulations. Results of the corrosivity tests can be read-across to Wolmanit CX-8 (9176).

Property	**Guideline and Method**	**Purity of the test substance (% (w/w)**	**Results**	**Reference**
Explosives	Differential Scanning Calorimetrie (DSC) according to OECD Guideline 113	100 % Wolmanit CX-10, batch no. U 9027	Onset temperature: 105 °C Peak temperature: 158°C Energy release: 210 J/g The test substance is not explosive because the exothermic decomposition energy, determined by a DSC, is less than 500 J/g; due to the high similarity of the test formulation with the individual members of the Wolmanit CX-10_family the results can be read-across to all other Wolmanit CX-formulations. The test substance Wolmanit CX-10 comprises all components of the Wolmanit CX-10_family except polyethylenimine (50 % in water), 2-ethylhexanoic acid and one other co-formulant (cf. conf. annex). None of the components of the CX-formulations are classified as explosive and no indications exist that these components would generate new properties in the Wolmanit CX-10 formulations. No reaction products are to be expected in the products of the Wolmanit CX-10 family with explosive properties. Therefore, the results of the study can be read-across to all	Anonymous 2003b

			products of the Wolmanit CX-10_family. Furthermore, Wolmanit CX-10 products including Wolmanit CX-8, which contains the aforementioned additional components, are in use since decades. Explosive properties were never seen in this long period. All together it is very unlikely that the other products of the Wolmanit CX-10_family are explosive.	
Flammable gases			Not applicable for liquids	
Flammable aerosols			Not applicable for liquids	
Oxidising gases			Not applicable for liquids	
Gases under pressure			Not applicable for liquids	
Flammable liquids	92/69/EEC, appendix A9 DIN EN 22719 and DIN 51755	100 % Wolmanit CX-10, batch no. U 9027	The vapour / air-mixtures did not ignite within the temperature range being defined in the standards mentioned before (i.e. up to 65°C for tests acc. to DIN 51755). Therefore, the flash point of the test formulation is above 60 °C. Consequently, the test product does not need to be classified as a flammable liquid according to the definition given in the Guidance on the Application of the CLP Criteria Version 5.0 – July 2017; section 2.6. FLAMMABLE LIQUIDS.The results can be read-across to all other Wolmanit CX-formulations	Anonymous 2003b
Flammable solids			Not applicable for liquids	
Self-reactive substances and			Not applicable. The decomposition energy from DSC measurement for	

mixtures			Wolmanit CX-10 (meta-SPC 3) was measured and is <300 kJ/kg. Self-reactivity of the test product can therefore be excluded. The results of this study can be read across to meta SPC 2. Furthermore, self-reactive substances or mixtures are defined as thermally unstable liquid or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). However, long-term storage of the Wolmanit CX-products (incl. products of meta SPC-1) shows that the mixtures do not undergo an exothermic decomposition in the presence of air / oxygen and therefore it is reliable to conclude that the Wolmanit CX-products do not undergo an exothermic decomposition in the absence of oxygen. Additionally accelerated storage of the Wolmanit CX-products shows that the products are stable at storage temperatures of 54 °C for at least 2 weeks in the presence of oxygen. Altogether there is no indication that meta SPC 1 is thermally unstable without participation of oxygen and undergoes a strongly exothermic decomposition even without participation of oxygen because thermal instability and strongly exothermic decomposition was not seen in the presence of oxygen. We	

			therefore do not consider meta SPC 1 as self-reactive.		
Pyrophoric liquids			Not applicable; the Wolmanit CX-products are not pyrophoric; decades of experience with Wolmanit CX-formulations have shown that the products do not ignite within five minutes after coming into contact with air. This is also shown by the long-term storage test where contact to air was permanently for up to 2 years.		
Pyrophoric solids			Not applicable for liquids		
Self-heating substances and mixtures			Not applicable for liquids		
Substances and mixtures which in contact with water emit flammable gases			Not applicable; the Wolmanit CX-products are water-dilutable products which do not emit flammable gases in contact with water		
Oxidising liquids	UN test O.2 described in part III, Section 34 of the UN-MTC	100	Wolmanit CX-8, batch no. 1000786509	Reference item (nitric acid 65%): The mean time for pressure to rise from 690 kPa to 2.070 kPa = 1.90 s. Only in 3 out of 5 tests with the test item a pressure of 2,070 kPa was reached within about 60 s: The mean time for Wolmanit CX-8 for pressure to rise from 690 kPa to	Anonymous 2023a

				2.070 kPa = 26.52 s, which is significantly greater than the mean pressure rise time for the reference item (1.90 s).	
		100	Wolmanit CX-10, batch no. 1000789069	Reference item (nitric acid 65%): The mean time for pressure to rise from 690 kPa to 2.070 kPa = 1.90 s. In none of the 5 tests with the test item a pressure of 2.070 kPA was reached within 60 s. Due to this result, it can be stated that the time for the pressure to rise from 690 kPa to 2,070 kPa of Wolmanit CX-10 is significantly higher than the mean pressure rise time for the reference item (1.90 s).	Anonymous 2023b
	Conclusion on oxidising liquids: Wolmanit CX-8 and Wolmanit CX-10 have no oxidising properties according to UN				

	Transport Regulation, Regulation (EC) No 440/2008 and do not fulfil classification criteria for oxidising liquids. The results of the both tests can also be read-across to Wolmanit CX-8 (9176) and to Wolmanit CX-8N. Wolmanit CX-8N contains the same ingredients than Wolmanit CX-8. In Wolmanit CX-8N the content of the carbonic acids malic acid and 2-ethylhexanoic acid is reduced and the reduced content of carbonic acids is substituted by water; furthermore the two carbonic acids do only contain oxygen bonded to carbon or hydrogen and have therefore no oxidising properties. In case of Wolmanit CX-8 (9176) organic and inorganic substances with oxygen bound to other elements than carbon or hydrogen are also contained in Wolmanit CX-8 and Wolmanit CX-10. Therefore, no differences between Wolmanit CX-8 (9176) and Wolmanit CX-8 or Wolmanit CX-10 are to be expected with respect to the oxidising properties.				
Oxidising solids			Not applicable for liquids		
Organic peroxides			Not applicable		
Corrosive to metals	UN test C.1 described in part III, Section 37.4.1.1 of the UN-MTC	Test concentration (% w/w)	Test product	Result	
			Wolmanit CX-8 (9176)	No data	
		100	Wolmanit CX-10, batch no. 1000389748	Steel Sheet mass loss after 7 days: 0.0%; Aluminium sheet mass loss after 7 days: 0.21%; Not corrosive	Anonymous 2015j
				Steel Sheet mass loss after 28 days: 0.0%; Aluminium sheet mass loss after 28 days: 3.28%; No localized corrosion occurred; Not corrosive	Anonymous 2022a
		100	Wolmanit CX-8, batch no.	Steel Sheet mass loss after 7	Anonymous

			1000310998	days: 0.0%; Aluminium sheet mass loss after 7 days: 0.50%;No localized corrosion occurred; Not corrosive	2015k
				Steel Sheet mass loss after 28 days: 0.0%; Aluminium sheet mass loss after 28 days: 2.99%; No localized corrosion occurred; Not corrosive	Anonymous 2022b
		100	Wolmanit CX-8N, batch no. TH 4463	Steel Sheet mass loss after 7 days: 0.0%; Aluminium sheet mass loss after 7 days: 0.50%; Not corrosive	Anonymous 2015l
				Steel Sheet mass loss after 28 days: 0.0%; Aluminium sheet mass loss after 28 days: 4.01%; No localized corrosion occurred; Not corrosive	Anonymous 2022c

	Conclusion on metal corrosivity: The relatively mass loss shows no corrosion for Wolmanit CX-formulations for the classification criteria of the UN Test C.1. Hence, the products are not corrosive.			
Auto-ignition temperatures of products (liquids and gases)	92/69/EC, appendix A15	100 % Wolmanit CX-10, batch no. U 9027 The results of the study performed with Wolmanit CX-10 can be read across to Wolmanit CX-8 and Wolmanit CX-8N	420 °C at atmospheric pressure (997-1018 mbar)	Anonymous 2003b
Relative self-ignition temperature for solids			Not applicable for liquids	
Dust explosion hazard			Not applicable for liquids	

2.2.3.1 Risk assessment for physicochemical properties

The flashpoint of biocidal product Wolmanit CX-10 is above 60°C. The biocidal product Wolmanit CX-10 and the other members of the biocidal product family are not flammable liquids. Explosive or oxidising properties can be excluded. The auto-ignition temperature of the biocidal product Wolmanit CX-10 is 420°C. Due to the similarity in composition, the other members of the biocidal product family have an auto-ignition temperature above 400°C with the utmost probability. The products are water based concentrates and the co-formulants are not expected to be hazardous according to the available data. The shelf life is 2 years. Therefore, there is no risk expected from the formulated products concerning the physico-chemical properties.

2.2.4 Methods for detection and identification

Validated analytical methods are available for the determination of the active substances of the products of the Wolmanit CX-10_family. The analytical methods are useful for the determination of the active substances in concentrates of the wood preservatives as well as for the determination of the actives substances in solutions of the wood preservatives. Copper originating from Copper Carbonate as well as from Cu-HDO can be determined very specific via atom absorption spectrometry. Likewise, boron originating from boric acid can be determined specifically via AAS when using a matrix standard of the wood preservative. The Cu-HDO content of the Wolmanit CX products can be determined by photometer after dilution of the wood preservative and conversion with $FeCl_3$ forming a yellow-orange complex. The UV-VIS spectrum of this complex can be differentiated by other coloured $FeCl_3$ complexes by its specific maximum. The copper content stemming from basic copper carbonate can be calculated by subtracting the copper content stemming from Cu-HDO ($FeCl_3$ photometric method) from the determined total amount of copper (AAS method).

For substances of concern (SoCs), such as 2-aminoethanol, 2-ethyl hexanoic acid and n-heptanoic acid validated analytical methods are available. Determinations have been carried out by HILIC-LC-MS/MS in the case of 2-aminoethanol and GC-MS after derivatization with Trimethylsulfonium hydroxide (TMSH) in the case of 2-ethyl hexanoic acid and n-heptanoic acid, using Wolmanit CX-8WB as test formulation.

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)** **Products of Wolmanit CX_family**			**Limit of quantification (LOQ) or other limits***	**Reference**
					Range	Mean	RSD		
Cu	flame atom absorption spectrometer (AAS)	5 measurements per test concentration for recovery determinations, triplicate measurements for determination of linearity and range.	Content [mg/L] = 21.80 x Absorbance + 0.038 3 calibration levels, Correlation coefficient: 0.999957 ; Range: 1 – 5 mg Cu/L;	no interference by other elements	Concentrates: Wolmanit CX-8: 96.2 – 101.7 Wolmanit CX-10: 99.6 - – 101.8	Concentrates: Wolmanit CX-8: 100.2 Wolmanit CX-10: 101.1 Solutions:	Concentrate: Wolmanit CX-8: 2.27 Wolmanit CX-10: 0.89	LOD: 0.08 mg Cu/L LOQ: 0.15 mg Cu/L	Anonymous 2014y

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
			this corresponds to: 21.8-109.0 % of the active substance concentration in Wolmanit CX-10 sample concentrates		Solutions: Wolmanit CX-8: 99.5 – 101.5 Wolmanit CX-10: 99.5 – 101.0	Wolmanit CX-8: 100.4 Wolmanit CX-10: 100.1	Solutions: Wolmanit CX-8: 1.02 Wolmanit CX-10: 0.65		
Cu-HDO	The Cu-HDO content of the Wolmanit CX products can be determined by photometer after dilution of the wood preservative and conversion with $FeCl_3$ forming a yellow-orange complex.	5 measurements per test concentration for recovery determinations, triplicate measurements for determination of linearity and range.	Content [mg/L] = 186,1 x Absorbance - 1,27 6 calibration levels, Correlation coefficient: 0.999967; Range: 18.1 – 217 mg Cu-HDO/L, this corresponds to: 29.5-353.1 % of the active substance concentration in Wolmanit CX-10 sample	$FeCl_3$ gives coloured complexes with different classes of compounds, for example with phenols, compounds able to form enols, hydroxamic acids. The presence of such compounds can lead to systematically errors. The colorations produced by these classes of compounds have in part other maxima and can be identified via comparison of the UV/VIS-spectra with a standard spectrum if necessary.	Concentrates: Wolmanit CX-8: 99.3 – 99.6 Wolmanit CX-10: 99.2 – 100.0 Solutions: Wolmanit CX-8: 99.1 – 100.0 Wolmanit CX-10: 98.4 – 99.1	Concentrates: Wolmanit CX-8: 99.5 Wolmanit CX-10: 99.7 Solutions: Wolmanit CX-8: 99.4 Wolmanit CX-10: 98.7	Concentrates: Wolmanit CX-8: 0.13 Wolmanit CX-10: 0.33 Solutions: Wolmanit CX-8: 0.34 Wolmanit CX-10: 0.27	LOD: 4.6 mg Cu-HDO/L LOQ: 15.4 mg Cu-HDO/L.	Anonymous 2014z

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
			concentrates						
Boron	flame atom absorption spectrometer (AAS)	5 measurements per test concentration for recovery determinations, triplicate measurements for determination of linearity and range.	Wolmanit CX-8 formulations: Content [mg B /L] = 2110 x Absorbance - 6.9 4 calibration levels, Range: 50 – 500 mg B/L Correlation coefficient: 0.999367 Wolmanit CX-10 formulations: Content [mg B / L] = 2174 x Absorbance - 4.5 Range: 50 – 500 mg B/L 4 calibration levels, Correlation coefficient:	The AAS measurement is carried out at a specific wavelength for boron (249.7 nm). Ingredients of the wood preservative may interfere the boron measurements at the flame AAS. Therefore, a matrix standard of the wood preservative, which has to be analysed, is used for the preparation of the analytical standards to avoid interfering.	Concentrates: Wolmanit CX-8: 102.0 – 106.2 Wolmanit CX-10: 104.6 – 106.2 Solutions: Wolmanit CX-8: 103.4 – 106.3 Wolmanit CX-10: 104.1 – 105.0	Concentrates: Wolmanit CX-8: 104.4 Wolmanit CX-10: 105.4 Solutions: Wolmanit CX-8: 105.4 Wolmanit CX-10: 104.3	Concentrates: Wolmanit CX-8: 1.70 Wolmanit CX-10: 0.76 Solutions: Wolmanit CX-8: 1.20 Wolmanit CX-10: 0.40	Wolmanit CX-8 formulations: LOD: 11 mg B/L LOQ: 15 mg B/L Wolmanit CX-10 formulations: LOD: 13 mg B/L LOQ: 19 mg B/L	Anonymous 2014aa

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
			0.999717						
2-Aminoethanol (SoC)	HILIC-LC-MS/MS after dilution	Linearity: Single determinations at five concentrations were performed. Recovery: 5 measurements at 2 concentration levels.	Y=1.2362x + 0.09306 Correlation coefficient (R2): 0.99861, 5 calibration levels, Range: 0 – 50 %; Analytical calibration extended over a range appropriate for the lowest and highest (± 20%) nominal concentration of the analyte	LC-MS/MS measurements show high specificity. No interfering with other Wolmanit CX co-formulants observed.	Level 1 (40 % w/w): 97.2 – 100.2 Level 2 (50 % w/w): 96.9 – 101.3	Level 1 (40 % w/w): 98.2 Level 2 (50 % w/w): 98.9	Level 1 (40 w/w%): 1.17 Level 2 (50 % w/w): 1.74	The method is working with a dilution of the wood preservative and its LoQ is several orders of magnitude lower than the test concentration.	Anonymous 2019a
2-ethyl hexanoic acid (SoC)	GC-MS after derivatization	Linearity: Single determinations at five concentrations were performed. Recovery: 5 measurements at 2 concentration	Y=0.245x + 0.00642 Correlation coefficient (R2): 0.999, Range: Analytical calibration extended over a range appropriate for the	GC-MS measurements show high specificity. No interfering with other Wolmanit CX co-formulants observed.	Level 1 (6.31 % w/w): 99.1 – 102.4 Level 2 (7.32 % w/w): 101.1 – 106.1	Level 1 (6.31 % w/w): 100.3 Level 2 (7.32 % w/w): 103.0	Level 1 (6.31 % w/w): 1.58 Level 2 (7.32 % w/w): 1.91	The method is working with a dilution of the wood preservative and its LoQ is several orders of magnitude lower than the test concentration.	Anonymous 2019a

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
		levels.	lowest and highest (± 20%) nominal concentration of the analyte						
n-heptanoic acid (SoC)	GC-MS after derivatization	Linearity: Single determinations at five concentrations were performed. Recovery: 5 measurements at 2 concentration levels.	Y=0.375x – 0.0738 Correlation coefficient (R2): 0.999, Range: Analytical calibration extended over a range appropriate for the lowest and highest (± 20%) nominal concentration of the analyte	GC-MS measurements show high specificity. No interfering with other Wolmanit CX co-formulants observed.	Level 1 (3.83 % w/w): 91.1 – 102.5 Level 2 (4.58 % w/w): 101.2 – 105.7	Level 1 (3.83 % w/w): 98.1 Level 2 (4.58 % w/w): 102.9	Level 1 (3.83 % w/w): 4.37 Level 2 (4.58 % w/w): 2.02	The method is working with a dilution of the wood preservative and its LoQ is several orders of magnitude lower than the test concentration.	Anonymous 2019a

*As the LOQ values of the active substances and SoCs are significantly lower than the respective concentration in the products, the LOQ values are not considered as relevant.

Analytical methods for monitoring

Reference is made to the assessments reports for the active substances Cu-HDO [Austria 2013], basic copper carbonate [France 2011] and boric acid [Netherlands 2009].

Analytical methods for soil

Reference is made to the assessments reports for the active substances Cu-HDO [Austria 2013], basic copper carbonate [France 2011] and boric acid [Netherlands 2009].

Analytical methods for air

Reference is made to the assessments reports for the active substances Cu-HDO [Austria 2013], basic copper carbonate [France 2011] and boric acid [Netherlands 2009].

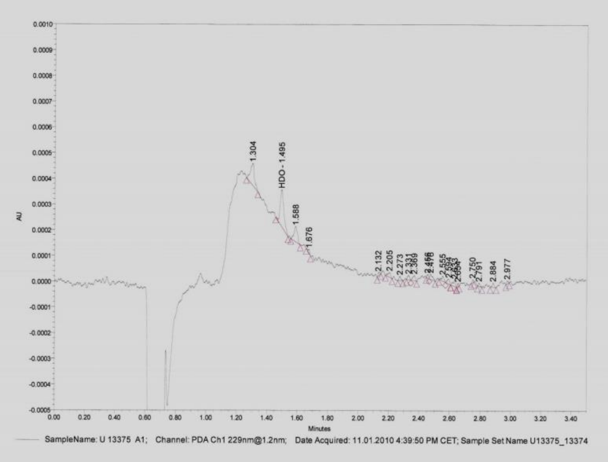
Analytical methods for water

Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**				**Limit of quantification (LOQ) or other limits**	**Reference**
					fortification levels	Range	Mean	RSD		
Cu-HDO	UPLC-UV method	3 fortification levels: 3.2 µg/L; 12.9 µg/L; 64 µg/L 5 measurements per level	Content Cu-HDO [µg/L] = 0.01369x - 0.086 correlation coefficient R^2=0.9999 4 calibration levels 6.4- 129 µg Cu-HDO/L	No significant interfering peaks of the matrix water at the retention time of Cu-HDO were observed. With regard to the range of the presented method the influence of the matrix of water can be disregarded.	3.2 µg/L	101.9% to 111.8%	106.4%	3.3 %.	LOD: 1.7 µg Cu-HDO/L LOQ is 2.8 µg Cu-HDO/L	Anonymous 2014ab
					12.9 µg/L	95.5 % to 97 %	96.2 %	0.7 %		
					64 µg/L	97.5 % to 99.1 %	98.1 %	0.6 %		

Cu-HDO	UPLC-DAD	3 fortification levels: 0.05 / 0.1 / 0.2 µg/L	Content Cu-HDO [µg/L] = =82.914x + 0.975 correlation coefficient R^2=0.9998 6 calibration levels (10 to 100 µg Cu-HDO/L)*	No significant interfering peaks of the tap water matrix water were observed at the retention time of Cu-HDO. The influence of the tap water matrix can be disregarded for the range of the presented method.	0.05 µg/L	53 – 83 %	66 %	17 %	LOD: 0.05 Cu-HDO/L LOQ: 0.1 µg Cu-HDO /L	Anonymous 2015m
					0.1 µg/L	67 – 94 %	80 %	14 %		
					0.2 µg/L	71 – 85 %	81 %	6 %		

*Linearity for the UPLC-DAD measurement was given between 10 – 100 µg/L without SPE. The method contains a concentration step using SPE before the analysis, which corresponds to a factor of 40 (from 400 ml of water, 10 ml of sample are available after the SPE) and thus calibration of the method can be regarded as linear even at low concentrations near LOQ. The linear range and LOQ refer to different samples, i.e. concentration in the injected sample and concentration of the water sample, respectively.

A refined analytical method for the determination of Cu-HDO as summarised in the table above is available. The limit of quantification of this refined method amounts to 2.8 Cu-HDO/L. The method shows excellent linearity in the range from 6.4 to 129 µg Cu-HDO/L. The LOQ is below this range, but analysis at the lowest level (3.2 µg Cu-HDO/L) with the calibration curve 6.4 to 129 µg Cu-HDO/L gave excellent recovery and precision. This, in turn, is only possible if the calibration is linear even at this low concentration. Moreover, water spiked with 3.2 µg Cu-HDO /L demonstrates a baseline separation, which indicates excellent selectivity at low Cu-HDO concentrations (cf. UPLC-UV chromatogram at a wavelength of 229 nm below):



The method has further been refined. The UPLC-DAD method in combination with solid phase extraction allows to determine traces of Cu-HDO in tap water with respect to the parametric value of Directive 98/83/EC (EU drinking water directive). The described solid phase extraction method can be applied to control the concentration of Cu-HDO in tap water at a level of 0.1 µg/L. Recoveries were determined to be 80 ± 14% at this concentration. Minimum concentrations of Cu-HDO in tap water that can be detected using this method, are in the range of 0.05 µg/L. Regarding to active substances basic copper carbonate and boric acid, reference is made to the assessment reports France 2011 and Netherlands 2009, respectively.

Analytical methods for animal and human body fluids and tissues

These analytical methods are only required where an active substance is classified as toxic or highly toxic, which is not the case for the used active substances Cu-HDO, basic copper carbonate and Boric acid. Reference is also made to the assessments reports for the named active substances.

Analytical methods for monitoring of active substances and residues in food and feeding stuff

Not necessary. No direct contact of Cu-HDO with food and feeding stuff is expected. See also document IIA of Cu-HDO assessment report.

2.2.5 Efficacy against target organisms

2.2.5.1 Function and field of use

The Wolmanit CX-10_family is composed of three Meta SPC levels which are comprised of the following four products: Wolmanit CX-10 (Meta SPC 3), Wolmanit CX-8 (Meta SPC 1), Wolmanit CX-8N (Meta SPC 1) and Wolmanit CX-8(9176) (Meta SPC 2). All four wood preservatives are based on the same active ingredients Copper(II) carbonate-copper(II) hydroxide (1:1), bis(N-cyclohexyl-diazenium-dioxy)-copper and boric acid.

In Wolmanit CX-10 the concentration of each active is a factor 1.25 higher than in the Wolmanit CX-8 products. Wolmanit CX-10 contains 16.3% copper(II) carbonate-copper(II) hydroxide (1:1), 3.5% bis(N-cyclohexyl-diazenium-dioxy)-copper and 5.0 % boric acid. The total copper content of the formulation is 10%.

Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) contain 13.04% copper(II) carbonate-copper(II) hydroxide (1:1), 2.8% bis(N-cyclohexyl-diazenium-dioxy)-copper and 4.0 % boric acid. The total copper content of the formulations is 8%.

From the active ingredient point of view Wolmanit CX-10 corresponds to an 1.25 fold concentrated version compared to Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8(9176), respectively Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8(9176) correspond to an 80% dilution of Wolmanit CX-10.

The products of the Wolmanit CX-10 family are intended for industrial users only. The field of use envisaged covers the preventive protection of timber for interior and exterior use (use classes 1 to 4), timber with ground and water contact. Scope of application is the preventive protection of wood and constructional timber against wood-destroying fungi including those causing soft-rot as well as insects including termites. The products are delivered as concentrate and are diluted with water to a suitable working concentration before application. The degree of dilution is depending on the wood species, type of wood product and the intended use of the treated wood.

2.2.5.2 Organisms to be controlled and products, organisms or objects to be protected

Wood-destroying fungi including those causing soft rot as well as wood-destroying insects including termites. The product is not effective against blue-stain and mould:

I.1 Fungi

I.1.1.1 Basidiomycetes

I.1.1.2 Soft rot fungi

I.2 Insecta

I.2.1 Coleoptera (wood boring beetles)

I.2.1.1 *Hylotrupes bajulus*

I.2.1.2 *Anobium punctatum*

I.2.1.4 *Lyctus brunneus*

I.2.2 Isoptera .sp

I.2.2.1 Sub-terranean termites

The PT 08 product is for the preservation of structural timber for interior and exterior use, for timber with ground and water contact, in particular for timber used in horticulture and landscape gardening, posts, poles, vine support, fences, palisades, playground equipment and wood paving.

2.2.5.3 Effects on target organisms, including unacceptable suffering

Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) show fungicidal and insecticidal effects. The products prevent the development of wood destroying organisms by inhibition of their metabolism after contact and/or ingestion.

2.2.5.4 Mode of action, including time delay

Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) prevent the development of the wood destroying organisms by contact or ingestion (inhibition of metabolism), no time delay.

The active substances Cu-HDO, basic Copper carbonate and boric acid are used as fungicides and insecticides. The products of the Wolmanit CX-10_family shall be used for treatment of wood in use classes 1 – 4. The Wolmanit CX-10_family products prevent the development of wood destroying organisms by inhibition of their metabolism after contact and/or ingestion. The effect on the target organisms to be controlled and the molecular mode-of-action can be deduced from the respective properties of the active substances of the products.

According to the CA-Report of Cu-HDO (AT, 2013) and basic Copper Carbonate (FR, 2011) these active substances belong to the group of copper biocides and inhibit enzymatic activity in fungi. Upon contact with the fungicide the spores passively take up copper II cations which hinder their germination. Copper II cations have a high binding affinity to amino- and carboxyl-groups and therefore act on many sites in the fungal metabolism. They combine with the sulfhydryl groups of amino acids and with carboxyl groups of the cell or membrane proteins. These reactions are unspecific and varied. Metabolism is interrupted through inhibition of many enzyme reactions. Copper II cations compete with other metals and their derivatives in the cell through chelation.

Amongst others the influence of copper II cations in the organism causes unspecific denatura-tion of proteins and enzymes. That is why it also acts as feeding and cell poison for insects (CA Report of Basic Copper Carbonate).

Information from the IRAC project is not available indicating that no insecticidal resistance is known by copper compounds.

According to the CA-Report of boric acid (NL, 2009) the mode of action is the following:

Fungicide: Inhibition of metabolism Insecticide: Stomach action (disrupts metabolic pathways). For all boron species, solutions will contain undissociated boric acid $B(OH)_3$, borate ions $B(OH)_4$-, alkali metal ion-pair complexes and possibly polynuclear boron complexes. Amounts of each of these compounds depend on pH, boron concentration and concentrations of alkali metals (Na, K). Primary mode of action is the interaction of the borate anion $B(OH)_4$- with polyols of biological significance e.g. oxidised co-enzymes (NAD+, NMN+ and NADP+).

The IRAC MoA Classification for boric acid is: "Miscellaneous non-specific (multi-site) inhibitor"

2.2.5.5 Efficacy data

The efficacy of the Wolmanit CX-10_family Meta SPC 1-3 (Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176)) was tested by internationally recognized and/or accredited laboratories.

Biological testing of the Wolmanit CX-10_family was conducted with the following formulations: "Wolmanit CX-10", "LP 11920" (laboratory code for Wolmanit CX-10), "Wolmanit CX-10 (80%)", "Wolmanit CX-LP 13632b" (laboratory code for Wolmanit CX-8), "Wolmanit CX-LP13492" (laboratory code for Wolmanit CX-10, "Wolmanit CX-LP 14781" (laboratory code for Wolmanit CX-8WB) and "Wolmanit CX-LP 15687" (laboratory code for Wolmanit CX-8N).

All the tested formulations contain the three active ingredients Copper(II) carbonate-copper(II) hydroxide (1:1), Bis(N-cyclohexyl-diazenium-dioxy)-copper and boric acid. As indicated previously the concentration of each active ingredient in the Wolmanit CX-10 formulation types (total copper content of 10%) is a factor 1,25 higher than in the Wolmanit CX-8 formulation types (total copper content of 8%). The formulation`s additives are in a large extend the same but there are slight differences in the combinations used in each product. The results of the different tests carried out (especially the results from the EN 113, ENV 807 and the termite tests) show that the efficacy of the products is irrespective of the formulation additive combination used and demonstrate that the slight differences do not affect the efficacy of the products. The formulations additives used do not have any fungicidal or insecticidal properties so that the results of the tests can be transposed between the different products. The argumentation has up to now been accepted in all countries in which the products have been authorised.

The test results are listed in Table "Experimental data on the efficacy of the biocidal product against target organism(s)" (see below). Eleven studies according to EN Standards and two studies according to Australian standards are provided to demonstrate the efficacy of the Wolmanit CX-10_family.

The results of the EN 113, ENV 807, EN 47 and EN 117 tests confirm the preventive efficacy of the Wolmanit CX-10_family against wood destroying fungi (brown rot, white rot, soft rot) and wood destroying insects including termites. Tests were conducted in combination with evaporating and/or leaching procedures (EN 73 and EN 84).

The critical values for the Wolmanit CX-10_family in each of the use classes 1, 2, 3, and 4 as defined in EN 335-1 were calculated according to EN 599-1.

Use class 1

Wood preservative products to be applied in use class 1 shall be effective against specific or all wood-boring beetles as specified in 599-1. The Wolmanit CX-10_family is effective against all wood boring beetles. As stipulated in EN 599-1 (6.1 c), the tests were carried out with the representative beetle species, the "Longhorn beetle" (*Hylotrupes bajulus*), which is the most tolerant beetle against copper containing preservatives.

Becker (1967) evaluated the efficacy of copper compounds and copper containing wood preservatives against *Hylotrupes bajulus*. He found that a solution of $CuSO_4$ had a preventive efficacy against newly hatched larvae of *Hylotrupes bajulus* at a concentration of 0.25% to 0.4% (Table 2, page 417). Harrow (1954) determined the effective concentration of $CuSO_4$ solution against newly hatched larvae of *Anobium punctatum* and found a concentration between 0.1% and 0.25% to be effective (page 418 of Becker (1967)). Becker (1967) and Harrow (1954) also tested the efficacy of CC preservatives against newly hatched larvae of *Hylotrupes bajulus* and *Anobium punctatum* and determined toxic values similar to those for $CuSO_4$ (Fig. 4, page 420 and page 419 of Becker (1967)). In all tests, *Hylotrupes bajulus* was more tolerant to copper than *Anobium punctatum*. This was also stated by Becker (1964) (page 180 below Fig. 5): "*Anobien- and Lyctus-Eilarven sind giftempfindlicher als die viel größeren Hausbock-Eilarven. Schutzmittel, die gegen letztere ausreichend vorbeugend wirksam sind, müssen sich auch gegen Anobien and Lyctus-Arten bewähren*." Translation: „Newly hatched larvae of *Anobium* and *Lyctus* are more susceptible to toxins than the much bigger newly hatched larvae of a longhorn beetle. Preservatives, having sufficient preventive efficacy against the latter, will also prove themselves against species of *Anobium* and *Lyctus*."

The above mentioned literature data of Becker 1967, Becker 1964 and Harrow 1954 have been included to allow a waiving due to a read across between the dossier and the respective literature data (see reference list table 102 sorted by author name).

To determine the critical value for use class 1, the results from the EN 47 + EN 73 (carried out with LP 11920) need to be considered only. The toxic values were 1.8 kg/m³ - 2.9 kg/m³. The derived biological reference value against *Hylotrupes bajulus* was 2.4 kg/m³ (Ref.: B 6.7-08). In this case the critical value for use class 1 is identical with the biological reference value. The critical value and the minimal retention for use class 1 is 2.4 kg/m³ for Wolmanit CX-10. For the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) - a factor of 1.25 must be applied. The minimal retention for these products amounts to 3.0 kg/m³.

Use class 2

The critical value for use class 2 must be derived from the critical value of use class 1 and the biological reference value determined by an additional test conducted with basidiomycetes on test specimens that were treated by an evaporative ageing procedure (EN 73). Two additional tests for the Wolmanit CX-10_family were conducted: an EN 113 + EN 73 test carried out with Wolmanit CX-10 (Ref.: B 6.7-01) and an EN 113 + EN 73 test carried out with Wolmanit CX-LP 15687 (=Wolmanit CX-8N) (Ref.: B 6.7-03).

The result of the EN 113 + EN 73 test with Wolmanit CX-10 (Ref.: B 6.7-01) leads to a biological reference value against wood destroying basidiomycetes (excluding *C. versicolor*) < 4.8 kg/m³ (against *Coniophora puteana* and *Poria placenta*).

The biological reference value against the brown rotting fungi is confirmed by the test carried out with Wolmanit CX-LP 15687 (=Wolmanit CX-8N). The biological reference value determined in this additional test was < 5.39 kg/m³ (against *Poria placenta*, Ref.: B 6.7-03).

The critical value for use class 2 is identical with the highest biological reference value determined in the tests stated above.

The critical value and minimal retention for use class 2 is therefore 4.8 kg/m³ for Wolmanit CX-10_family). For the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8(9176) - the critical value and minimal retention amount to 5.39 kg/m³.

Use class 3

The critical value for use class 3 must be derived from the critical value of use class 2 and biological reference values that have been determined in additional test with beetles and basidiomycetes on test specimens that were treated by a leaching procedure (EN 84). Several additional tests were carried out for the Wolmanit CX-10_family: an EN 47 + EN 84 (conducted with LP 11920 (Ref.: B 6.7-05), an EN 113 + EN 84 (conducted with Wolmanit CX-10, Ref B 6.7-01) and an EN 113 + EN 84 (conducted with Wolmanit CX-LP 15687, Ref.: B 6.7-02).

From the result of the EN 47 + EN 84 test with LP 11920 (Ref.: B 6.7-05) a biological reference value of < 1.8 kg/m³ can be derived.

The result of the EN 113 + EN 84 test with Wolmanit CX-10 (Ref.: B 6.7-01) leads to a biological reference value against wood destroying basidiomycetes (excluding *C. versicolor*) of < 4.8 kg/m³ (against *Gloeophyllum trabeum*).

The biological reference value against the brown rotting fungi is confirmed by the test carried out with Wolmanit CX-LP 15687 (=Wolmanit CX-8N). The biological reference value determined in this test was < 5.26 kg/m³ (against *Gloeophyllum trabeum*, Ref.: B 6.7-02).

The critical value for use class 3 is identical with the highest biological reference value determined in the tests stated above.

The minimal retention for Wolmanit CX-10 in use class 3 is 4.8 kg/m³ (identical to the critical value for use class 2). For the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) – the critical value and the minimal retention amount to 5.4 kg/m³ (identical to the critical value for use class 2).

Use class 4

The critical value for use class 4 is derived from the critical value of use class 3 and additional tests carried out on test specimens that were treated by a leaching procedure (EN 84) and subsequently subjected to attack by basidiomycetes (including *Coriolus versicolor*) or soil inhibiting microorganisms (test according to ENV 807). The following additional tests were performed: an EN 113 + EN 84 conducted with Wolmanit CX-10, (Ref.: B 6.7-01) and three ENV 807 conducted with Wolmanit CX-8 (Ref.: B 6.7-04), Wolmanit CX-8F (Ref.: B 6.7-06) and Wolmanit LP 14781 (Ref.: B 6.7-05).

The toxic values of the EN 113 + EN 84 test with Wolmanit CX-10 (Ref.: B 6.7-01) including *C. versicolor* on beech were 4.3 – 6.6 kg/m³. According to EN 599-1 (5.1.3) the biological reference value is identical with the mid toxic value, because the mean mass loss of the lower toxic value was lower than 10% (w/w). This leads to a biological reference value of 5.5 kg/m³ for Wolmanit CX-10. For the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) a factor of 1.25 must be applied. The minimal retention for these products amounts to 6.9 kg/m³. The test with *Coriolus versicolor* was performed on beech only, because white rot fungi are much more aggressive on hardwoods than on softwood. *Coriolus versicolor* is described as one of the most destructive wood decay fungi on beech wood (Schmidt 1994). This is also reflected in paragraphs 5.1.2 and 8.6.3 of the test standard EN 113. A test carried out on beech wood fulfils the validity criteria only, if a mass loss of at least 20% is reached in the untreated control- and in the virulence specimens. For pine, this validity criterion is reduced to 15%. Testing of the wood preservative on a hardwood substrate therefore presents a worst-case situation.

The biological reference value of Wolmanit CX-8 determined in the ENV 807 test (Ref.: B 6.7-04) was 11.81 kg/m^3 and calculated as shown below.

Table 1: biological reference value of Wolmanit CX-8

	solution concentration % (m/m)	mean preservative retention kg/m^3	mean corrected loss in mass %				loss in mass test product = 3% loss in mass for ref product %	n.r.P
			8	16	24	32		
CC-Ref	0,10	0,70	0,00	3,03	6,29	10,73		
	0,16	1,19	0,00	2,27	3,83	14,71		
	0,25	1,87	0,00	0,44	5,33	7,98		
	0,40	3,05	0,00	0,00	0,20	2,15		
CX-8	0,00	0,00	0,00	5,12	10,78	15,89		
	0,16	1,22	0,00	6,73	6,27	13,62	6,49	
	0,25	1,89	0,00	1,73	5,77	10,36	3,85	2,76
	0,40	3,03	0,00	0,66	4,62	9,64	2,73	
	0,63	4,80	0,00	0,12	1,32	2,95	0,75	
	1,00	7,88	0,00	0,00	0,73	1,18	0,38	

Table showing the mass losses of the reference preservative and test product Wolmanit CX-8 after various test periods (data from Ref.: B 6.7-04).

According to ENV 807 a nominal effective retention of the reference preservative (n.r.R.) of 1.87 kg/m^3 must be selected. Time periods **a** and **b** are 16 and 24 weeks respectively.

Calculation of the nominal effective retention of the test preservative (n.e.r.):

Selection of the nominal effective retention of the reference preservative (n.r.R.): 1.87 kg/m^3

a = 0.44 %

b = 5.33 %

c_1 = 1.73 %, c_2 = 0.66 %

d_1 = 5.77 %, d_2 = 4.62 %

W_1 = 3.85 %, W_2 = 2.73 %

R_1 = 1.89 kg/m^3, R_2 = 3.03 kg/m^3

Nominal retention of the test preservative (n.r.P.): 2.76 kg/m^3

Nominal effective retention of the test preservative (n.e.r.) = 2.76 kg/m^3 / 1.87 kg/m^3 * 8 kg/m^3 = 11.81 kg/m^3

The biological reference value of Wolmanit CX-LP 14781 determined in the ENV 807 test (Ref.: B 6.7-05) was 10.87 kg/m^3 and calculated as shown below.

Table 2: biological reference value of Wolmanit CX-LP 14781

	solution concentration % (m/m)	**mean preservative retention** kg/m^3	**mean corrected loss in mass** %				**loss in mass test product = 3% loss in mass for ref product** %	**n.r.P**
			8	**16**	**24**	**32**		
CC-Ref	0,10	0,70	0,00	3,03	6,29	10,73		
	0,16	1,19	0,00	2,27	3,83	14,71		
	0,25	1,87	0,00	**0,44**	**5,33**	7,98		
	0,40	3,05	0,00	0,00	0,20	2,15		
LP 14781	0,00	0,00	0,00	5,12	10,78	15,89		
	0,16	1,22	0,00	1,75	6,95	9,34	**4,47**	
	0,25	1,91	0,00	**1,75**	**6,24**	11,40	**4,10**	**2,54**
	0,40	3,02	0,00	**0,01**	**4,12**	6,19	**2,16**	
	0,63	4,78	0,00	0,00	0,16	2,86	**0,08**	
	1,00	7,45	0,00	0,00	0,03	0,64	**0,02**	

Table showing the mass losses of the reference preservative and test product Wolmanit CX-LP 14781 after various test periods (data from Ref.: B 6.7-05).

According to ENV 807 a nominal effective retention of the reference preservative (n.r.R.) of 1.87 kg/m^3 must be selected. Time periods **a** and **b** are 16 and 24 weeks respectively.

Calculation of the nominal effective retention of the test preservative (n.e.r.):

Selection of the nominal effective retention of the reference preservative (n.r.R.): 1.87 kg/m^3

a = 0.44 %

b = 5.33 %

c_1 = 1.75 %, c_2 = 0.01 %

d_1 = 6.24 %, d_2 = 4.12 %

W_1 = 4.10 %, W_2 = 2.16 %

R_1 = 1.91 kg/m^3, R_2 = 3.02 kg/m^3

Nominal retention of the test preservative (n.r.P.): 2.54 kg/m^3

Nominal effective retention of the test preservative (n.e.r.) = 2.54 kg/m^3 / 1.87 kg/m^3 * 8 kg/m^3 = 10.87 kg/m^3

The biological reference value of Wolmanit CX-8F determined in an ENV 807 test (Ref.: B 6.7-06) was 10.7 kg/m^3 and calculated as shown below.

Table 3: biological reference value of Wolmanit CX-8F

	solution concentration % (m/m)	**mean preservative retention** kg/m^3	**mean corrected loss in mass** %				**loss in mass test product = 3% loss in mass for ref product** %	**n.r.P**
			8	**16**	**24**	**32**		
CC-Ref	0,10	0,70	0,00	3,03	6,29	10,73		
	0,16	1,19	0,00	2,27	3,83	14,71		
	0,25	1,87	0,00	0,44	5,33	7,98		
	0,40	3,05	0,00	0,00	0,20	2,15		
CX-8F	0,00	0,00	0,00	5,12	10,78	15,89		
	0,16	1,26	0,00	4,16	8,23	11,74	6,29	
	0,25	1,92	0,00	1,74	6,39	6,59	4,17	2,50
	0,40	3,09	0,00	0,21	3,27	6,47	1,81	
	0,63	4,85	0,00	0,01	0,95	1,80	0,50	
	1,00	7,71	0,00	0,00	0,15	0,06	0,08	

Table showing the mass losses of the reference preservative and test product Wolmanit CX-8F after various test periods (data from Ref.: B 6.7-06).

According to ENV 807, a nominal effective retention of the reference preservative (n.r.R.) of 1.87 kg/m^3 must be selected. Time periods **a** and **b** are 16 and 24 weeks respectively.

Calculation of the nominal effective retention of the test preservative (n.e.r.):

Selection of the nominal effective retention of the reference preservative (n.r.R.): 1.87 kg/m^3

a = 0.44 %

b = 5.33 %

c_1 = 1.74 %, c_2 = 0.21 %

d_1 = 6.39 %, d_2 = 3.27 %

W_1 = 4.17 %, W_2 = 1.81 %

R_1 = 1.92 kg/m^3, R_2 = 3.09 kg/m^3

Nominal retention of the test preservative (n.r.P.): 2.50 kg/m^3

Nominal effective retention of the test preservative (n.e.r.) = 2.50 kg/m^3 / 1.87 kg/m^3 * 8 kg/m^3 = 10.695 kg/m^3

The results from the ENV 807 tests carried out with the boron free formulations Wolmanit LP 14781 and Wolmanit CX-8F can be used as worst-case to confirm the efficacy of the products from the Wolmanit CX-10_family. The addition of boron can only increase the fungicidal efficacy.

The nominal effective retentions obtained in the three soft rot tests (ENV 807) are nearly the same: 11.81 kg/m³, 10.87 kg/m³ and 10.695 kg/m³. The results of the studies confirm clearly that the slight difference in the formulation additives does not have any influence on the efficacy of the formulations. The results of the provided tests can be transposed within the different products of the Wolmanit CX-10_family.

The critical value for use class 4 is identical with the highest biological reference value determined in the tests stated above. The minimal retention for use class 4 is 11.8 kg/m³ for Wolmanit CX-8 formulation types (Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176). For Wolmanit CX-10, a factor of 0.8 must be applied giving a critical value of 9.44 kg/m³.

Termites

To test the efficacy of the Wolmanit CX-10_family against termites, EN 117 tests with *Reticulitermes santonensis* have been carried out using test specimens that were subjected to an evaporating procedure according to EN 73 or to a leaching procedure according to EN 84. Tests carried out for the Wolmanit CX-10_family are:

EN 117 + EN 73 conducted with LP 11920, (Ref.: B 6.7-10) and EN 117 + EN 84 (conducted with Wolmanit CX-10 (80%), Ref.: B 6.7-09). The efficacy against termites is confirmed by two additional studies carried out in Australia using termites of the species *Mastotermes darwiniensis* and *Coptotermes acinaciformis* being much more virulent than the European termites of the species *Reticulitermes santonensis.* In addition, the EN 117 + EN 73 conducted with Wolmanit CX-LP 14781 (Ref.: B 6.7-11) a similar formulation containing the same active ingredients as Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) but without boric acid can be used as worst-case study to support the termiticidal efficacy of the Wolmanit CX-10 product family.

Wolmanit CX-10, as an 80% solution, was tested according to the European standard EN 117 against the termite species *Reticulitermes santonensis* (Ref.: B 6.7-09). Test specimens were subjected to the leaching procedure EN 84 prior to conduction of the EN 117 test. The toxic value determined in this EN 117 test after leaching was < 8.975 kg/m³, giving a biological reference value (brv) of 9 kg/m³ for the 80% solution of Wolmanit CX-10. For Wolmanit CX-10 the biological reference value is 7.2 kg/m³.

In an additional test, the efficacy of Wolmanit CX-10 (laboratory code LP11920) was examined after conducting the evaporating procedure EN 73 (Ref.: B 6.7-10). The toxic values obtained in the study were 7.4 – 10.86 kg/m³, resulting in a b.r.v of 10.9 kg/m³ for Wolmanit CX-10. To determine the brv of the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) - a factor of 1.25 must be applied. Accordingly, the b.r.v for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) calculates to 13.6 kg/m³.

The EN 117 test with Wolmanit CX-LP 14781 was performed using test specimens that were subjected to an evaporating procedure (EN 73) (Ref.: B 6.7-11). The toxic values of this test were 9.8 kg/m³ – 13.1 kg/m³. A biological reference value of 13.1 kg/m³ can be derived which confirms the biological reference value calculated in the precedent study for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176). For Wolmanit CX-10, the corresponding biological reference value calculates to 10.48 kg/m³.

The highest biological reference value of these three tests was 10.9 kg/m³ for Wolmanit CX-10 corresponding to 13.6 kg/m³ for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176).

The very good termiticidal efficacy of the Wolmanit CX-10 product family was also shown by laboratory and field tests carried out by CSIRO in Australia. Wolmanit CX-10 (as Wolmanit CX-LP 13492) was tested in a laboratory test according to a test protocol of the

Australasian Wood Preservation Committee. This test is carried out with the economically most important termite species in Australia: *Mastotermes darwiniensis* respectively *Coptotermes acinaciformis.* The test is a "no-choice test" and was performed on impregnated test specimens that were subjected to a combined evaporating and leaching procedure prior to testing. Similar to the European standard test method EN 117, test specimens with a size of 15 x 25 x 50 mm³ are used. Test duration was 6 and 8 weeks for *M. darwiniensis* and *C. acinaciformis*, respectively. Both termite species are recognised as very destructive wood destroyers. The untreated control specimens were nearly completely destroyed. *M. darwiniensis* caused a mass loss of 49.1% and *C. acinaciformis* was even more destructive causing a mass loss of von 97.1%. Test specimens treated with a retention of 7.54 kg/m³ Wolmanit CX-10 (as Wolmanit CX-LP 13492) were well protected. *M. darwiniensis* and *C. acinaciformis* caused mass losses of 2.1% and 3.8%, respectively. The critical value and minimal retention for wood preservatives in Australia is set at a mass loss of 5%. Wolmanit CX-10 with a retention of 7.54 kg/m³ fulfils this requirement. Calculation of the retention for the 80% versions of the Wolmanit CX-10_family using the factor 1.25 amounts to 9.43 kg/m³ for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176). This retention is in the same range as determined in the EN 117 / EN 84 test carried out at CIRAD.

A field test carried out according to the „Drum technique" of the assessment protocols of the Australasian Wood Preservation Committee confirmed the very good termiticidal efficacy of the Wolmanit CX-10 product family. In the test, Wolmanit CX-8 (as Wolmanit CX-LP 13632b) was tested. The tests were carried out in the tropical region of the Northern Territory in Australia. Test sites were chosen for the occurrence of the important termite species *M. darwiniensis* and *C. acinaciformis*. All test specimens were treated by an evaporating procedure prior to testing. Wolmanit CX-8 was very effective at the lowest retention tested of 11.6 kg/m³. *M. darwiniensis* and *C. acinaciformis* caused mass losses of 2.6% and 1.1%, respectively. On untreated pine specimens, mass losses of 68.8% respectively 57.8% were determined. The retention of 11.6 kg/m³ corresponds very well with the retentions observed in the EN 117 / EN 73 tests conducted at CIRAD. The tests carried out in Australia confirm the good efficacy of the products of the Wolmanit CX-10_family.

In the tests carried out according to EN 117, the highest biological reference values were obtained after evaporation according to EN 73. Therefore, the critical value against termites for the Wolmanit CX-10 product family must be derived from the tests after evaporative ageing.

For protection against termites in use class 1, 2, 3 and 4, the minimum retention amounts to 10.9 kg/m³ for Wolmanit CX-10. For the 80% versions - Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) - a factor of 1.25 must be applied. The minimal retention for these products amounts to 13.6 kg/m³.

Field test according to EN 252

The EN 599-1 (2013) specifies for each of the five use classes defined in EN 335-1, the biological tests required for evaluating the efficacy of wood preservatives for the preventive treatment of solid timber. Field tests acc. to EN 252 are not obligatorily required for UC 4 but are listed under additional requirements. EN 252 may be required due to local conditions, to support the demands of specifiers or the claims of the manufacturer.

For more important construction products, harmonised standards have been developed under the legislation of the Regulation (EU) No 305/2011 -Construction Product Regulation (CPD) laying down harmonised conditions for the marketing of construction products. In these standards specific requirements concerning the durability of the construction product are determined.

In EN 14081 (2011) "Timber structures –Strength graded structural timber with rectangular cross section–" reference is made to EN15228 but field tests are not required.

Different from that in EN 14229 (2011) "Structural timber – Wood poles for overhead lines" in the section durability for wood preservatives used for the treatment for poles for overhead lines field tests acc. to EN 252 are explicitly required.

For most timber construction-products the recommended retentions in UC 4 for wood preservatives should not be derived from EN 252 but from the biological tests required as obligatory in EN 599.

Wood poles for overhead lines or for other construction products with a very long service life expectation, the in ground (UC 4) retention shall be derived from the EN 599 tests required including EN 252.

The EN 252 test enclosed for the products of the Wolmanit CX-10_family is therefore relevant only for the treatment of wooden poles or when specifiers require EN 252 tests explicitly.

This is even more important as for all timber structures also for the ones, where the requirements have been defined in harmonised standards, timber species with an adequate natural durability could be used as an alternative to timber protected with wood preservatives.

For the classification of wood species in natural durability classes, field tests for use class 4 are not obligatory.

Assessment of EN 252 field test results for Wolmanit CX-10_family

Efficacy tests were carried out with an 80% dilution of Wolmanit CX-10 (Wolmanit CX-8 tested under Laboratory code LP 13632b). The efficacy was tested by "Swedish University of Agricultural Science" according to the field test standard EN 252 "Field test method for determining the relative protective effectiveness of a wood preservative in ground contact". The field test was started in September 1999 in Simlångsdalen, Sweden. Test report (B 6.7-14 TEST REPORT No. 2004-F7) contains the evaluation data after five years exposure of the test stakes. The ratings for each individual stake during the five years of testing are included. This data was used to plot Figure 1. The graph shows the development of the rating for the five test retentions of LP 13632b, the two test retentions of the reference preservative CCA and the untreated control, during five years of testing (Figure 1). After five years of testing stakes treated with 1.3% CCA (9.1 kg/m³) were rated 0.5. Stakes treated with 0.63% (4.6 kg/m³) or 1.25% (9.0 kg/m³) of LP 13632b were rated 3.6 and 0.9, respectively. Stakes treated with 1.875% (13.5 kg/m³) or 2.5% (17.9 kg/m³) were rated 0.5 and stakes treated with 3.5% (25.5 kg/m³) were rated with 0.2. Untreated control stakes were rated 4.

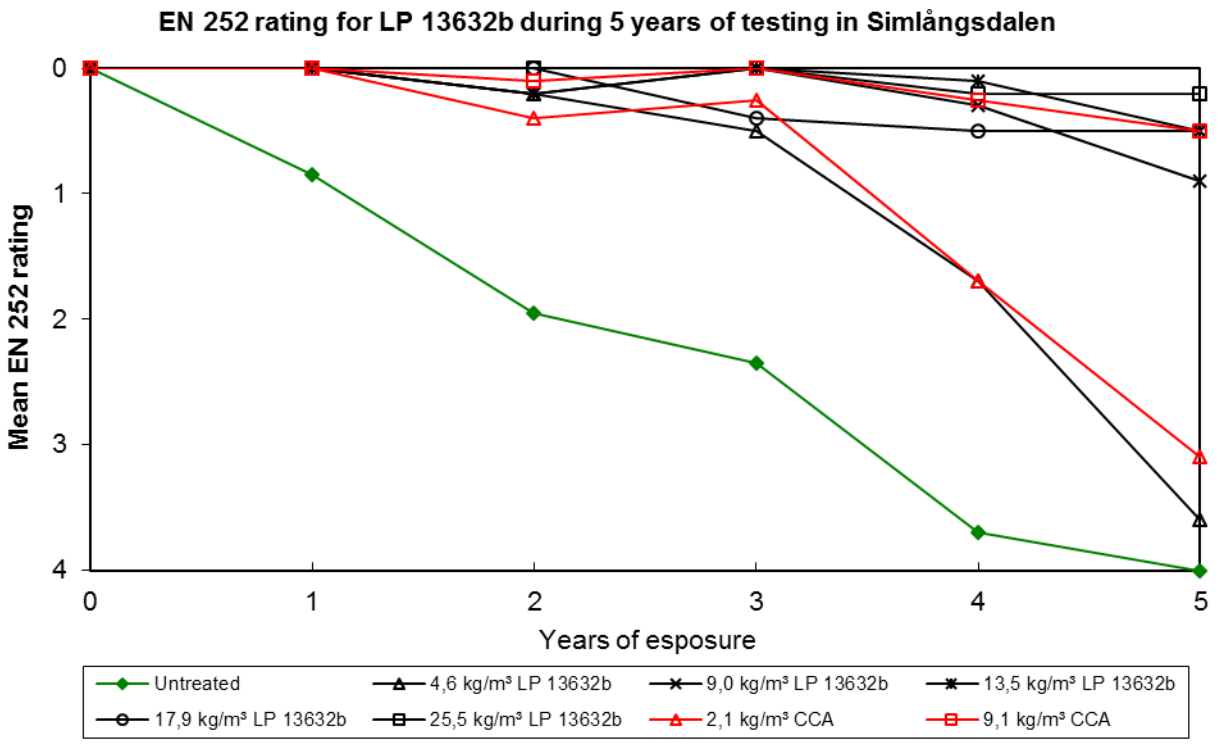


Figure 1: Graph showing the EN 252 rating of stakes treated with LP 13632b, CCA and of untreated control stakes.

The upper biological test value for this EN 252 test was determined according to DIN EN 599-1:2014-03 Section 5.2.27. In short, this value must be derived by plotting the ratings of the test product against those of the reference preservative.

The upper retention of the reference preservative must approximate 9 kg/m³ CCA (cf. DIN EN 252:2014-01 Section 6.1). In the present test, the upper retention of the reference preservative was slightly higher: 9.1 kg/m³. The mean rating at the required upper retention of 9.0 kg/m³ CCA can be derived graphically (Figure 2). This rating is equal to 0.5, therefore the upper biological test value for LP 13632b must be derived from the upper nominal retention of LP 13632b only.

The test data shows that after five years the preservative performs similar at retentions 13.5 kg/m³ and the next higher retention of 17.9 kg/m³ (Figure 2). This result is surprising and not conclusive, because a higher amount of preservative can be expected to perform better. This result can be explained by the failure of one of the stakes treated with 17.9 kg/m³ after three years of testing. At that time, none of the other stakes with this retention showed any sign of decay. Further, during the next two years of testing only one stake showed slight decay (rating 1) confirming the good performance of the preservative at the higher retention of 17.9 kg/m³. It is therefore highly likely, that the failed stake was not treated correctly and does not represent the performance of the preservative. Using the 5 years data, the graphical determination of the upper nominal retention of LP 13632b amounts to 13.2 kg/m³ (Figure 2). The upper biological test value is calculated by dividing the upper nominal retention by 0.75. This value amounts to 17.6 kg/m³. This confirms the observation of the good performance of LP 13632b at a retention of 17.9 kg/m³ in the field test. The upper biological test value of 17.6 kg/m³ is above the nominal effective retention for Wolmanit CX-8 of 11.81 kg/m³ according to the ENV 807 test. This can be explained by the high virulence of the test field Simlångsdalen judged by the severe attack at the untreated controls. In Wolmanit CX-10 the concentration of each active is a factor 1.25 higher than in the Wolmanit CX-8 products. To determine the upper biological test value of Wolmanit CX-10, a factor of 0.8 must be applied giving 14.1 kg/m³.

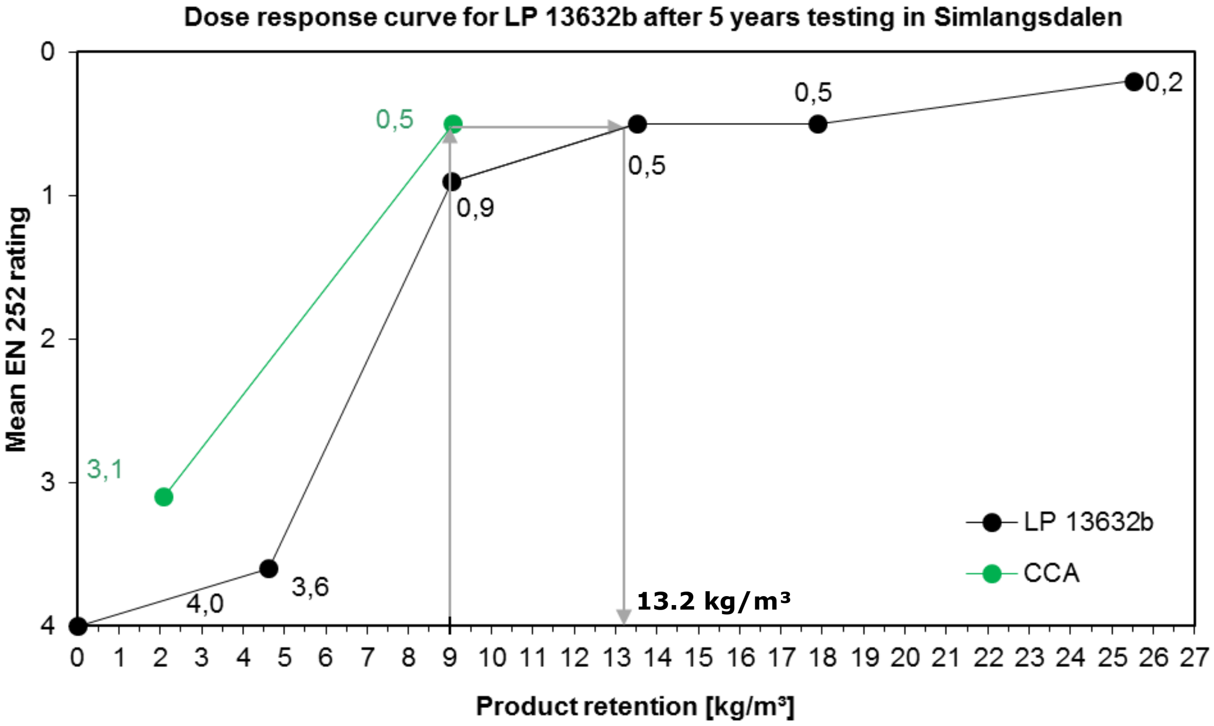


Figure 2: Derivation of the upper nominal retention of LP 13632b after 5 years of testing.

Conclusion on efficacy:

The efficacy tests have shown that the products of the Wolmanit CX-10_family Meta SPC 1-3 provide preventive efficacy against wood-destroying fungi including soft rot as well as against wood-destroying insects including termites.

The applied field of application - Wood preservative for industrial use against wood destroying fungi and insects on internal and external structural timber with and without ground and water contact, in particular for timber used in horticulture and landscape gardening, playground equipment, posts, vine support, fences, palisades and wood paving – is supported by the submitted efficacy tests.

For the insecticidal efficacy, the required tests – EN47 + EN84, EN47 + EN73, EN117 + EN84 and EN117 + EN73 - were provided. The results show that for the efficacy against wood boring beetles a retention of 2.4 kg/m³ is sufficient for Wolmanit CX-10 and a retention of 3.0 kg/m³ is sufficient for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) for the Use Classes 1-4. For the protection against termites, the results of the tests show that a retention of 10.9 kg/m³ is sufficient for Wolmanit CX-10 and a retention of 13.6 kg/m³ is sufficient for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) for the Use Classes 1-4.

For the fungicidal efficacy, the required tests – EN113 + EN84, EN113 + EN73 and ENV807 – were provided. The results show that for the efficacy against brown rot fungi a retention of 4.8 kg /m³ is sufficient for Wolmanit CX-10 and a retention of 5.4 kg /m³ is sufficient for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) for Use Classes 1-4. For the efficacy against white rot fungi, a retention of 5.5 kg/m³ is sufficient for Wolmanit CX-10 and a retention of 6.9 kg/m³ is sufficient for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) for Use Class 4. For the efficacy against soft rot fungi, a retention of 9.44 kg/m³ is sufficient for Wolmanit CX-10 and a retention of 11.8 kg/m³ is sufficient for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) for Use Class 4.

The critical values for Wolmanit CX-10 are summarised in the following table:

Table 4: Product retentions of Wolmanit CX-10 (Meta SPC 3) based on laboratory tests

	Use Class 1	Use Class 2	Use Class 3	Use Class 4
Wood boring beetles	2.4 kg/m³	2.4 kg/m³	2.4 kg/m³	2.4 kg/m³
Termites	10.9 kg/m³	10.9 kg/m³	10.9 kg/m³	10.9 kg/m³
Brown rot fungi		4.8 kg/m³	4.8 kg/m³	4.8 kg/m³
White rot fungi				5.5 kg/m³
Soft rot fungi				9.44 kg/m³

The critical values for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176) are summarised in the following table:

Table 5: Product retentions of Wolmanit CX-8 (Meta SPC 1 & 2) formulations based on laboratory tests

	Use Class 1	Use Class 2	Use Class 3	Use Class 4
Wood boring beetles	3.0 kg/m³	3.0 kg/m³	3.0 kg/m³	3.0 kg/m³
Termites	13.6 kg/m³	13.6 kg/m³	13.6 kg/m³	13.6 kg/m³
Brown rot fungi		5.4 kg/m³	5.4 kg/m³	5.4 kg/m³
White rot fungi				6.9 kg/m³
Soft rot fungi				11.8 kg/m³

Overall, the efficacy of the products has been demonstrated for all intended use classes. Since termites occur only in the southern part of Europe, use against termites will not be needed in all member states. Therefore, a distinction is made between use against fungi and insects including termites and use against fungi and insects without termites.

The critical values for the single products in the Wolmanit CX-10_family in all use classes are summarised in the tables below.

Table 6: Minimum product retentions of Wolmanit CX-10_family products without termite protection

Use class	Critical value (without termite testing)	
	Wolmanit CX-8, Wolmanit CX-8N, Wolmanit CX-8 (9176)	Wolmanit CX-10
1	3.0 kg/m³	2.4 kg/m³
2	5.4 kg/m³	4.8 kg/m³
3	5.4 kg/m³	4.8 kg/m³
4	11.8 kg/m³	9.44 kg/m³

Table 7: Minimum product retentions of Wolmanit CX-10_family products with termite protection

Use class	Critical value (with protection against termites)	
	Wolmanit CX-8, Wolmanit CX-8N, Wolmanit CX-8 (9176)	Wolmanit CX-10
1	13.6 kg/m³	10.9 kg/m³
2	13.6 kg/m³	10.9 kg/m³
3	13.6 kg/m³	10.9 kg/m³
4	13.6 kg/m³	10.9 kg/m³

The retentions for each use classes given in the tables above correspond to the minimum retentions as derived from EN 599. According to the retention requirements mentioned in EN 351-1, additional adjustments can be made to take account of regional variations in building practices and climate as well as the variations in exposure conditions and service life requirements for different treated components within a use class.

According to the available guidance on efficacy (ECHA 2018; chapter 5.5.8.2.2.6): "Because the concept of ESL is not part of the BPR and claims for a specific service life is consequently solely the applicant's responsibility, the applicant must have the right to apply for lower or higher retentions than just the CV up to the retention rate which is limited by the human health and environmental risk assessments." Subsequently it is not required from the efficacy testing strategy to cover the set service life.

In use class 3 without protection against termites, the retention is therefore adjusted and set at 9.0 kg/m³. The retentions range therefore from 4.8 kg/m³ (Wolmanit CX-10) respectively 5.4 kg/m³ (Wolmanit CX-8 products) to 9.0 kg/m³ (Wolmanit CX-10 as well as Wolmanit CX-8 products) without protection against termites.

In use class 4 – normal use without protection against termites, the retention is adjusted and set at 18 kg/m³ for Wolmanit CX-10 and at 22.5 kg/m³ for Wolmanit CX-8, Wolmanit CX-8N and Wolmanit CX-8 (9176). The retentions range therefore from 9.44 kg/m³

(Wolmanit CX-10) respectively 11.8 kg/m³ (Wolmanit CX-8 products) to 18 kg/m³ for Wolmanit CX-10 and 22.5 kg/m³ for the Wolmanit CX-8 products.

In use class 4 – special application such as transmission poles, the minimum retention is de-rived from the lab test and the field test and the maximum retention is adjusted and set at 25.0 kg/m³ for Wolmanit CX-10 and at 31.25 kg/m³ for the Wolmanit CX-8 products. The retentions range therefore from 14.1 kg/m³ (Wolmanit CX-10) respectively 17.6 kg/m³ (Wolmanit CX-8 products) to 25 kg/m³ (Wolmanit CX-10) respectively 31.25 kg/m³ (Wolmanit CX-8 products) with and without protection against termites.

The adjusted retentions correspond to the highest recommended/selected retentions from single specifiers in Europe in order to meet their enhanced expectations for the treated timber regarding its durability within selected frame conditions.

Table 8: Minimum and maximum applied product retentions of Wolmanit CX-10

	Wolmanit CX-10 without protection against termites	Wolmanit CX-10 with protection against termites
1	2.4 kg/m³	10.9 kg/m³
2	4.8 kg/m³	10.9 kg/m³
3	4.8 kg/m³ - 9 kg/m³	10.9 kg/m³
4	9.44 kg/m³ - 18 kg/m³	10.9 kg/m³ - 18 kg/m³
4 special	14.1 – 25 kg/m³	14.1 – 25 kg/m³

Table 9: Minimum and maximum applied product retentions of Wolmanit CX-8 products

	Wolmanit CX-8 products without protection against termites	Wolmanit CX-8 products with protection against termites
1	3 kg/m³	13.6 kg/m³
2	5.4 kg/m³	13.6 kg/m³
3	5.4 - 9.0 kg/m³	13.6 kg/m³
4	11.8 - 22.5 kg/m³	13.6 – 22.5 kg/m³
4 special	17.6 - 31.25 kg/m³	17.6 - 31.25 kg/m³

Table 10: Experimental data on the efficacy of the biocidal product against target organism(s)

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
III.1	PT08	Wolmanit CX-10	EN 113 + EN 84	Test concentrations: 0.63; 1.0; 1.6; 2.5;4.0 % w/w 5 replicates per concentration and per test fungus Wood species (mean density of test specimen): - pine sapwood (490 kg/m^3) - Beech (649 kg/m^3) Exposure time: 16 weeks Validity: mean mass loss of virulence controls: *C. puteana*: 40.3 % *P. placenta*: 35.4 % *G. trabeum*: 38.9 % *C. versicolor*: 44.3% The minimum mass loss in the virulence controls according to EN 113 is achieved. Thus, the test is valid.	*Coniophora puteana* BAM Ebw. 15 *(pine)*	<0.63 % w/w	<4.6 kg/m^3	B 6.7-01
					Poria placenta FPRL 280 *(pine)*	<0.63 % w/w	<4.7 kg/m^3	
					Gloeophyllum trabeum BAM Ebw. 15 *(pine)*	<0.63 % w/w	<4.8 kg/m^3	
					Coriolus versicolor CTB 863A *(beech)*	0.63 – 1.0 % w/w	4.3 – 6.6 kg/m^3	
III.1	PT08	Wolmanit CX-10	EN 113 + EN 73	Test concentrations: 0.63; 1.0; 1.6; 2.5;4.0 % w/w 5 replicates per concentration and per test fungus	*Coniophora puteana* BAM Ebw. 15 *(pine)*	<0.63 % w/w	<4.8 kg/m^3	B 6.7-01
					Poria placenta FPRL 280 *(pine)*	<0.63 % w/w	<4.8 kg/m^3	

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
				Wood species(mean density of test specimen): - pine sapwood(490 kg/m^3) - Beech (649 kg/m^3) Exposure time: 16 weeks Validity according to EN 113: see above.	*Gloeophyllum trabeum* BAM Ebw. 15 *(pine)*	<0.63 % w/w	<4.7 kg/m^3	
					Coriolus versicolor CTB 863A *(beech)*	0.63 - 1.0 % w/w	4.1 – 6.6 kg/m^3	
III.1	PT08	Wolmanit CX-LP 15687 (Wolmanit CX-8N)	ÖNORM EN 113 + ÖNORM EN 84	Test concentrations: 0; 0.68; 0.83; 1.04; 1.31;1.63 % w/w 4 replicates per concentration and per test fungus Wood species (mean density): pine (0.52 g/cm^3) Exposure time: 16 weeks Validity: mean mass loss of virulence controls: *C. puteana*: 34.84 % *P. placenta*: 27.6 % *G. trabeum*: 29.18 % The minimum mass loss in the virulence controls according to EN 113 is achieved. Thus, the test is valid.	*Coniophora puteana* BAM Ebw. 15	< 0.68 % w/w	<5.25 kg/m^3	B 6.7-02
					Gloeophyllum trabeum BAM 109	< 0.68 % w/w	<5.26 kg/m^3	
					Poria placenta FPRL 280	< 0.68 % w/w	<5.15 kg/m^3	
III.1	PT08	Wolmanit CX-LP	ÖNORM EN 113 + ÖNORM	Test concentrations:	*Coniophora puteana* BAM	< 0.68 % w/w	<5.23 kg/m^3	B 6.7-03

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
		15687 (Wolmanit CX-8N)	EN 73	0; 0.68; 0.83; 1.04; 1.31; 1.63 % w/w 4 replicates per concentration and per test fungus Wood species: (mean density): pine (0.52 g/cm^3)Exposure time: 16 weeks Validity: mean mass loss of virulence controls: *C. puteana*: 35.68 % *P. placenta*: 26.82 % *G. trabeum*: 31.94 % The minimum mass loss in the virulence controls according to EN 113 is achieved. Thus, the test is valid.	Ebw. 15			
					Gloeophyllum trabeum BAM 109	< 0.68 % w/w	<5.25 kg/m^3	
					Poria placenta FPRL 280	< 0.68 % w/w	<5.39 kg/m^3	
III.1	PT08	Wolmanit CX-8 (Wolmanite CX-LP 13632b)	ENV 807 + EN 84	Test concentrations: 0,16; 0.25; 0.4; 0.63; 1 % (w/w) 6 replicates per test concentration - Wood species: (mean density): pine (567 kg/m^3) – Exposure: up to 32 weeks.	Soil inhabiting microorganisms	*1.97 % w/w*	11.81 kg/m^3	B 6.7-04
III.1	PT08	Wolmanit CX-LP14781	ENV 807 + EN 84	Test concentrations: 0,16; 0.25; 0.4; 0.63; 1% (w/w) 6 replicates per test concentration	Soil inhabiting microorganisms	*1.81 % w/w*	10.87 kg/m^3	B 6.7-05

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
				Wood species: (mean density): pine (564 kg/m³): Exposure: up to 32 weeks. -				
III.1	PT08	Wolmanit CX-8F	ENV 807 + EN 84	Test concentrations: : 0,16; 0.25; 0.4; 0.63; 1% (w/w) 6 replicates per test concentration Wood species: (mean density): pine (564 kg/m³) Exposure: up to 32 weeks. - Pine:	Soil inhabiting microorganisms	*1.78 % w/w*	10.70 kg/m³	B 6.7-06

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**		**Test results: effects**		**Reference**
							Limit of efficacy / toxic value / threshold value		
							Treating solution	Preservative concentrate	
III.2	PT08	Wolmanit CX-10 (LP 11920)	DIN EN 47 + EN 84	Test concentrations: 0.25; 0.4; 0.63; 1.00 % Application via impregnation Wood species: pine Exposure time: 4 and 12 weeks Test individuals: 30 larvae per concentration Control: 30 larvae in untreated wood The test is valid since only 1 dead larvae was found in the control sample.	Egg larvae of *Hylotrupes bajulus*	4 wks	> 1.00 % w/w	> 7.5 kg/m³	B 6.7-07
					Egg larvae of *Hylotrupes bajulus*	12 wks	< 0.25 % w/w	< 1.8 kg/m³	
III.2	PT08	Wolmanit CX-10 (LP 11920)	DIN EN 47 + EN 73	Test concentrations: 0.25; 0.4; 0.63; 1.00 % Application via impregnation Wood species: pine Exposure time: 4 and 12 weeks Test individuals: 30 larvae per concentration Control: 30 larvae in untreated wood The test is valid since only 1 dead larvae was found in the control sample.	Egg larvae of *Hylotrupes bajulus*	4 wks	> 1.00 % w/w	> 7.2 kg/m³	B 6.7-08
					Egg larvae of *Hylotrupes bajulus*	12 wks	0.25 – 0.40 % w/w	1.8 – 2.9 kg/m³	

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
III.2	PT08	Wolmanit CX-10 (80%)	EN 117 + EN 84	Test concentrations: 1.75; 2; 2.25 % 5 replicates per concentration + 1 untreated control Wood species: pine Exposure time: 8 weeks Test individuals: 3-7 per replicate	*Reticulitermes santonensis*	<1.75 % w/w	<8.975 kg/m³	B 6.7-09
III.2	PT08	Wolmanit CX-10 (LP 11920)	EN 117 + EN 73	Test concentrations: 0; 1; 1.5; 2; 2.5 % 3 replicates per concentration + 1 untreated control Wood species: pine Exposure time: 8 weeks Test individuals: 69-92 per replicate	*Reticulitermes santonensis*	1.0 % – 1.5 % w/w	7.4 kg/m³ - 10.86 kg/m³	B 6.7-10
III.2	PT08	Wolmanit CX-LP 14781	EN 117 + EN 73	Test concentrations: 0 ; 1.1; 1.4; 1.8; 2.3; 3 % 3 replicates per concentration + 3 untreated control replicates Application: vacuum pressure treatment Wood species: pine Exposure time: 8 weeks Test individuals: 250 per test	*Reticulitermes santonensis*	1.4 – 1.8 % w/w	9.8 – 13.1 kg/m³	B 6.7-11

Function	**Field of use envisaged**	**Test substance**	**Test method**	**Test system / concentrations applied / exposure time**	**Test organism(s)**	**Test results: effects**		**Reference**
						Limit of efficacy / toxic value / threshold value		
						Treating solution	Preservative concentrate	
				block				
III.2	PT08	Wolmanit CX-10 as Wolmanit CX-LP 13492	Laboratory bioassay after leaching and evaporation	Test concentrations: 1.64; 2.46; 3.28 % 6 replicates per concentration + control Wood species: *Pinus radiate* sapwood (mean density 460 kg/m³) Exposure time: 6 and 8 weeks Target organisms: 150g mound material from a wild nest per replicate	*Mastotermes darwiniensis and Coptotermes acinaciformis*	1.64 % w/w	7.54 kg/m³ for both termite species	B 6.7-12
III.2	PT08	Wolmanit CX-8 as Wolmanit CX-LP 13632b	Field test according to the drum technique after evaporation	Test concentrations: 1.5; 2.0; 3.0 % 5 replicates per concentration + water control Wood species: *Pinus radiata* Exposure time: 1 year Target organisms: active termite galleries in freshly cut tree stumps	*Mastotermes darwiniensis and Coptotermes acinaciformis*	1.5 % w/w	11.6 kg/m³ for both termite species	B 6.7-13
III.1	PT08	Wolmanit CX-LP 13632b	EN 252	Field test / 0.625 - 1.25 - 1.875 - 2.5 - 3.5 % (w/w) / 5 years 10 replicates (stakes) per concentration	*Soil microorganism*	Upper biological test value Wolmanit CX-8 formulations: 17.6 kg/m³ Upper biological test value Wolmanit CX-10: 14.1 kg/m³		B 6.7-14

Conclusion on the efficacy of the product

The efficacy tests have shown that the products of the Wolmanit CX-10_family provide preventive efficacy against wood-destroying fungi including soft rot as well as against wood-destroying insects including termites. Please find a detailed argumentation supporting the read-across of efficacy data between all product formulations in the confidential annex.

The applied field of application - Wood preservative for industrial use against wood destroying fungi and insects on internal and external structural timber with and without ground and water contact, in particular for timber used in horticulture and landscape gardening, playground equipment, posts, vine support, fences, palisades and wood paving – is supported by the submitted efficacy tests.

Minimum and maximum applied product retentions of Wolmanit CX-10 product

	Wolmanit CX-10 without protection against termites	Wolmanit CX-10 with protection against termites
1	2.4 kg/m³	10.9 kg/m³
2	4.8 kg/m³	10.9 kg/m³
3	4.8 kg/m³ - 9 kg/m³	10.9 kg/m³
4	9.44 kg/m³ - 18 kg/m³	10.9 kg/m³ - 18 kg/m³
4 special	14.1 – 25 kg/m³	14.1 – 25 kg/m³

2.2.5.6 Occurrence of resistance and resistance management

No case of resistance for the intended target species is known. However, fungal strains have been described which exhibit tolerance towards copper. The members of the Wolmanit CX-10_family contain three different active substances against insects and fungi, the target organisms (basic copper carbonate, Cu-HDO and boric acid) so that a resistance development is extremely unlikely.

2.2.5.7 Known limitations

When the products of the Wolmanit CX-10_family are applied in the treatment concentrations and product retentions as recommended for each use class no limitations on efficacy are to be expected. For the efficacy of the wood preservative it is required that the impregnated timber is protected from outdoor weathering during storage for at least 2 days, at temperatures ≤ 5°C for at least 7 days (frost days not to be counted).

2.2.5.8 Evaluation of the label claims

The field of application, the recommended product retentions and the treatment solutions stated on the label for the use classes 1 – 4 reflect the results of the efficacy tests.

2.2.5.9 Relevant information if the product is intended to be authorised for use with other biocidal product(s)

Not necessary. According to the applicant, the products of the Wolmanit CX-10_family are not intended to be authorised for use with other biocidal products.

2.2.6 Risk assessment for human health

2.2.6.1 Assessment of effects on Human Health

General information: The assessment of human health effects is based on the Competent Authority or Assessment Reports of Cu-HDO (Austria, 2013), basic copper carbonate (France, 2011) and boric acid (Netherlands, 2009). For the human health effect assessment of Wolmanit CX-10_family products data on similar tested mixtures were submitted by the applicant. These data were also evaluated during the active substance evaluation of Cu-HDO. Please see the confidential Annex for further justification and "read-across". In addition eCA AT has verified the results of the tested formulations concerning classification with data from individual co-formulants and the active substances. The classification of the mixtures of the Wolmanit CX-10_family is based on all available evidence.

Skin corrosion and irritation

Summary table of in vitro studies on skin corrosion/irritation

No in vitro skin corrosion / irritation studies available.

Summary table of animal studies on skin corrosion /irritation					
Method, GLP, Reliability	**Species, Strain. Sex. No/group**	**Test substance. Vehicle. Dose levels. Duration of exposure**	**Results**		**Reference**
OECD Guideline 404; GLP	New Zealand white rabbits; 3 females	Wolmanit CX-10 (VM 546) 4 h semi-occlusive exposure	**Average score 24, 48, 72h**		B 8.1
			Erythema and eschar	**Edema**	
			2.9 Not reversible	3.4 not completely rev.	
			Severe lesions, deep necrosis; Wolmanit CX-10 is corrosive to skin		

In a skin irritation test the biocidal product Wolmanit CX-10 ("old formulation") displays corrosive properties: 72 hours after exposure, erythema with a score of 4 and edema with a score of 3.7 could be observed. Additional examinations were performed in all animals up to 14 days after the end of exposure. The scars, noted when eschar was at least partly shedded, and thick adhesive crusts, respectively, give evidence for deep necrosis induced by the test substance. In the absence of data for a shorter exposure duration and considering the calculation approach (including one substance of concern classified for category 1B, present with more than 5%) the preparation has to be classified for skin corrosion category 1B "H314 – causes severe skin burns and eye damage" according to Regulation (EC) 1272/2008.

Due to the similar composition of the old and the new Wolmanit CX-10 formulation the results of this study are also valid for the Wolmanit CX-10_family formulations (see composition and read across in the confidential annex).

Summary table of human data on skin corrosion irritation

No human data on skin corrosion irritation available.

Conclusion used in Risk Assessment – Skin corrosion and irritation	
Value/conclusion	The products of the Wolmanit CX-10_family are regarded to be corrosive on skin.
Justification for the value/conclusion	The test formulation showed severe lesions and deep necrosis; effects were non-reversible. Data available on the components of Wolmanit CX-10_family also resulted in the same classification (cf. confidential annex).
Classification of the product according to CLP	Skin corrosion, category 1B, H314 – causes severe skin burns and eye damage (according to Regulation (EC) No 1272/2008).

Eye irritation

Summary table of in vitro studies on serious eye damage and eye irritation

No in vitro studies on serious eye damage and eye irritation available.

Summary table of animal studies on serious eye damage and eye irritation

Method. Guideline. GLP status. Reliability	**Species. Strain. Sex. No/group**	**Test substance. Dose levels.**	**Results** *Average score (24, 48, 72h)/ observations and time point of onset. reversibility*				**Remarks** *(e.g. major deviations)*	**Reference**
			Cornea Opacity	Iris	Redness Conjunctiva	Chemosis		
OECD Guideline 405; GLP	New Zealand White Rabbits 1 female	Wolmanit CX-10 "old" (VM 546)	3.7	1 (24h) at reading times 48 h und 72 h the iris was not discernible due to corneal opacity	3.0	4.0	No major deviations known	B 8.2

When eye irritating features of Wolmanit CX-10 (VM546) were tested, the average score of cornea opacity (after 24, 48 and 72 hours) was greater than 3, which is clearly indicating risk of serious damage to eyes. The test would not have been necessary, since the product showed already corrosion to the skin, which indicates also risk for serious eye damage. The test was carried out in 1994, means a long time before the European biocides review.

With the classification for skin corrosion, the additional label with regard to risk for serious eye damage can be ommited.

Due to the similar composition of the old and the new Wolmanit CX-10 formulations the results of this study are also valid for the actual Wolmanit CX-10 formulation (see composition and read across in the confidential annex).

Summary table of human data on serious eye damage and eye irritation

No human data on serious eye damage and eye irritation available.

Conclusion used in Risk Assessment – Eye irritation	
Value/conclusion	Products of the Wolmanit CX-10_family are expected to provide a risk of serious damage to eyes.
Justification for the value/conclusion	The average score of cornea opacity (after 24, 48 and 72 hours) was greater than 3. Data available on the components of Wolmanit CX-10_family also resulted in the same classification (cf. confidential annex).
Classification of the product according to CLP	With the classification for skin corrosion, serious damage to eyes is implicit as reflected in the hazard statement for skin corrosion. Therefore labelling for risk for serious eye damage can be omitted.

Respiratory tract irritation

Summary table of animal studies on respiratory tract irritation

From the acute inhalation toxicity study and the dermal corrosion/irritation study, a corrosive effect on the respiratory system can be deduced.

Summary table of human data on respiratory tract irritation

No human data on respiratory tract irritation available.

Conclusion used in the Risk Assessment – Respiratory tract irritation	
Conclusion	The products of the Wolmanit CX-10_family are corrosive to the respiratory tract.
Justification for the conclusion	Corrosive effects observed in the acute inhalation toxicity study (see section on acute inhalation toxicity).
Classification of the product according to CLP	EUH071 – corrosive to the respiratory tract. For assignment of STOT SE 3 (H335) please see confidential annex, chapter 3.6.5.

Skin sensitization

Summary table of animal studies on skin sensitisation					
Method. Guideline. GLP status. Reliability	**Species. Strain. Sex. No/group**	**Test substance. Vehicle. Dose levels. Duration of exposure Route of exposure**	**Results** *Number of animals sensitised / total number of animal*	**Remarks** *(e.g. major deviations)*	**Reference**
OECD Guideline 406; GLP	Albino guinea pigs Dunkin Hartley	Wolmanit CX LP 15172 Preparation of test substance: For induction 50%, for challenge 25%	0/20 (24h and 48h after challenge) No allergic reactions could be observed. Other toxicological symptoms could also not be observed. The animals of the control group showed no allergic reactions as well. The sensitivity of the used guinea pig strain was shown by the potency of benzocaine to cause allergic symptoms. “Wolmanit CX LP 15172” is no skin sensitiser	No major deviations known	B 8.3/01
EPA-Guideline OPPTS 870.2600; OECD Guideline 406; GLP	Guinea pigs, Dunkin Hartley; female; 20 animals for the test substance group; 10 animals for the control group.	WOLMANIT LP16067B	No allergic reactions could be observed. Positive control animals: 5/10 animals had a positive response in this test, which is markedly more than the minimum of 15 %, the threshold for classification requested by the guideline. Thus the results confirm both the sensitivity and the reliability of the experimental techniques. "Wolmanit LP 16067 B "is not a skin sensitizer	No major deviations known	B 8.3/02

In a skin sensitisation test (Buehler) performed with Wolmanit CX LP15172, a formulation that is nearly identical with Wolmanit CX-10 (cf. confidential annex), the test animals showed no allergic reactions. Womanit CX-10 does not contain components that are classified for skin sensitization. In conclusion, the test formulation is not skin sensitising. The results of the test can be read-across to products within meta SPC 2 and 3 (cf. confidential annex for further information).

In a second skin sensitisation test (Buehler) performed with Wolmanit CX LP16067B, a formulation similar to products in meta SPC 1, no skin sensitzing effects was observed (cf. confidential annex for further information).

In conclusion, the biocidal products of the Wolmanit CX-10_family are considered not to induce skin sensitisation.

However labelling with EUH208 is necessary to inform already sensitized people for the presence of polyethyleneimine for products in meta SPC 1.

Summary table of human data on skin sensitisation

No human data on skin sensitisation available.

Conclusion used in Risk Assessment – Skin sensitisation	
Value/conclusion	The products of the Wolmanit CX-10_family are not sensitising.
Justification for the value/conclusion	No allergic reactions in skin sensitisation tests.
Classification of the product according to CLP	No classification required. For meta SPC 1: According to CLP Annex II, point 2.8 a labelling is necessary with EUH208 — 'Contains polyethyleneimine. May produce an allergic reaction' for meta SPC 1 products.

Respiratory sensitization (ADS)

Summary table of animal data on respiratory sensitisation

No animal data on respiratory sensitisation available.

Summary table of human data on respiratory sensitisation

No human data on respiratory sensitisation available.

Conclusion used in Risk Assessment – Respiratory sensitisation	
Value/conclusion	Not sensitising.
Justification for the value/conclusion	No component of the Wolmanit-CX products is classified as sensitising to the respiratory tract. Furthermore, in the skin sensitisation studies performed with Wolmanit CX LP 15172 and Wolmanit LP16067B no sensitising effect has been observed.
Classification of the product according to CLP	Not required.

Acute toxicity

The acute toxicity of Wolmanit CX-10 "old formulation" and Wolmanit CX-LP 15172 was tested by the oral and dermal route as well as by the inhalative route. All tests were conducted using rats.

The studies were performed according to GLP and the respective OECD guidelines. The results of these tests can be "read across" to products of the Wolmanit CX-10_family (cf. confidential annex).

Acute toxicity by oral route

Summary table of animal studies on acute oral toxicity

Method Guideline **GLP status, Reliability**	**Species. Strain. Sex. No/group**	**Test substance. Dose levels Type of administration**	**Signs of toxicity** *(nature. onset. duration. severity. reversibility)*	**Value LD50**	**Remarks** *(e.g. major deviations)*	**Reference**
OECD Guideline 401; GLP	Rats, Him:OFA, Sprague Dawley, SPF 5f/group 1 5m+5f/group 2 5f/group 3	Wolmanit CX-10 (VM 546) Dose levels: group 1: 200 mg/kg bw group 2: 447 mg/kg bw group 3: 1000 mg/kg bw	Induction of haemorrhages at various organs and gastrointestinal irritation.	485 mg/kg bw	No deviations known	B 8.5.1

The LD50$_{oral,rat}$ of Wolmanit CX-10 ("old") amounts to 485 mg/kg bw and this indicates the need to classify for acute oral toxicity category 4, H302 – Harmful if swallowed (according to Regulation (EC) No 1272/2008).

The clinical signs found in group 2 were piloerection, incomplete/complete eyelid closure, specific toxic signs, cyanosis, and dyspnoea in the early deaths, sunken flanks, tremor, and sedation.

Pathology (group 2): All males and 1/5 females were normal. In the affected animals, changes of glandular stomach mucosa (detachable covering, redness, swelling, haemorrhages, ulcera) and thymus petechiae were noted in surviving as well as in spontaneously died animals. Intestinal and subpleural pulmonary haemorrhages, a small spleen and exsiccosis were found only in the spontaneously died animals. Changes on stomach mucosa are interpreted by a local irritative effect of the test substance. Several alterations on various organs, i.e. multiple haemorrhages (those on the thymus may be due to agonal asphyxia), small spleen, dark liver surface, and exsiccosis indicate a haemodynamic and vascular disorder. No evidence was found for impaired blood coagulation. The haemodynamic disorder was the cause of early deaths.

Summary table of human data on acute oral toxicity

No human data on acute oral toxicity available.

Value used in the Risk Assessment – Acute oral toxicity	
Value	LD50: 485 mg/kg bw
Justification for the selected value	Result of acute oral toxicity study. Data available on the components of Wolmanit CX-10_family also resulted in the same classification (cf. confidential annex).
Classification of the product according to CLP and DSD	Category 4, H302 – Harmful if swallowed (according to Regulation (EC) No 1272/2008)

Acute toxicity by inhalation

Summary table of animal studies on acute inhalation toxicity

Method. Guideline. GLP status. Reliability	**Species. Strain. Sex. No/group**	**Test substance. form** *(gas. vapour. dust. mist)* **and particle size (MMAD) Actual and nominal concentration. Type of administration**	**Signs of toxicity** *(nature. onset. duration. severity. reversibility)*	**LC50**	**Remarks** *(e.g. major deviations)*	**Reference**
OECD Guideline 403; GLP	Rats, Crl:CD (SD)IGS BR Sprague Dawley 5m+5f / group	Wolmanit CX-LP 15172 4 h exposure by aerosol inhalation (nose only) nominal concentration: 14.4, 26.6, 59.1 [mg/L] analytical concentration: 0.62, 1.23, 1.63 [mg/L]	Findings in life and post mortem indicate toxic / corrosive effects to the lungs. Cause of deaths was probably failure in lung functions.	LC50 [mg/L/4h]: 1.46 (male + female) LC50 [mg/L/4h]: 1.11 (m) LC50 [mg/L/4h]: 1.75 (f)	No deviations known	B 8.5.2

Regarding the inhalative route, an acute inhalation hazard test was carried out with rats (cf. confidential annex for "read across" of tested formulations). The reported $LC50_{inhalative, rat}$ value for both sexes is 1.46 mg/L/4h which leads to classification for acute inhalation toxicity category 4, "H332 – Harmful if inhaled" (according to Regulation (EC) No 1272/2008)

Within this study the most prominent findings were lesions in the lungs. Haemorrhages, congestion, oedema and irritation/destruction was seen in animals of all groups. All other signs, exsiccosis, secret in the mouth and nose, thymus petechiae, a maximally filled urinary bladder, a sanguineus content in the thorax and a small spleen were only observed in spontaneously died animals and may be a sequel of blood loss and the general bad condition caused by the lesions in the lungs. 7 animals of the mid dosed group and 3 of the high dosed one were normal at necropsy. In the surviving animals, a concentration dependent reduction of the weight gain in the first week after the exposure was observed.

The adverse effects described above require in addition labelling with "EUH071 – corrosive to the respiratory tract".

Summary table of human data on acute inhalation toxicity

No human data on acute inhalation toxicity available.

Value used in the Risk Assessment – Acute inhalation toxicity	
Value	LC50 [mg/L/4h]: 1.46 (male + female)
Justification for the selected value	Result of experimental study. Data available on the components in Wolmanit CX-10_family resulted in the same classification (cf. confidential annex)..
Classification of the product according to CLP	Category 4, H332 – Harmful if inhaled (according to Regulation (EC) No 1272/2008) EUH071 – corrosive to the respiratory tract

Acute toxicity by dermal route

Summary table of animal studies on acute dermal toxicity

Method, guideline GLP, reliability	**Species, strain, sex, No/group**	**Test substance, vehicle, dose levels, surface area**	**Signs of toxicity** *(nature, onset, duration, severity, reversibility)*	**LD50**	**Remarks** *(e.g. major deviations)*	**Reference**
OECD Guideline 402; GLP	Rats, Him:OFA, Sprague Dawley, SPF 5m/5f	Wolmanit CX-10 (VM 546) 2000 mg/kg bw 24 h exposure	All animals survived until scheduled termination. The signs in life and post mortem findings indicate no other than local toxic effects attributable to the action of the test substance. Scars indicated corrosion of the skin at the application sites. There are no differences between the sexes in the response to the test substance.	>2000 mg/kg bw	--	B 8.5.3

Wolmanit CX-10 ("old") does not display any acute systemic toxicity by the dermal route: The LD50, dermal, rat is > 2000 mg/kg bw, which is above the concentration range which leads to classification. All animals survived until 14 days post application, but were effected: Chromodacryorrhoea was observed in all animals of both sexes. This sign of general malaise lasted until 1 day p.a. Motor excitation was noted in all animals of both sexes, screaming was observed in 3/5 females. Except for one female, both signs lasted until maximum 1 hour p.a. A blue staining of the skin at the application site was found in all animals of both sexes after patch removal. Redness, swelling, and eschar formation were found at the application sites at both sexes. Redness and swelling diminished mainly within 1 day p.a., but in any case within maximum 4 days p.a. in the remaining animals eschar desquamated within 4 through 10 days after application of the test substance. In 2 of 5 females wounds were observed from 5 days p.a. until the scheduled termination, i.e. 14 days p.a.

One animal of each sex was normal at terminal necropsy. Pulmonary haemorraghes were observed in 2/5 males and in 1/5 females. In the same female a grey-white covering on spleen capsule was found additionally. In 4/5 males and 3/5 females scares were noted at the application sites.

Summary table of human data on acute dermal toxicity

No human data on acute dermal toxicity available.

Value used in the Risk Assessment – Acute dermal toxicity	
Value	LD50, dermal, rat is > 2000 mg/kg bw,
Justification for the selected value	Result of acute dermal toxicity study. Data available on the components of Wolmanit CX-10_family also resulted in the same classification (cf. confidential annex).
Classification of the product according to CLP	No classification required.

Other endpoints: reprotoxicity

As of 17th December 2022 the generic concentration limit for boric acid has to be applied according the DELEGATED REGULATION (EU) 2021/849. Therefore, all products of the Wolmanit CX-10_family are classified with Repr. 1B, H360FD.

Information on dermal absorption

Summary table of in vitro studies on dermal absorption						
Method, guideline, GLP status, reliability	**Species**	**Test substance, doses**	**Absorption data for each compartment and final absorption value**		**Remarks** *(e.g. major deviations)*	**Reference**
OECD 428 GLP, Reliability 1	Human skin from Abdomen	LP 16013 (Wolmanit CX) / Cu-HDO Tested dilution: 2% formulation or 0.06% Cu-HDO		**% of Applied Dose**	no deviations known	B 8.6/01
			Tape strips	6.28		
			Membrane Washing	78.07		
			Sum	**84.36**		
			Skin preparation	**3.92**		
			Absorbed Dose			
			Sum Receptor Samples 0 - 24 h including Wash Out	2.35		
			Receptor Fluid	3.70		
			Receptor Chamber Washing	0.11		
			Sum (after 24 h)	**6.16**		
			Sample Time [h]	**% of Applied Dose**		
			0.5	0.32		
			1	0.76		
			2	1.72		
			4	2.62		
			6	3.10		
			10	3.78		

Summary table of in vitro studies on dermal absorption							
Method, guideline, GLP status, reliability	**Species**	**Test substance, doses**	**Absorption data for each compartment and final absorption value**			**Remarks** *(e.g. major deviations)*	**Reference**
			24		6.00		
OECD 428	Human skin	Wolmanit CX-8 (LT 396) with 4% boric acid Dose: 1:20 / v:v; 10 µL / cm² → target conc.: 2.45 mg $B(OH)_3$/mL, corresponding to 0.43 mg Boron equivalents/mL) → target dose: 4.3 µg/cm² (related to Boron equivalents)	**dose group 1**	**µg Boron**	**% of dose**	no deviations known The mean total recoveries fulfil the quality criteria put forward in the test guidelines. Major amounts of the test substance were detected in the skin wash performed 8 hours after application of the test substance (95.5 ± 5.6 % of dose). In the skin wash performed 24 hours post dosing, the concentration of Boron was < LoQ. 5.2 ± 6.7 % of the applied dose were found in the receptor fluid. In the skin preparation, mean recovery accounted to 0.2 ± 0.6 % of dose. In conclusion, 5.4% ± 7.3 % of the applied boric acid (sum of recovered test substance in receptor fluid and skin preparation) were absorbed into and through human skin under the test conditions used	B 8.6/02
			applied dose	4.3 ± 0.1	100 ± 1.7		
			non-absorbed dose				
			skin washing after 8 hours	4.1 ± 0.3	95.5 ± 5.6		
			skin washing after 24 hours	<LOQ[2]	0.0		
			sum	4.1 ± 0.3	95.5 ± 5.6		
			absorbable dose				
			receptor fluid +	0.2 ± 0.3	5.2 ± 6.7		
			skin preparation	0.01 ± 0.03	0.2 ± 0.6		
			sum	0.2 ± 0.3	5.4 ± 7.3		

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[2] for further calculations, values ⩽ LOQ were set to 0.0

Summary table of in vitro studies on dermal absorption

Method, guideline, GLP status, reliability	**Species**	**Test substance, doses**	**Absorption data for each compartment and final absorption value**			**Remarks** *(e.g. major deviations)*	**Reference**
			total	4.3 ± 0.2	100.9 ± 5.7	after application of 10 µL / cm^2 of an aqueous dilution of the wood preservative LT 396 1:20 / v:v. According to dermal absorption Guidance from EFSA (Buist et al. 2017): to address variability between replicates/animals, in the case of 8 replicates dermal absorption should be calculated as follows: Absorption (mean value) + 0.84 * sample standard deviation = 5.4 + 0.84*7.3 = **11.5% rounded to 12%**	

Dermal absorption properties of Cu-HDO

The in vitro dermal absorption study performed with LP 16013 (Wolmanit CX) has already been evaluated during assessment of Cu-HDO and the representative product Wolmanit CX, which is nearly identical with Wolmanit CX-10 (Austria, 2013).

Dermal absorption data on another (reference) formulation can be used, if the formulation for which dermal absorption needs to be determined is closely related (EFSA, 2017). The justification of the use of data on this similar formulation is detailed in the confidential annex.

Based on the study B 8.6/01 dermal absorption is based on mean values:

Absorption = receptor fluid + receptor chamber washes + skin sample (including tape strips, because they were pooled). According to the EFSA (2017) method a value of 25% is calculated. Tape strip 1 and 2 were included in the calculation because individual analysis were lacking.

The value of **25% dermal absorption** is much higher than the indicative value of 3% from the in vivo rat dermal absorption study (see CAR for Cu-HDO, Austria 2013). This in vivo study is not fully valid because of low recovery rate of 77% with Cu-HDO in Wolmanit CX.

Dermal absorption properties of basic copper carbonate

The following information can be taken over from the assessment report for basic copper carbonate (France 2011):

"It was agreed during the TMIII08 that a dermal absorption of 5% has to be used for diluted solutions and 100% for the concentrated product". This value should be equally applicable for the Wolmanit CX-10_family products and in use concentrations, since the concentrations are similar: Concentrations of products assessed in the CAR for basic copper carbonate were 1% to 15% (=10 to 150 g/L) and for the in-use solutions about 3 to 5 g Cu/L. The value of 5% was determined using a dermal penetration study on an agrochemical product (Cu^{2+} 1.27-1.86%) and in a further study using topical formulations (emulsions or ointments, Cu^{2+} applied 0.13% to 0.05%) (Pirot et al 1996a; 1996b cited in the CAR for basic sopper carbonate).

The decision at the TMIII08 also stated that the dermal penetration values should also be in line with the EU-RAR for copper. In the EU-RAR, a dermal penetration value of 0.3% was agreed at TCNES and by SCHER.

Basic copper carbonate concentration in the Wolmanit CX-10_family products is about 13 to 16% and product in use concentrations are between 1% and 5%, resulting in 1.3 to 6.5 g/L basic copper carbonate or 0.4% to 0.08% Cu^{2+} for the different use classes.

Therefore, the results described above can also be read across to Wolmanit CX-10_family and their aqueous dilutions. Therefore, a **dermal absorption value of 5%** has been choosen for the risk assessment of these products.

Dermal absorption properties of boric acid

To determine the dermal absorption properties of boric acid in Wolmanit CX-formulations a new in vitro test according to OECD 428 has been performed with Wolmanit CX-8 (meta SPC 1). As indicated above a **dermal absorption value of 11.5%** (~12%) can be derived from this study (B 8.6/02). However, the BPF span a wide range of dilutions i.e. UC 4 special application results in a 19-fold dilution, UC 4 normal 27-fold and UC 1 200-fold. With increased dilutions (and thus assumed dermal absorption) the application rates a lower. Therefore, also the "default value" value for boron of 20% was used for higher dilutions.

Please note that the in-use dilutions (treatment or application solutions) are not considered as corrosive to the skin (cf. section 2.2.6.3.1).

Value(s) used in the Risk Assessment – Dermal absorption				
Substance	Cu-HDO	Basic copper carbonate	Boric acid	2-Ethylhexanoic acid and 2-MEA
Value(s)*	100% for concentrate 25% for in-use dilution	100% for concentrate 5% for in-use dilution	100% for concentrate 11.5% (or rounded to 12%) and 20% for in-use dilutions	100% for concentrate 50% for in-use dilution
Justification for the selected value(s)	Overall result of in vitro and in vivo studies	It was agreed during the TMIII09 that a dermal absorption of 5% has to be used for diluted solutions	in vitro study (B 8.6/02) and "default value" for boron	Default values according to EFSA, 2017

Available toxicological data relating to non-active substance(s) (i.e. substance(s) of concern)

Please see confidential appendix.

Available toxicological data relating to a mixture

Products of the Wolmanit CX-10_family are not intended for concomitant use with other products.

2.2.6.2 Exposure assessment

Identification of main paths of human exposure towards active substance(s) and substances of concern from its use in biocidal product

Summary table: relevant paths of human exposure							
Exposure path	**Primary (direct) exposure**			**Secondary (indirect) exposure**			
	Industrial use	**Professional use**	**Non-professional use**	**Industrial use**	**Professional use**	**General public**	**Via food**
Inhalation	Yes	No	No	No	Yes	Yes	No
Dermal	Yes	No	No	No	Yes	Yes	No
Oral	No	No	No	No	No	Yes	No

List of scenarios

Summary table: scenarios			
Scenario number	**Scenario**	**Primary or secondary exposure** **Description of scenario**	**Exposed group**
1	Vacuum pressure treatment / oscillating pressure process	Primary Exposure: Vacuum pressure treatment of wood; Exposure has been calculated with handling model 1	Industrial
2	Sanding/sawing of treated wood	Secondary Exposure: Sanding / processing of treated wood, acute or chronic	Professional/ General public
3	Mouthing of treated wood chips	Secondary Exposure: A toddler picks up and chews a wood off-cut	General public
4	Playing on treated wood structures	Secondary Exposure: Toddler is playing outdoors on a playground structure made of treated wood	General public

5	Inhalation of volatilised residues indoors	Secondary Exposure: Toddlers – Inhalation of volatilised residues indoors released in the living area of a domestic house.	General public
6	Livestock exposure	Secondary Exposure of livestock	Livestock animals

General remark concerning exposure assessment:

The current calculations for basic copper carbonate family are based on the active substance basic copper carbonate applying an adjustment from copper concerning the molecular weight (221.1 for basic copper carbonate to 2*63.5 for Cu^{2+}) while it is important to stress that AEL values in the CAR were expressed in Cu^{2+} equivalents (cf. France, 2011). However, this adjustment did not affect in any way the risk characterisation ratios (despite dermal absorption value was set for copper). For basic copper carbonate oral absorption of 36% for humans and 25% for animals were determined (France, 2011). These values defined for the a.s. are also the values of the copper.

For renewal of the BPF exposure and risk characterisation ratios should be performed based on Cu^{2+}.

Industrial exposure

Scenario [1]

Description of Scenario [1]
The impregnation process itself represents a closed system. The timber is treated in sealed treatment vessels and the job entails a cycle of loading, waiting, unloading and removal of treated timber to storage. Dermal contamination may occur through direct contact with the surface of treated timber and through contact with ancillary equipment and contaminated process plant. The workers in vacuum-pressure preservative plants work typically for 8 hours a day and for at least five days a week. Industrial users spend only a fraction of their time using wood preservatives. Operators also conduct other tasks so that the actual time in proximity to wood preservative or treated wood is limited. Vacuum-pressure application is a process in which potential exposure to the operator is minimised by the use of appropriate controls (workplace safety standards). At the end of the impregnation process, a final vacuum phase follows which ensures that the treated wood leaves non-dripping the impregnation vessel. Workers are obliged to wear personal protective equipment (PPE), i.e. chemical resistant gloves, and protective coverall (material to be specified by the authorisation holder within the product information). Furthermore, workers are expected to wear special safety shoes. Therefore, any exposure of feet can be excluded and has therefore not been considered for calculation of the total exposure. This is in line with ECHA 2020, Table 1, line 21, where only indicative values for hands and body are given. Exposure during mixing and loading operations is considered negligible as automated dilution by pumping transfer means exposure would be very low or accidental (EC 2008, page 8). Cf. to further considerations of the scenario. For exposure estimation for application and post-application, Handling model 1 was used

(ECHA 2020, Table 1, line 21). The model is representative for industrial wood preservation and comprises the task of intermittent manual handling of water-wet wood and associated equipment. Dermal contamination occurs through direct contact with the surface of treated timber and through contact with ancillary equipment and contaminated process plant. Dermal exposure may also arise from the spread of contamination into areas such as control rooms and from secondary sources such as previously contaminated overalls and gloves. Handling model 1 includes application and post-application exposures.

Calculations have been performed on basis of the maximum applied water based - treatment solution (density approx. 1g/cm³) for use class 4, special application.

For Cu-HDO, basic copper carbonate, boric acid, and 2-MEA the worst case has been identified for the max. content in meta SPC 3 (e.g. product Wolmanit CX-10) with the corresponding application solution. For 2-EHA the worst case has been identified for the max. content in meta SPC 1 (e.g. product Wolmanit CX-8) with the corresponding application solution.

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. In Tier 3 the highest concentration of an active substance/SoC per meta SPC were used instead of above explained worst case model formulation.

Per working day 3 treatment cycles have been considered in accordance with default assumptions of Handling model 1 (worst case), although in special application only 2 treatment cycles can be performed within an 8-hour working day, as the vacuum pressure / oscillating pressure treatment requires a prolonged treatment phase due to the required very high product retentions in wood.

Only tier 2 calculations have been performed, as the indicative value for hands is only given inside gloves.

It is considered that the scenario “cleaning of the treatment chamber”, which will occur only 1 time per year (applicant’s statement in DRA), represents a short time exposure scenario and is covered by Handling model 1 calculations. Concerning PPE the calculations were based on coated coveralls.

Bystanders are covered by the exposure assessment of the user.

For background information on Tier 3, please see section “Further information and considerations on scenario [1]”.

Description of Scenario [1], continued		
	Parameters	**Value**
Tier 1	Tier 1 was not assessed, as in Handling model 1 indicative values were given for hands inside gloves. Therefore, it is not possible to recalculate potential exposure without gloves.	
Tier 2	Concentration of substance in product – worst case model formulation – Tier 2	3.5% (Cu-HDO) 16.3% (Cu-Carb.) 5% (Boric acid) 8% (2-EHA) 42.0% (2-MEA)
	Concentration of application solution for worst case model formulation Tier 2	4.17% (Wolmanit CX-10) 5.21% (Wolmanit CX-8)
	Indicative exposure value of hands (dermal	1080 mg/cycle

	exposure inside gloves, application solution)[1]	
	Indicative exposure value rest of body (application solution)[1]	8570 mg/cycle
	Indicative inhalative exposure (application solution)[1]	1.9 mg/m³
	Number of cycles per working day[1]	3 cycles/day
	Penetration through clothing (body)[2] (Corresponds to coated coveralls, default protection factor 90%)	10%
	Cycle time[1]	180 min
	Inhalation rate[3]	1.25 m³/h = 0.021 m³/min
	Body weight of adult[4]	60 kg
	Dermal absorption rate of substances (Cu-HDO, basic copper carbonate, Boric acid, 2-EHA)	25% (Cu-HDO) 5% (Cu-Carb.) 12% (Boric acid)[8] 50% (2-EHA); 50% (2-MEA) See chapter 2.2.6 of PAR, section "Information on dermal absorption", table "Value(s) used in the Risk Assessment – Dermal absorption"
Tier 3	Indicative exposure value of hands (dermal exposure inside gloves, application solution)[5]	108.68 mg/cycle
	Concentration of substance in product – Tier 3 meta SPC 1	2.8% (Cu-HDO) 13.04% (Cu-Carb.) 4.0% (Boric acid) 29.6% (2-EHA) 8.0% (2-MEA)
	Concentration of substance in product – Tier 3 meta SPC 2	2.8% (Cu-HDO) 13.04% (Cu-Carb.) 4.0% (Boric acid) 33.6% (2-EHA) 7.5% (2-MEA)
	Concentration of substance in product – Tier 3 meta SPC level 3	3.5% (Cu-HDO) 16.3% (Cu-Carb.) 5% (Boric acid) 42.0% (2-MEA)
	Concentration of application solution - Tier 3 meta PSC level 1&2	5.21%[6]

	Concentration of application solution - Tier 3 meta PSC level 3	4.17%[7]

[1] ECHA 2020, Handling Model 1, page 19-20, Table, line 21
[2] ECHA 2015a, page 156, Table B
[3] ECHA 2015a, page 16, Table 2
[4] ECHA 2015a, page 15, Table 1
[5] The applicant provided measured data, see Klaucke, Scholle, 2015. As only indicative values for exposure of hands inside gloves are available from the study, in Tier 3 the indicative values for the rest of body as well as inhalation are taken from Handling model 1 (ECHA 2015a). For more details on Tier 3, please see section "Further information and considerations on scenario [1]".
[6] For UC4 the concentration of the application solution is 3.75%
[7] For UC4 the concentration of the application solution is 3%
[8] For UC 4 (higher dilution) 20% dermal absorption was used

Calculations for Scenario [1]

$$\begin{aligned}
&Potential\ hands\ exposure\ \left[\frac{mg}{kg\ bw\ day}\right]\\
&= Indicative\ exposure\ value\ \left[\frac{mg}{cycle}\right] \times \frac{conc.of\ application\ solution\ [\%]}{100}\\
&\times \frac{conc.substance\ in\ product\ [\%]}{100} \times no.of\ cycles\ per\ day[\frac{1}{day}]\ \times \frac{dermal\ abs.[\%]}{100}\\
&\times \frac{1}{body\ weight\ [kg]}
\end{aligned}$$

$$\begin{aligned}
&Potential\ body\ exposure\ \left[\frac{mg}{kg\ bw\ day}\right]\\
&= Indicative\ exposure\ value\ \left[\frac{mg}{cycle}\right] \times \frac{conc.of\ application\ solution\ [\%]}{100}\\
&\times \frac{conc.substance\ in\ product\ [\%]}{100} \times no.of\ cycles\ per\ day\ [\frac{1}{day}]\\
&\times \frac{Clothing\ penetration\ [\%]}{100} \times \frac{dermal\ abs.[\%]}{100} \times \frac{1}{body\ weight\ [kg]}
\end{aligned}$$

$$\begin{aligned}
&Inhalative\ exposure\ \left[\frac{mg}{kg\ bw\ day}\right]\\
&= indicative\ value\ \left[\frac{mg}{m^3}\right] \times \frac{conc.of\ application\ solution\ [\%]}{100}\\
&\times \frac{conc.substance\ in\ product\ [\%]}{100} \times inhalation\ rate\ \left[\frac{m^3}{min}\right]\\
&\times cycle\ time\ per\ day\ [min/day] \times \frac{1}{body\ weight\ [kg]}
\end{aligned}$$

Detailed calculations are included in Appendix 3.2.

Summary table: estimated exposure from industrial uses given in [mg/kg bw/day]					
Scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenario [1]	Tier 2; gloves, coated coverall - worst case model formulation	Cu-HDO: 0.0002 Cu-Carb.: 0.0008 Boric acid: 0.0002 2-EHA: 0.0005 2-MEA: 0.0021	Cu-HDO: 0.0353 Cu-Carb.: 0.0329 Boric acid: 0.0242 2-EHA: 0.2018 2-MEA: 0.8481	n.a.[1]	Cu-HDO: 0.0355 Cu-Carb.: 0.0337 Boric acid: 0.0245 2-EHA: 0.2023 2-MEA: 0.8502
Scenario [1]	Tier 3; measured data combined with modelled data – meta SPC 1	Cu-HDO: 0.0002 Cu-Carb.: 0.0008 Boric acid: 0.0002 2-EHA: 0.0005 2-MEA: 0.0018	Cu-HDO: 0.0176 Cu-Carb.: 0.0164 Boric acid: 0.0121[2] 2-EHA: 0.1006 2-MEA: 0.3723	n.a.[1]	Cu-HDO: 0.0178 Cu-Carb.: 0.0172 Boric acid: 0.0123 2-EHA: 0.1011 2-MEA: 0.3741
Scenario [1]	Tier 3; measured data combined with modelled data – meta SPC 2	Cu-HDO: 0.0002 Cu-Carb.: 0.0008 Boric acid: 0.0002 2-EHA: 0.0005 2-MEA: 0.0021	Cu-HDO: 0.0176 Cu-Carb.: 0.0164 Boric acid: 0.0121[2] 2-EHA: 0.0943 2-MEA: 0.4226	n.a.[1]	Cu-HDO: 0.0178 Cu-Carb.: 0.0172 Boric acid: 0.0123 2-EHA: 0.0948 2-MEA: 0.4247
Scenario [1]	Tier 3; measured data combined with modelled data – meta SPC 3	Cu-HDO: 0.0002 Cu-Carb.: 0.0008 Boric acid: 0.0002 2-MEA: 0.0021	Cu-HDO: 0.0176 Cu-Carb.: 0.0164 Boric acid: 0.0121[2] 2-MEA: 0.4228	n.a.[1]	Cu-HDO: 0.0178 Cu-Carb.: 0.0172 Boric acid: 0.0123 2-MEA: 0.4249

[1] n.a. not assessed

[2] For UC4 (application solution 3 or 3.75%) and 20% dermal absorption the estimated exposure vor boric acid is 0.0147 mg/kg bw/d.

Further information and considerations on scenario [1]

Calculations in the Assessment Report of the a.s.:

The calculations in Austria 2013 have been more restrictive using the 95th percentiles. In the meantime, the Human exposure ad hoc group decided to use the 75th percentiles for Handling model 1.

Considerations on Tier 3 (Hand exposure):

The default/indicative exposure value for hands mentioned in Handling model 1 (ECHA 2017a) have been deduced from older studies involving timber treatment sites working with water-based formulations composed of copper, chromium and arsenic compounds commonly referred to as CCA. There is a variety of modes of action and ways in which substances migrate through, and leach out of the timber and the mentioned value may not necessarily apply to copper-Cu-HDO-amine formulation. In this case, the calculation can further be refined under consideration of actual hand exposure measurements performed in industrial treatment plants using Wolmanit CX-products under real exposure conditions. Two studies were performed with different approaches. For further considerations, please see below.

The hand exposure measurements submitted in the context of the assessment of the active substance Cu-HDO were based on a rinsing procedure of the hands (BASF Wolman GmbH 2004). Hand rinses were performed on an operator at different time intervals within a normal workday. The method consists in shaking the hand in a plastic bag containing an adequate solvent (ethanol – 95% in water). The amount of in-use product on a hand (actual exposure) has been reported in a range of 15 – 17 mg for a 2% treatment or application solution of Wolmanit CX-10 at the end of the working shift. For the applied maximum treatment solutions of 4.17% (special application, Wolmanit CX-10) the amount of in-use product on one hand is therefore expected to be in the range of 31.3 – 35.4 mg. The exposure value is far below the indicative value mentioned in Handling model 1. However, the results of the study are limited as it was only performed on one test person. This was accepted for active substance approval with regard to showing one safe use. Therefore, the test was accepted also for product authorisation, however, the results have limited conclusiveness.

The second study (Klaucke, Scholle, 2015) is based on the measurement of the amount of wood preservative in cotton gloves worn under the normal protective gloves during a complete treatment cycle including preparation of the application solution, operation of the treatment plant (loading, unloading) and handling of the treated wood. The measurements took place on 8 different treatment sites using different Wolmanit CX-products with different application solution concentrations. The measurements have been repeated on a daily basis during a complete normal working week. The following products were used in the study: Wolmanit CX-8, Wolmanit CX-8N, Wolmanit CX-10, Wolmanit CX-10.2, Wolmanit CX-8M. Please confer to the confidential annex for information on the detailed composition of the products.

The exposure survey has been performed in a total of 8 industrial impregnation plants performing vacuum pressure treatment and / or oscillating treatment of wood. Impregnation plants located in Northern, South-West, South and Middle Europe have been chosen for the survey. Small-sized- and medium sized enterprises as well as high sized enterprises participated in the survey. The Wolmanit CX-products used by the companies of the survey are members of the Wolmanit CX-10_family as well as of the Wolmanit CX-8WB family. The products are used in treatment concentrations covering the maximum applied treatment concentrations of the products of the mentioned families including those for special application. The designated use of the treated wood of the different impregnation plants includes wood products intended for horticulture, landscaping and playground structures as well as for special use like wooden railway sleepers and wooden poles for electricity and telecommunication lines. The collected data reflect therefore the variability of treatment plants concerning location, size, and degree of automation, used product and treatment concentrations as well as the designated end-use of the treated wood.

The results of the second study (Klaucke, Scholle, 2015) correlate very well with the results obtained in the first study (BASF Wolman GmbH 2004) and can directly be used in higher Tier calculations instead of the default/indicative exposure value for hands of 1080 mg/cycle as suggested in Handling model 1 (ECHA 2015a).

The results from the exposure measurements show that the real exposure value for hands when using Wolmanit CX-products is significantly more than a factor 10 lower than the default/indicative value in the model.

A total of 50 measurements have been performed in eight different companies using Wolmanit CX-formulations for the deep impregnation of wood. The number of measurements performed allows a statistical evaluation of the results and the calculation of the median, the 75 % and the 95 % value:

Parameter	**Probability of hand exposure inside gloves**	
	Impregnation plants using Wolmanit CX-formulations mg/cycle	Handling model 1 (HSE surveys 1989, 1993, 1996, AEAT survey 1997-8) mg/cycle
95th % value	108.68	2410
75th % value	55.84	1080
50th % value (median)	26.69	783
Min. value	3.33	42
Max. value	161.81	7570

The 95% value of the actual measurements has been used for calculation of primary hand exposure (tier 3 calculations; conservative assessment).

<u>Considerations on automated mixing and loading:</u>

In addition to the justification that the exposure is negligible compared to other related tasks, the scenario “RISKOFDERM Toolkit Connecting lines” was scrutinized, where a HI<0.01 is obtained (combined exposure to active subtances and SOCs (mixture approach)) without PPE. Thus the M&L can be considered as negligible.

Calculation of external exposure (local effects):

The internal exposure values in scenario 1, tier 2, can also be expressed as external exposure values: External exposure of hands inside gloves amounts to 1080 mg solution/cycle (Handling model 1), concentration of the application solution is 5.21% (worst case), number of cycles per day is 3, and the hand surface of adults is 820 cm² (ECHA 2015a). This (1080*5.21/100*3/820=0.2) results in a local exposure of ~0.2 mg product / cm² skin, provided that suitable protective gloves are worn.

Combined scenarios

It is assumed that an industrial worker encounters inhalative exposure at home.

Summary table: combined systemic exposure from industrial uses					
Scenarios combined	**Estimated uptake [mg/kg bw/day]**				
		inhalation	**dermal**	**oral**	**total**
Scenario 1 - meta SPC 1 + Scenario 5 Tier 3	**Cu-HDO**	0.0002	0.0176	n.a.[1]	0.0178
	Cu-Carb.	0.0008	0.0164		0.0172
	Boric acid	0.0002	0.0121		0.0123
	2-EHA	0.0104	0.1006		0.1110
	2-MEA	0.0066	0.3723		0.3789
Scenario 1 - meta SPC 2 + Scenario 5 Tier 3	**Cu-HDO**	0.0002	0.0176	n.a.[1]	0.0178
	Cu-Carb.	0.0008	0.0164		0.0172
	Boric acid	0.0002	0.0121		0.0123
	2-EHA	0.0104	0.0943		0.1047
	2-MEA	0.0069	0.4226		0.4295
Scenario 1 - meta SPC 2 + Scenario 5 Tier 3	**Cu-HDO**	0.0002	0.0176	n.a.[1]	0.0178
	Cu-Carb.	0.0008	0.0164		0.0172
	Boric acid	0.0002	0.0121		0.0123
	2-EHA	0.0099	0.0000		0.0099
	2-MEA	0.0069	0.4228		0.4297

[1] n.a. not assessed

Professional exposure

Primary exposure of (non-industrial) professionals is excluded because the Wolmanit CX-10_family products are only applied in industrial plants.

Secondary exposure may occur during sanding of wood.

Scenario [2]

<table>
<tr><th colspan="3">Description of Scenario [2]</th></tr>
<tr><td colspan="3">Secondary exposure occurs during sanding or sawing of treated wood. For exposure assessment, use class 4 special applications retention (31.25 kg/m^3 Wolmanit CX-8-formulations) is identified as worst case for professionals (See also “further information and considerations on scenario 2-4”). For general public use class 4 normal retention (22.5 kg/m^3) was calculated.
The realistic worst case is based on the assumption that a wooden post is sanded by an adult worker without protective equipment. Only the amount of substance in the outer 1cm of the post was regarded, considering that the wood is impregnated evenly. The sanding generates a certain dust concentration in air. Exposure occurs via inhalation for max. 6 hours per day (reflecting professionals, long term exposure. This covers as a worst case also short term exposure as well as non-professional use).
For dermal exposure, contact with hands is assessed.
As a worst case the max. content in meta SPC 1 (e.g. product Wolmanit CX-8) with the corresponding application solution was identified for Cu-HDO, Cu.-Carb. Boric acid, and 2-EHA. For 2-MEA the max. content in meta SPC 2 (e.g. product Wolmanit CX-8SF) with the corresponding application solution represents the worst case. So the aforementioned worst case model formulation was used for calculations. 2-MEA was only taken into account for professional use (for more information please see chapter “Risk characterisation for systemic effect”).
Tier 2: Transfer coefficient (dislodgeable residues) of rough sawn wood was taken into account.</td></tr>
<tr><td></td><td>Parameters</td><td>Value</td></tr>
<tr><td>Tier 1</td><td>Concentration of substance in product</td><td>2.8% (Cu-HDO)
13.04% (Cu-Carb.)
4% (Boric acid)
8% (2-EHA)
33.6% (2-MEA)</td></tr>
<tr><td></td><td>Product Retention UC4 (special application)</td><td>31.25 kg/m^3</td></tr>
<tr><td></td><td>Product retention (UC 4 normal application)</td><td>22.5 kg/m^3</td></tr>
<tr><td></td><td>Volume of post[1]</td><td>0.04 x 0.04 x 2.5 m</td></tr>
</table>

	Exposure duration[2]	6 h per day
	Inhalation rate[3]	1.25 m³/h
	Dust concentration in air[1]	5 mg/m³
	Wood density[2]	400 mg/cm³
	Inhalative absorption[4]	100%
	Body weight of adult[5]	60 kg
	amount of a.s. in the outer 1cm layer, all on surface, UC 4 special	0.875 mg a.s./cm² (Cu-HDO) 4.075 mg a.s./cm² (Cu-Carb.) 1.25 mg a.s./cm² (Boric acid) 2.5 mg a.s./cm² (2-EHA) 10.5 mg a.s./cm² (2-MEA)
	amount of a.s. in the outer 1cm layer, all on surface, UC 4 normal	0.630 mg a.s./cm² (Cu-HDO) 2.934 mg a.s./cm² (Cu-Carb.) 0.9 mg a.s./cm² (Boric acid) 1.8 mg a.s./cm² (2-EHA) 7.56 mg a.s./cm² (2-MEA)
	Hand surface area (palms)[5]	410 cm²
	Contaminated hand surface area[1]	40%
	Dermal absorption rate of substances (Cu-HDO, basic copper carbonate, boric acid, 2-EHA)	25% (Cu-HDO) 5% (Cu-Carb.) 20% (Boric acid) 50% (2-EHA); 50% (2-MEA) See chapter 2.2.6 of PAR, section "Information on dermal absorption", table "Value(s) used in the Risk Assessment – Dermal absorption"
	Frequency of sanding/sawing[1]	1 per day
Tier 2	Transfer coefficient (dislodgeable residues) of rough sawn wood[6]	2%

Tier 3	Not applicable; As already Tier 2 results in an acceptable risk, the submitted wipe studies were not taken into consideration (See further information and considerations on scenario [2-4]).

[1] EC, 2002, page 50f; This guidance document was used as this scenario was not described in ECHA, 2015.
[2] Austria 2013, Doc II-B, page 29
[3] ECHA, 2015a, page 16, Table 2
[4] ECHA, 2017a, page 194
[5] ECHA, 2015a, page 15, Table 1
[6] ECHA, 2015a, page 171, Table

Calculations for Scenario [2]

$$\mathit{Inhalative\ systemic\ exposure}\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$= \mathit{Conc.of\ a.s.in\ b.p.}[\%] * \mathit{product\ retention}\ \left[\frac{kg}{m^3}\right] * \frac{1000}{100} * \mathit{volume\ of\ post}\ [m^3]$$

$$* \mathit{conversion\ factor}\ (\mathit{all\ of\ substance\ in\ outer}\ 1cm\ \mathit{layer\ of\ post}) * \mathit{Exposure\ time}\ [h]$$

$$* \mathit{Inhalation\ rate}\ \left[\frac{m^3}{h}\right] * \mathit{Dust\ concentration\ in\ air}\ \left[\frac{mg}{m^3}\right] * \frac{1}{\mathit{Wood\ density}\ \left[\frac{mg}{cm^3}\right]}$$

$$* \frac{\mathit{inhalative\ absorption}[\%]}{100} * \frac{1}{60\ [kg]}$$

$$\mathit{Dermal\ systemic\ exposure}\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$= \mathit{Conc.of\ a.s.in\ b.p.}[\%] * \mathit{product\ retention}\ \left[\frac{kg}{m^3}\right] * \frac{1000}{100 * 100} * \frac{1000}{100 * 100 * 100}$$

$$* \mathit{Hand\ surface\ area}\ [cm^2] * \frac{\mathit{Contaminated\ hand\ surface\ area}\ [\%]}{100}$$

$$* \frac{\mathit{dermal\ absorption}\ [\%]}{100} * \mathit{frequency\ of\ use}\ [\frac{1}{day}] * \frac{1}{60\ [kg]}$$

Detailed calculations are included in Appendix 3.2.

Summary table: systemic exposure from non-professional uses given in [mg/kg bw/day]

Exposure scenario	Tier/PPE	Estimated inhalation uptake	Estimated dermal uptake	Estimated oral uptake	Estimated total uptake
Scenario [2] UC 4 special	Tier 1 / no PPE	Cu-HDO: 0.0018 Cu-Carb.: 0.0085 Boric acid: 0.0026 2-EHA: 0.0052 2-MEA: 0.0218	Cu-HDO: 0.5979 Cu-Carb.: 0.5569 Boric acid: 0.6833 2-EHA: 3.4167 2-MEA: 14.3500	n.a.[1]	Cu-HDO: 0.5997 Cu-Carb.: 0.5654 Boric acid: 0.6859 2-EHA: 3.4219 2-MEA: 14.3718
Scenario [2] UC 4 normal	Tier 1 / no PPE	Cu-HDO: 0.0013 Cu-Carb.: 0.0061 Boric acid: 0.0019 2-EHA: 0.0037	Cu-HDO: 0.4305 Cu-Carb.: 0.4010 Boric acid: 0.4290 2-EHA: 2.4600		Cu-HDO: 0.4318 Cu-Carb.: 0.4071 Boric acid: 0.4939 2-EHA: 2.4637
Scenario [2] UC 4 special	Tier 2 / no PPE	See above (Tier 1)	Cu-HDO: 0.0120 Cu-Carb.: 0.0111 Boric acid: 0.0137 2-EHA: 0.0683 2-MEA: 0.2870	n.a.[1]	Cu-HDO: 0.0138 Cu-Carb.: 0.0196 Boric acid: 0.0163 2-EHA: 0.0735 2-MEA: 0.3088
Scenario [2] UC 4 normal	Tier 2 / no PPE	See above (Tier 1)	Cu-HDO: 0.0086 Cu-Carb.: 0.0080 Boric acid: 0.0098 2-EHA: 0.0492		Cu-HDO: 0.0099 Cu-Carb.: 0.0141 Boric acid: 0.0117 2-EHA: 0.0529

[1] n.a. not assessed

Non-professional exposure

Non-professional primary exposure does not occur. The products of the Wolmanit CX-10_family are only sold to industrial treatment plants.

Secondary exposure may occur during sanding of wood. This scenario is covered by professional sanding (scenario 2).

Exposure of the general public

Scenario [3]

Description of Scenario [3]		
Mouthing of treated wood chips (secondary exposure): A toddler picks up and chews a wood cut-off. (See also "further information and considerations on scenario 2-4"). The relevant exposure route is oral. This is an incidental event and exposure duration is therefore best described as acute. It is assumed that 100% of all a.s. and SoC are retained and bound in the outermost 1 cm of the timber volume and that this part is accessible to toddlers for chewing. It is further assumed that only a small fraction of the total preservative become released by chewing, as most of it is bound inside of the piece of wood. A reasonable assumption is that 10% may become released. A piece of the size of 16 cm^3 is chewed. Tier 1: The post was treated at the utmost with a treatment rate of 22.5 kg/m^3 of meta SPC 1-formulations (e.g. Wolmanit CX-8) (corresponding to UC4 worst case; chewing of a wood chip intended for UC4 special applications is not considered realistic). Thereby, substances are extracted by chewing. Oral absorption is 100%. Tier 2: Refinement: Extraction from the cut-off is limited by the water solubility of the substances as well as by the saliva produced by toddler per day. It is assumed that the mouthing takes place during 5 hours (very conservative assumption). Remarks: The scenario 3 is considered highly conservative. First, it is expected to be unlikely that parents allow their toddlers to stay near a working place where treated wood is processed. Furthermore, chewing the raw surface of the wood off-cut is considered unpleasant. It is therefore unlikely that the toddler would chew for a significant time like 5 hours a wood off-cut.		
	Parameters	**Value**
Tier 1	Size of wood chip (4x4x1 cm)[1]	16 cm^3

	Concentration of substance in product	2.8% (Cu-HDO) 13.04% (Cu-Carb.) 4% (Boric acid) 8% (2-EHA)
	Product retention	22.5 kg/m³
	Extraction of substance by chewing[1]	10%
	Frequency[1]	1/day
	Body weight toddler[2]	10 kg
Tier 2	Water solubility of substance[3]	6.1 mg/L (Cu-HDO) 1.237 mg/L (Cu-Carb.)
	Salvia produced by toddler per day[4]	0.2 L
	Duration of chewing[4]	5 h / day
	Oral absorption	100% (Cu-HDO) 36% (Cu-Carb.)[5]
Tier 3	Not applicable. As already Tier 2 results in an acceptable risk, the submitted wipe studies were not taken into consideration (See further information and considerations on scenario [2-4]).	

[1] EC, 2002, page 50ff; This guidance document was used as this scenario was not described in ECHA, 2015a.
[2] ECHA, 2015a, page 15, Table 1
[3] Austria 2013, Assessment report page 44; France 2011, Assessment report page 43,
[4] Austria 2013, Doc II-B, page 29
[5] cf. to chapter 2.2.6 of this document

Calculations for Scenario [3]

$$Oral\ systemic\ exposure, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$= Conc.of\ substance\ in\ b.p.[\%] * product\ retention\ \left[\frac{kg}{m^3}\right] * \frac{1000}{100}$$

$$* volume\ of\ wood\ chip\ [cm^3] * \frac{1}{1000} * \frac{Extraction\ [\%]}{100} * Frequency\ \left[\frac{1}{day}\right]$$

$$* \frac{1}{body\ weight\ [kg]}$$

$$Oral\ systemic\ exposure, tier\ 2\ \left[\frac{mg}{kg\ bw\ day}\right] = water\ solubility\ of\ substance\ \left[\frac{mg}{L}\right] * Salvia\ production\ \left[\frac{L}{day}\right] * \frac{1}{24}\left[\frac{day}{h}\right] * \frac{Duration\ of\ chewing\ [h\ ]}{day} * \frac{1}{body\ weight\ [kg]}$$

Detailed calculations are included in Appendix 3.2.

Summary table: systemic exposure from non-professional uses given in [mg/kg bw/day]					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenario [3]	Tier 1 / no PPE	n.a.[1]	n.a.[1]	Cu-HDO: 0.1008 Cu-Carb.: 0.4694 Boric acid: 0.1440 2-EHA: 0.2880	Cu-HDO: 0.1008 Cu-Carb.: 0.4694 Boric acid: 0.1440 2-EHA: 0.2880
Scenario [3]	Tier 2 / no PPE	n.a.[1]	n.a.[1]	Cu-HDO: 0.0254 Cu-Carb.: 0.0019	Cu-HDO: 0.0254 Cu-Carb.: 0.0019

[1] n.a. not assessed

Scenario [4]

Description of Scenario [4]		
Playing on treated wood structures (secondary exposure): Toddler is playing outdoors on a playground structure made of treated wood. The scenario for the toddler covers the scenario for the child. For exposure assessment, use class 4 retentions (22.5 kg/m³, meta SPC 1-formulations; e.g. Wolmanit CX-8) are identified as worst case. For 2-MEA the max. content in meta SPC 2 (e.g. product Wolmanit CX-8SF) with the corresponding application solution represents the worst case. (See also "further information and considerations on scenario 2-4"). In general, dermal and oral exposure are expected to occur in parallel. As a worst case it is assumed that all of the contamination of the toddler's hand is ingested during mouthing behavior for the active substances and the SoCs. This reflects the worst case absorption values. Tier 1: The realistic worst case is based on the assumption that an toddler is playing outdoors on a playground structure made of treated wood. The surface concentration is assumed to be 100%. The hand surface area is given with 230.4/2=115.2 cm² (both hand palms without backs) of which 40% are contaminated (1 event per day). Tier 2: Tier 2 considers a transfer coefficient for dislodgeable residues. Tier 3: Submitted studies by the applicant. For background information on tier 3, please see section "Further information and considerations on scenario [2]-[4]". To account for multiple hand contacts of children on playgrounds a preliminary contact number of 10 was assumed. However this value has no scientific base and is a pragmatic approach and accounts for the test conditions in the submitted study.		
	Parameters	**Value**
Tier 1	Concentration of substance in product	2.8% (Cu-HDO) 13.04% (Cu-Carb.) 4% (Boric acid) 8% (2-EHA)
	Product retention[5]	22.5 kg/m³
	Hand surface area[2]	115.2 cm²
	Contaminated hand surface area[3]	40%
	amount of a.s. in the outer 1cm layer, all on surface, UC 4 normal	0.630 mg a.s./cm² (Cu-HDO) 2.934 mg a.s./cm² (Cu-Carb.) 0.9 mg a.s./cm² (Boric acid) 1.8 mg a.s./cm² (2-EHA)

	Oral absorbtion rates of substances (Cu-HDO, Cu-Carb., Boric acid, 2-EHA)	100% (Cu-HDO) 36% (Cu-Carb.) 100% (Boric acid) 100% (2-EHA)
	Playing events[3]	1 / day
	Body weight of toddler[2]	10 kg
Tier 2	Transfer factor (dislodgeable residues)[4]	2%
Tier 3	Measured concentration via wipe test	0.0375 µg/cm² = **0.0000375 mg/cm² (Cu-HDO)** 0.235 µg/cm² (Cu) corresponds to*: **0.7944 µg/cm² ($CuCO_3$) =0.0007944 mg/cm² ($CuCO_3$)**
	Number of contacts[1]	10

[1] as agreed in CG-teleconference on 13/01/2021 for this particular case, NOT a harmonised default

[2] ECHA, 2015a, page 15, Table 1

[3] ECHA, 2015b, HEAdhoc recommendation No 5

[4] ECHA, 2015a, page 171, Table

[5] Please refer to section 2.1.4 of this document

***Calculation for $CuCO_3$ (as all present Copper was analysed in one step):**

n(mol)=m/M

Mw=349.9 µg/µmol (Cu-HDO) m(Cu-HDO)= 0.0375 µg **n=0.000107 µmol (Cu-HDO)**

Mw=63.546 µg/µmol (Cu) m(Cu)= 0.2350 µg **n=0.0037 µmol (Cu)**

n($CuCO_3$)= n(Cu) – n(Cu-HDO) = n=0.0037 µmol (Cu) - n=0.000107 µmol (Cu-HDO) = **0.003593 µmol**

Mw=221.1 µg/µmol ($CuCO_3$)

m($CuCO_3$) = n($CuCO_3$)* M ($CuCO_3$) = 0.003593 µmol * 221.1 µg/µmol = **0.7944 µg/cm²**

Calculations for Scenario [4]

$$Dermal/Oral\ systemic\ exposure, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$= Conc. of\ substance\ in\ b.p. [\%] * product\ retention\ \left[\frac{kg}{m^3}\right] * \frac{1000}{100 * 100} *$$

$$* \frac{1000}{100\ * 100 * 100} * Hand\ surface\ area\ [cm^2] * \frac{Contamination\ [\%]}{100}$$

$$* \frac{Dermal/Oral\ absorption\ [\%]}{100} * Frequency\ \left[\frac{1}{day}\right] * \frac{1}{body\ weight\ [kg]}$$

$$Dermal/oral\ systemic\ exposure, tier\ 2\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$= Dermal\ systemic\ exposure, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right] * \frac{Transfer\ factor\ [\%]}{100}$$

$$Dermal/oral\ systemic\ exposure, tier\ 3\ \left[\frac{mg}{kg\ bw\ day}\right]$$

$$=\ measured\ concentration\ \left[\frac{mg}{cm^2}\right] *\ Hand\ surface\ area\ [cm^2]$$

$$* \frac{dermal -\ oral\ absorption[\%]}{100} * \frac{Contamination\ [\%]}{100} * Frequency\ \left[\frac{1}{day}\right]$$

$$* \frac{1}{body\ weight\ [kg]} * number\ of\ contacts$$

Detailed calculations are included in Appendix 3.2.

Summary table: systemic exposure from non-professional uses given in [mg/kg bw/day]					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenario [4]	Tier 1 / no PPE	n.a.[1]	-[3]	Cu-HDO: 2.9030 Cu-Carb.: 4.8672 Boric acid: 4.1472 2-EHA: 8.2944	Cu-HDO: 2.9030 Cu-Carb.: 4.8672 Boric acid: 4.1472 2-EHA: 8.2944
Scenario [4]	Tier 2 / no PPE	n.a.[1]	-[3]	Cu-HDO: 0.0581 Cu-Carb.: 0.0973 Boric acid: 0.0829 2-EHA: 0.1659	Cu-HDO: 0.0581 Cu-Carb.: 0.0973 Boric acid: 0.0829 2-EHA: 0.1659

Scenario [4]	Tier 3 / no PPE	n.a.[1]	-[3]	Cu-HDO: 0.0017 Cu-Carb.: 0.0132	Cu-HDO: 0.0017 Cu-Carb.: 0.0132

[1] n.a. not assessed

[2] worst case for combined dermal and oral route

[3] Please see description of scenario [4]

Further information and considerations on scenario [2-4]

Product retentions used for risk assessment

The maximum applied product retention of 31.25 kg/m³ of products of meta SPC 1 (e.g. Wolmanit CX-8) for Cu-HDO, Cu.-Carb. Boric acid, and 2-EHA and products of meta SPC 2 (e.g. Wolmanit CX-8SF) for 2-MEA has been considered for calculation of human exposure of professionals (secondary exposure). For general public a product retention of 22.5 kg/m³ has been considered.

However, UC4 special application, which is used in practice only for the impregnation of transmission poles was taken into account as a worst case, as impregnated transmission poles are thought to be processed any further by professionals before being placed in the ground. Therefore secondary exposure calculations for scenario 2 - professionals sanding treated wood - are based on use class 4 product retentions for special application For non-professionals calculations are based on UC 4 normal product retentions.

For the other secondary exposure scenarios 3 to 4 (toddler chewing wood cut-off; toddler playing on treated wood structures) the calculation with the "normal" UC 4 retentions represent a worst case.

Considerations on Tier 3 (Dislodgeable residues, wipe test):

The default value for transfer of a substance from treated wood to hands (dislodgeable residues) is given with 2% for a dried fluid on rough sawn wood (ECHA 2015a, page 171)

The applicant provided two studies (wipe tests) for determination of the migration of the substances.

In study Seidel, 2002, the surface residue dissipation of Cu-HDO treated wood was determined by wipe samples according to the US EPA Guidelines OPPTS 875.2300 and 875.2400. Freshly treated lumber after a fixation time of 2 weeks, lumber which has been exposed to natural weathering for some three weeks after fixation and lumber exposed to natural weathering for 4 years were examined and analysed for copper as well as for Cu-HDO. As the analytical method for determination of Cu-HDO is not described in sufficient detail and is not validated, it is assumed as a worst case scenario that the whole amount of copper which was detected correlates to Cu-HDO. This yields in a maximum amount of Cu-HDO of 1.377 µg/cm^2.

The second study (Scholle, 2015) also uses a wipe test according to the US EPA Guidelines OPPTS 875.2300 and 875.2400. Treated wood boards were examined after a fixation period of several weeks, when the moisture content of the wood decreased below 30%. A second set of boards was additionally weathered for 14 days before examination. The following maximum amounts of substance were detected: please find relevant table in confidential annex.

Scenario 4:

Tier 1 exposure assessment can be estimated as a fast and conservative approach. Tier 2 considers a transfer coefficient for dislodgeable residues. With this refinement, 2-EHA and 2-MEA already resulted in acceptable exposure levels, but resulted in unacceptable risk concerning the active substances. This is why AT CA proceeded with Tier 3 calculations as studies are available and additional exposure assessments become inevitable.

Therefore above mentioned study (Scholle, 2015) using a wipe test according to the US EPA Guidelines OPPTS 875.2300 and 875.2400 in Tier 3 with the biocidal product family member Wolmanit CX-8F was taken into account (application solution 3.75%, measured retention rate ~26 kg/m³, concentration a.s. and SoCs as provided in table: 2.8% Cu-HDO, 13.04% Cu-Carb, 4.9% 2-EHA, and 31.60% 2-MEA).

Scenario [5]

Description of Scenario [5]

Inhalation of volatilised residues: toddler inhaling volatilised residues from treated timber indoors. As worst case 24 h/day of inhalation exposure is assumed. This scenario also covers children and adults. Nevertheless inhalation exposure of adults were calculated in Tier 3 for a combined exposure with scenario 1.

According to the HEEG Opinion 13 endorsed at TM IV 2011 and amended after TM III 2013 long-term exposure to volatilised residues can be neglected if the following Tier 1 screening tool which is based on the toddler (inhalation rate of 8 m^3/24 h and bw of 10 kg) representing the worst case, is ≤ 1:

$$0.328 \bullet \frac{MW(g/mol) \bullet VP(Pa)}{AEL_{long-term}} \leq 1$$

As this is true for Cu-HDO (0.348), boric acid (0.0004) and basic copper carbonate (0.0102) long-term exposure to volatilised residues is neglected for adults, infants and children for this two a.s.

For the both SoCs 2-EHA and 2-MEA following equation was used:

$$0.410 \cdot \frac{mw \cdot vp}{AEC_{long-term}} \leq 1$$

in which AEC long-term (mg/m^3) was replaced by the comparable $\text{DNEL}_{\text{inhalation long-term}}$ (mg/m^3). Calculated values for 2-EHA (67.6) and 2-MEA (626.1) showed that the two SoCs have to be included in further considerations with regard to long-term inhalation exposure to volatilised residues.

For tier 1 assessment it is assumed a toddler is exposed to the saturated vapour concentration of the active substance/SoC for 24 hours a day. This represents a very conservative estimation as it is not possible for the air to hold more than the saturated vapour concentration of a substance at a given temperature. No ventilation rate assumed.

Tier 2 was skipped due the reason that studies were submitted by the applicant.

For background information on tier 3, please see section "Further information and considerations on scenario [5]".

	Parameters	**Value**
	Inhalative absorption[1]	100 %
	long-term inhalation rate[2](toddler)	8.0 m^3/24 h

	Long-term inhalation rate[2] (adult)	16.0 m^3/24 h
	Bodyweight (toddler)[3]	10 kg
	Bodyweight (adult)[3]	60 kg
	Exposure duration	24 hours
	Gas constant	8.31451 J/molK
	Vapour pressure	<0.0001 Pa (Cu-HDO, between 20 °C and 50 °C)[8] <0.00001 Pa ($CuCO_3$ 25 °C)[4] <0.00001 Pa (Boric acid 20 °C)[6] 4 Pa (2-EHA 20 °C)[7] 50 Pa (2-MEA 20 °C)[5]
	Molecular weight	Mw=349.9 g/mol (Cu-HDO) Mw=61.833 g/mol (Boric acid) Mw=221.1 g/mol ($CuCO_3$) Mw=61.08 g/mol (2-MEA) Mw=144.2 g/mol (2-EHA)
Tier 3	Measured concentration in air (mg/m³)[9]	0.018 (2-MEA) <0.037 (2-EHA)

[1] ECHA, 2017a, page 193

[2] ECHA, 2015a, page 16, Table 2

[3] ECHA, 2015a, page 15, Table 1

[4] France, 2011, Assessment report page 43

[5] Safety Data Sheet, Monoethanolamine EG

[6] Netherlands, 2009, AR page 23

[7] Safety Data Sheet, 2-Ethylhexanoic acid

[8] Safety Data Sheet, Cu-HDO

[9] The applicant provided measured data, the concentration in air was derived from two exposure studies (please see studies BASF Wolman, 2018 and Boras, 2002). For more details on Tier 3, please see section "Further information and considerations on scenario [6]".

Calculations for Inhalation of volatilised residues indoors for Scenario [5]

$$Inhalative\ systemic\ exposure\ Tier\ 1\ (SVC)\ \left[\frac{mg}{kg\ bw\ day}\right] = \frac{\left(vapour\ pressure\ [Pa] * molecular\ weight\ \left[\frac{g}{mol}\right]\right)}{\left(gas\ constant\ \left[\frac{j}{Kmol}\right] * temperature\ [K]\right)} * 1000 * Alveolar\ ventilation\ rate\ \left[\frac{m^3}{d}\right] * \frac{inhalative\ absorption[\%]}{100} * \frac{1}{body\ weight\ [kg]}$$

$$Inhalative\ \ systemic\ exposure, tier\ 3\ \left[\frac{mg}{kg\ bw\ day}\right] = \ measured\ concentration\ \left[\frac{mg}{m^3}\right] * \ Alveolar\ ventilation\ rate\ \left[\frac{m^3}{d}\right] * \frac{inhalative\ absorption[\%]}{100} * \frac{1}{body\ weight\ [kg]}$$

Detailed calculations are included in Appendix 3.2.

Summary table: systemic exposure from volatilised residues given in [mg/kg bw/day]					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenario [5] toddler	Tier 1	2-EHA: 189.4135 2-MEA: 1002.8933	n.r.	n.r.	2-EHA: 189.4135 2-MEA: 1002.8933
Scenario [5] toddler	Tier 3	2-EHA: 0.0296 2-MEA: 0.0144	n.r.	n.r.	2-EHA: 0.0296 2-MEA: 0.0144
Scenario [5] adult	Tier 3	2-EHA: 0.0099 2-MEA: 0.0048	n.r.	n.r.	2-EHA: 0.0099 2-MEA: 0.0048

n.r.: not relevant

Further information and considerations on scenario [5]

For further information on Tier 3, please see section "Further information and considerations on scenario [6]".

Combined scenarios

Summary table: combined systemic exposure for general public					
Scenarios combined	**Estimated uptake [mg/kg bw/day]**				
		inhalation	**dermal**	**oral**	**total**
Scenarios [3+4+5], Tier 2/3,	**Cu-HDO**	negligible	-[1]	0.0271	0.0271
	Cu-Carb.	negligible	-[1]	0.0151	0.0151
	Boric acid	negligible	-[1]	0.2269	0.2269
	2-EHA	0.0296	-[1]	0.4539	0.4835

[1] cf. to explanation in scenario [4]

n.r.: not relevant

Monitoring data

No surveys or studies with the actual products of the Wolmanit CX-10_family or with a surrogate are available for monitoring.

Dietary exposure

Direct contact of Wolmanit CX-10_family biocidal products to human and animal food or feed can be excluded due to the authorised use. A dietary risk assessment due to direct contact to foodstuff is therefore not necessary. Copper and copper compounds are approved and used in other regulatory fields (e.g. plant protection, veterinary, food additives, cosmetics) implying dietary exposure to Cu.

The European Medicine Agency (EMA) published in 2016 an European public MRL assessment report (EPMAR) on copper carbonate for all food producing species. The assessment showed "that the administration of copper carbonate by dietary formulations leads to a systemic absorption not significantly exceeding the other copper derivatives and is therefore unlikely to result in residues in liver that exceed physiological values. It was also shown that copper residues in liver after parenteral administration, although increased when compared with controls, remained within the physiological range" (EMA, 2016). The conclusion of this evaluation is that the establishment of MRL values for copper carbonate is not needed for the protection of the consumer. The substance can thus be included in the list of substances approved for use in all food-producing species with a 'No MRL required' classification (EMA, 2016).

Information of non-biocidal use of the active substance

Due to lack of guidance concerning section "Information of non-biocidal use of the active substance" it is not specified for what (non-biocidal) uses information has to be delivered. Nevertheless a non-exhaustive research was performed using EU Pesticides Database as well as EMA Database.

Summary table of other (non-biocidal) uses			
	Sector of use	**Intended use**	**Reference value(s)**
Cu-HDO Bis(N-cyclohexyl-diazenium-dioxy)-copper (CAS: 312600-89-8)	PPP[1] – not approved	---	---
	EMA[2] – not approved	---	---
Basic copper carbonate Copper(II) carbonate-copper(II) hydroxide (1:1) (CAS: 12069-69-1)	PPP[1]		MRLs of copper compounds can be found in Regulation (EC) No. 396/2005[4].
	EMA[2] – not approved	---	The substance can be included in the list of substances approved for use in all food-producing species with a 'No MRL required' classification (EMA, 2016)[5].
Boric acid (CAS: 10043-35-3) Boric acid is a REACH registered substance. Please find all relevant information here: Registration Dossier - ECHA (europa.eu)[3]	PPP[1] – not approved	---	---
	EMA[2] – not approved	---	---

[1]* PPP (Plant protection products)

[2] EMA (European Medicines Agency)

[3] https://echa.europa.eu/de/registration-dossier/-/registered-dossier/15472/1/2

[4] EUR-Lex - 32005R0396 - EN - EUR-Lex (europa.eu)

[5] European public MRL assessment report for copper carbonate (europa.eu)

Estimating Livestock Exposure to Active Substances used in Biocidal Products

Scenario [6]

Description of Scenario [6]

An estimation of potential exposure of livestock to wood treated with the biocidal product is required and an assessment is included for Wolmanit CX-10.

Treated materials can be formed into structures that livestock animals have access to (e.g. wooden fence rails around paddocks), and may become part of animal housing (e.g. edgings of the livestock's stalls) and transport vehicles. Livestock animals can be exposed orally by chewing on the wood, dermally by rubbing/leaning on the fencing/wooden wall and via inhalation of volatilised residues.

The extent of the oral and dermal exposures will be dependant on the animals' behaviour and husbandry practices; e.g. dermal exposure will result during rubbing on treated timber, but oral exposure (chewing/licking) will be more likely to occur during routine stabling or grazing where access to treated timber is commonplace.

This scenario is calculated in line with ECHA 2017a (chapter 6.5.3.1). Horses, beef and dairy cattle, pigs and goats were considered as recommended by the guidance. As no values of wood consumption for goats are available the value for horses was used for calculation. No oral exposure was calculated for beef and dairy cattle and pigs as they do not show a stereotypic chewing behavior. As calves show a different behaviour than grown-up beef cattle therefore a scenario "Oral exposure through licking treated surfaces" was calculated in line with ECHA 2017a (chapter 6.5.1.2, page 344).

The guidance states that the default maximum absorption of biocidal product into the treated wood is 50 L/m^3, which corresponds to the outer 1 cm layer of treated wood. As a worst case it is considered that the total amount of (active) substances from this layer is available through touching, chewing or licking.

As parts of the horse stalls or fencing and paddocks might be outdoor, the calculations are based on the highest treatment or application solution of 3.75% for the meta SPC1-formulations (e.g. Wolmanit CX-8) product in water for UC4 conditions, which represents the worst case for all relevant substances, except for 2-MEA where meta SPC 2-formualtions (e.g. Wolmanit CX-8SF) represents the worst case.

The inhalation exposure assessment can be regarded as very conservative estimation since a saturated vapour concentration (SVC) is considered. Furthermore, the most volatile substances can be assumed to already have evapourated after the drying phase of the treated wood. However this statement is not substantiated by data.

As inhalation exposure of active substances Cu-HDO, Cu-Carb., and Boric acid already showed acceptable values in Tier 1 SVC-approach, AT CA proceeded with Tier 3, as measured data for the SoC 2-EHA is available. For background information on Tier 3,

please see section "Further information and considerations on scenario [6]".		
	Parameters	**Value**
Tier 1	Concentration of substance in product Wolmanit CX-8	2.8% (Cu-HDO) 13.04% (Cu-Carb.) 4.0% (Boric acid) 8.0% (2-EHA)
	Maximum absorption of biocidal product into treated wood in the outer 1 cm layer	50 L/m³
	Application solution UC 4 Wolmanit CX-8/Wolmanit CX-8SF	3.75%
	Amount of active substance in the outer 1 cm layer of wood	52.5 g/m³ (Cu-HDO) 244.5 g/m³ (Cu-Carb.) 75.0 g/m³ (Boric acid) 150.0 g/m³ (2-EHA)
	Horse wood consumption[1]	1.9E-05 m³ per day
	Body weight[1] horse lactating goat slaughter goat fattening pig breeding pig beef cattle dairy cattle calf cattle	 400 kg 70 kg 13 kg 100 kg 260 kg 500 kg 650 kg 200 kg
	Thickness of surface layer of the wooden wall representing the amount of substance per square meter	0.05 mm = 0.05×10^{-3} m
	Body surface area in contact with surface[1]: horse lactating goat slaughter goat	 1.62 m² 0.45 m² 0.15 m²

	fattening pig breeding pig beef cattle dairy cattle calf cattle	0.45 m^2 0.84 m^2 1.44 m^2 1.68 m^2 0.87 m^2
	Tongue surface area calf[2]	0.008 m^2
	Licks per day[2]	10
	Thickness of treated wood of which a. s./SoC is extracted by licking	0.01 m
	Transfer coefficient	100%
	Amount of a.s. / SoC per square meter	2.63 mg/m² (Cu-HDO) 12.23 mg/m² (Cu-Carb.) 3.75 mg/m² (Boric acid) 7.5 mg/m² (2-EHA)
	Vapour pressure	<0.0001 Pa (Cu-HDO, between 20 °C and 50 °C)[9] <0.00001 Pa (Cu-Carb. 25 °C)[5] <0.00001 Pa (Boric acid 20 ºC)[7] 4 Pa (2-EHA 20 °C)[8]
	Molecular weight	Mw=349.9 g/mol (Cu-HDO) Mw=61.833 g/mol (Boric acid) Mw=221.1 g/mol (Cu-Carb.) Mw=144.2 g/mol (2-EHA)
	Gas constant	8.31451 J/K mol
	Temperature	293 K
	Alveolar ventilation rate[1] horse lactating goat slaughter goat fattening pig breeding pig beef cattle dairy cattle	 43 m^3/d 11 m^3/d 3 m^3/d 14 m^3/d 30 m^3/d 51 m^3/d 62 m^3/d

	calf cattle	25 m^3/d
	Inhalative absorption	100%
	Extraction factor by chewing	100%
Tier 2	Oral absorption (Cu-Carb.)[3]	25%
Tier 3	Measured concentration in air (mg/m^3)[11]	<0.037 (2-EHA)

[1] ECHA, 2017a, page 366

[2] ECHA, 2017a, page 344

[3] France, 2011, Assessment report page 48

[4] ECHA, 2015a, page 171, Table

[5] France, 2011, Assessment report page 43

[6] Safety Data Sheet, Monoethanolamine EG

[7] Netherlands, 2009 Assessment report. page 23

[8] Safety Data Sheet, 2-Ethylhexanoic acid

[9] Safety Data Sheet, Cu-HDO

[10] The applicant provided measured data, the concentration in air was derived from two exposure studies (please see studies BASF Wolman, 2018 and Boras, 2002). For more details on Tier 3, please see section "Further information and considerations on scenario [6]".

Calculations for estimating livestock exposure for Scenario [6]

Total exposure: oral exposure + dermal exposure + inhalation exposure

$$\begin{aligned}
&Oral\ systemic\ exposure, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right] \\
&\quad = Conc. of\ substance\ in\ b.p. [\%] \\
&\quad * Maximum\ absorption\ of\ b.p. into\ treated\ wood\ in\ outer\ 1\ cm\ layer\ \left(\frac{L}{m^3}\right) \\
&\quad * Treatment\ solution\ UC\ 4\ [\%]\, \frac{1000}{100 * 100} * wood\ consumption\ \left[\frac{m^3}{day}\right] \\
&\quad * Extraction\ by\ chewing\, \frac{[\%]}{100} * oral\ absorption\, \frac{[\%]}{100} * \frac{1}{body\ weight\ [kg]} * 1000
\end{aligned}$$

$$\begin{aligned}
&Oral\ systemic\ exposure\ licking, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right] \\
&\quad = Conc.of\ substance\ in\ b.p.[\%] \\
&\quad * Maximum\ absorption\ of\ b.p.into\ treated\ wood\ in\ outer\ 1\ cm\ layer\ \left(\frac{L}{m^3}\right) \\
&\quad * Treatment\ solution\ UC\ 4\ [\%]\ \frac{1000}{100*100} * Tongue\ surface\ area\ [m^2] \\
&\quad * Licks\ per\ day\ \left[\frac{1}{day}\right] \\
&\quad * Thickness\ of\ treated\ wood\ of\ which\ a.s.or\ SoC\ is\ extracted\ by\ licking\ [m] \\
&\quad * oral\ absorption \frac{[\%]}{100} * \frac{1}{body\ weight\ [kg]} * 1000
\end{aligned}$$

$$\begin{aligned}
&Inhalative\ systemic\ exposure\ \left[\frac{mg}{kg\ bw\ day}\right] \\
&\quad = \frac{\left(vapour\ pressure\ [Pa] * molecular\ weight\ \left[\frac{g}{mol}\right]\right)}{\left(gas\ constant\ \left[\frac{j}{Kmol}\right] * temperature\ [K]\right)} * 1000 \\
&\quad * Alveolar\ ventilation\ rate\ \left[\frac{m^3}{d}\right] * \frac{inhalative\ absorption[\%]}{100} * \frac{1}{body\ weight\ [kg]}
\end{aligned}$$

$$\begin{aligned}
&Dermal\ systemic\ exposure, tier\ 1\ \left[\frac{mg}{kg\ bw\ day}\right] \\
&\quad = Conc.of\ substance\ in\ b.p.[\%] \\
&\quad * Maximum\ absorption\ of\ b.p.into\ treated\ wood\ in\ outer\ 1\ cm\ layer\ \left(\frac{L}{m^3}\right) \\
&\quad * Treatment\ solution\ UC\ 4\ [\%]\ \frac{1000}{100*100} * Thickness\ of\ surface\ layer[mm] \\
&\quad * Body\ surface\ area\ in\ contact\ with\ surface\ [m^2] * transfer\ coefficient \frac{[\%]}{100} \\
&\quad * \frac{1}{body\ weight\ [kg]}
\end{aligned}$$

Detailed calculations are included in Appendix 3.2.

Summary table: systemic exposure of livestock exposure given in [mg/kg bw/day]					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**

Scenario [6] Horses	Tier 1	Cu-HDO: 0.0015 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 25.4524	Cu-HDO: 0.0106 Cu-Carb.: 0.0495 Boric acid 0.0152 2-EHA: 0.0304	Cu-HDO: 0.0025 Cu-Carb.: 0.0116 Boric acid: 0.0036 2-EHA: 0.0071	Cu-HDO: 0.0147 Cu-Carb.: 0.0612 Boric acid 0.0188 2-EHA: 25.4899
Lactating Goats	Tier 1	Cu-HDO: 0.0023 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 37.2062	Cu-HDO: 0.0169 Cu-Carb.: 0.0786 Boric acid 0.0241 2-EHA: 0.0482	Cu-HDO: 0.0143 Cu-Carb.: 0.0664 Boric acid: 0.0204 2-EHA: 0.0407	Cu-HDO: 0.0334 Cu-Carb.: 0.1451 Boric acid 0.0445 2-EHA: 37.2952
Slaughter goats	Tier 1	Cu-HDO: 0.0033 Cu-Carb.: 0.0002 Boric acid 0.0001 2-EHA: 54.6385	Cu-HDO: 0.0303 Cu-Carb.: 0.1411 Boric acid 0.0433 2-EHA: 0.0865	Cu-HDO: 0.0767 Cu-Carb.: 0.3573 Boric acid: 0.1096 2-EHA: 0.2192	Cu-HDO: 0.1103 Cu-Carb.: 0.4986 Boric acid 0.1529 2-EHA: 54.9443
Fattening pig	Tier 1	Cu-HDO: 0.0020 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 33.1474	Cu-HDO: 0.0118 Cu-Carb.: 0.0550 Boric acid 0.0169 2-EHA: 0.0338	n.r.	Cu-HDO: 0.0138 Cu-Carb.: 0.0551 Boric acid 0.0169 2-EHA: 33.1811
Breeding pig	Tier 1	Cu-HDO: 0.0017 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 27.3193	Cu-HDO: 0.0085 Cu-Carb.: 0.0395 Boric acid 0.0121 2-EHA: 0.0242	n.r.	Cu-HDO: 0.0101 Cu-Carb.: 0.0396 Boric acid 0.0121 2-EHA: 27.3435
Beef cattle	Tier 1	Cu-HDO: 0.0015 Cu-Carb.: 0.0001 Boric acid	Cu-HDO: 0.0076 Cu-Carb.: 0.0352 Boric acid	n.r.	Cu-HDO: 0.0090 Cu-Carb.: 0.0353 Boric acid

		0.0000 2-EHA: 24.1502	0.0108 2-EHA: 0.0216		0.0108 2-EHA: 24.1718
Dairy cattle	Tier 1	Cu-HDO: 0.0014 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 22.5839	Cu-HDO: 0.0068 Cu-Carb.: 0.0316 Boric acid 0.0097 2-EHA: 0.0194	n.r.	Cu-HDO: 0.0082 Cu-Carb.: 0.0317 Boric acid 0.0097 2-EHA: 22.6033
Calf cattle	Tier 1	Cu-HDO: 0.0018 Cu-Carb.: 0.0001 Boric acid 0.0000 2-EHA: 29.5959	Cu-HDO: 0.0114 Cu-Carb.: 0.0532 Boric acid 0.0163 2-EHA: 0.0326	Cu-HDO: 0.2100 Cu-Carb.: 0.9780 Boric acid: 0.3000 2-EHA: 0.6000	Cu-HDO: 0.2232 Cu-Carb.: 1.0313 Boric acid 0.3163 2-EHA: 30.2285
Scenario [6]Horses	Tier 2	n.r.	n.r.	Cu-HDO: 0.0025 Cu-Carb.: 0.0029 Boric acid: 0.0036 2-EHA: 0.0071	Cu-HDO: 0.0147 Cu-Carb.: 0.0525 Boric acid 0.0188 2-EHA: 25.4899
Lactating Goats	Tier 2	n.r.	n.r.	Cu-HDO: 0.0143 Cu-Carb.: 0.0166 Boric acid: 0.0204 2-EHA: 0.0407	Cu-HDO: 0.0334 Cu-Carb.: 0.0953 Boric acid 0.0445 2-EHA: 37.2952
Slaughter goats	Tier 2	n.r.	n.r.	Cu-HDO: 0.0767 Cu-Carb.: 0.0893 Boric acid: 0.1096 2-EHA: 0.2192	Cu-HDO: 0.1103 Cu-Carb.: 0.2306 Boric acid 0.1529 2-EHA: 54.9443
Fattening pig	Tier 2	n.r.	n.r.	n.r.	Cu-HDO: 0.0138 Cu-Carb.:

					0.0551 Boric acid 0.0169 2-EHA: 33.1811
Breeding pig	Tier 2	n.r.	n.r.	n.r.	Cu-HDO: 0.0101 Cu-Carb.: 0.0396 Boric acid 0.0121 2-EHA: 27.3435
Beef cattle	Tier 2	n.r.	n.r.	n.r.	Cu-HDO: 0.0090 Cu-Carb.: 0.0353 Boric acid 0.0108 2-EHA: 24.1718
Dairy cattle	Tier 2	n.r.	n.r.	n.r.	Cu-HDO: 0.0082 Cu-Carb.: 0.0317 Boric acid 0.0097 2-EHA: 22.6033
Calf cattle	Tier 2	n.r.	n.r.	Cu-HDO: 0.2100 Cu-Carb.: 0.2445 Boric acid: 0.3000 2-EHA: 0.6000	Cu-HDO: 0.2232 Cu-Carb.: 0.2978 Boric acid 0.3163 2-EHA: 30.2285
Scenario [6] Horses	Tier 3	2-EHA: 0.0040	n.r.	n.r.	2-EHA: 0.0415
Lactating Goats	Tier 3	2-EHA: 0.0058	n.r.	n.r.	2-EHA: 0.0947
Slaughter goat	Tier 3	2-EHA: 0.0085	n.r.	n.r.	2-EHA: 0.3143
Fattening pig	Tier 3	2-EHA: 0.0052	n.r.	n.r.	2-EHA: 0.0389

Breeding pig	Tier 3	2-EHA: 0.0043	n.r.	n.r.	2-EHA: 0.0285
Beef cattle	Tier 3	2-EHA: 0.0038	n.r.	n.r.	2-EHA: 0.0254
Dairy cattle	Tier 3	2-EHA: 0.0035	n.r.	n.r.	2-EHA: 0.0229
Calf cattle	Tier 3	2-EHA: 0.0046	n.r.	n.r.	2-EHA: 0.6373

n.r. not relevant

Further information and considerations on scenario [5] and [6]

Considerations on Tier 3 (inhalation exposure):

Remark: Considerations concerning 2-MEA are relevant for scenario 5 only.

Tier 1 inhalation exposure assessment can be estimated as very rough and conservative, as a daily exposure of 24 hours on basis of the saturated vapour concentration (SVC) with no ventilation was considered. As this rough approach in Tier 1 already showed acceptable exposure levels for the active substances but resulted in unacceptable risk for humans/livestock concerning 2-EHA and 2-MEA, AT CA proceeded with Tier 3 calculations as studies are available and additional exposure assessments become inevitable.

Therefore in Tier 3 workplace exposure measurements (BASF Wolman, 2018) and air concentration measurements performed in test rooms loaded with treated wood (Boras, 2002) were be used to refine the calculations for exposure assessment.

Concerning 2-EHA (Boras, 2002):

The report presents indoor air concentration measurement of 2-EHA with Wolmanit CX-S treated timber. Please cf. to the confidential annex for detailed information of composition of this product and for read-across.

For the purpose of the study, untreated pinewood was impregnated via vacuum pressure treatment and afterwards placed in a measuring room, which can be regarded as a normal room in a residential building with a door and a double window. In order to simulate worst case conditions a very high area of impregnated wood/room volume ratio of 0.2 m^2/m^3 was chosen. Samples for the measurements were taken in a period of two weeks; the first samples were taken the day after impregnation and then 4, 8 and 15 days after. The results can therefore be read across and considered as worst-case. The air concentrations of all samples were below the detection limit of 0.037 mg/m^3. Thus for inhalation exposure calculation this value was used.

Concerning 2-MEA (BASF Wolman, 2018, scenario 5):

The workplace air concentration measurements have been performed at various places in a pressure impregnation plant. Amongst these, there was also the stabilization room where the treated wood is stored for drying, which can be considered as worst-case compared to the exposure of completely dried wood in indoor rooms as the treated wood is still freshly impregnated. The measured concentration of 2-MEA in the stabilisation hall was 0.018 mg/m³. This value was used for inhalation exposure calculation.

The wood preservative used for measurement of 2-MEA is Wolmanit CX-8 which is not part of the current authorisation. Anyway, its composition is known by the AT CA. Please cf. to the confidential annex for detailed information of composition of this product and for read-across.

Conclusion and WCCE calculation

The trigger value of 0.004 mg/kg bw/day was exceeded for all active substances for all species.

Therefore WCCE (worst case consumer exposure) calculation, that considers residues of the substance that occur as a result of authorised use was performed:

For Cu-HDO oral absorption is 100% (Austria, 2013). For basic copper carbonate oral absorption of 36% for humans and 25% for animals were determined (France, 2011). Based on the homeostatic regulation process of copper, bioaccumulation and biomagnification are considered as not applicable for copper according to the AR (France, 2011).

The content of the oral absorption of boric acid was 100% (Netherlands, 2009). Boron species including boric acid have a low bioconcentration or bioaccumulation potential in aquatic or terrestrial species (Netherlands, 2009).

Results from a toxicokinetic study in rats show that 2-EHA is rapidly and extensively absorbed after oral administration with 90% and 70% oral and dermal absorption. In mice and rats, 2-EHA showed a preferential distribution in kidneys, liver and blood. Available data indicate that 2-EHA undergoes extensive metabolism and exhibited a rapid elimination in rats after oral, intravenous and dermal administrations. Excretion occurs predominantly in the urine within the first 24 hours, which is consistent with the rapid excretion of the substance observed in workers exposed by the dermal and inhalation routes (Spain, 2017). Therefore no bioaccumulation is assumed. Because 2-EHA is transferred to pubs (Spain, 2017) exposure via lactation is possible.

The worst case consumer exposure (WCCE) was performed assuming residues in milk (lactating goats) and meat (calf for Cu-HDO, Cu-Carb., boric acid and 2-EHA).

The screeing estimate took into account all possible exposure pathways that would result from use of the biocide (oral, dermal and inhalation, cf. table above). The assumptions about the relative distribution of the substances between the edible tissues of the food basket should be conservative and scientifically plausible (EMA, 2015).

Screening calculation residues in milk: No data are available that would allow quantifying the transfer of the active substances and SoCs into milk, therefore 100% of the external exposure calculation of lactating goats was used for the calculation. I_{milk} is from the EMA food basket (1.5 L/day or 1.5 kg/day)

WCCE = amount of transfer into milk*I_{milk}/bw human

WCCE Cu-HDO: 0.0334 mg/kg bw/d*1.5 kg/d /60 kg = 0.000835

WCCE Cu-Carb.: 0.0953 mg/kg bw/d*1.5 kg/d /60 kg = 0.0023825

WCCE Boric acid: 0.0442 mg/kg bw/d*1.5 kg/d /60 kg = 0.001105

WCCE 2-EHA: 0.0947 mg/kg bw/d*1.5 kg/d /60 kg = 0.0023675

Screening calculation residues in meat: I_{tissue} = daily edible tissue consumption from EMA food basket (0.5 kg/day)

WCCE Cu-HDO: 0.2232 *0.5 kg/d /60 kg = 0.00186

WCCE Cu-Carb.: 0.2978 *0.5 kg/d /60 kg = 0.002482

WCCE Boric acid: 0.3163 *0.5 kg/d /60 kg = 0.002636

WCCE 2-EHA: 0.6373 *0.5 kg/d /60 kg = 0.005311

Sum of both calculations per substance:

WCCE Cu-HDO: 0.002695 mg/kg bw/d

WCCE Cu-Carb.: 0.0048645 mg/kg bw/d

WCCE Boric acid: 0.003741 mg/kg bw/d

WCCE 2-EHA: 0.007679 mg/kg bw/d

Estimating transfer of biocidal active substances into foods as a result of professional and/or industrial application(s)

The trigger values of 0.004 mg/kg bw/day are exceeded for all substances for all species. WCCE calculation: See above.

Estimating transfer of biocidal active substances into foods as a result of non-professional use

Not applicable for Wolmanit CX-10 products. Non-professional use is not foreseen.

Exposure associated with production, formulation and disposal of the biocidal product

Occupational exposure during production and formulation of the biocidal product is not assessed under the requirements of the BPR. It is assumed that the production is performed in conformity with national and European occupational safety and health regulations.

In addition, production or formulation of biocidal products are already covered by REACH legislation, where the registrants (manufacturers/importers) of substances are obliged to consider human hazard and exposure and to provide RMMs/exposure scenarios for ensuring safe use (e.g. via SDS in the supply chain). Moreover, it is assumed that industrial production sites are subject to permit for installation. Therefore, it is not considered relevant to perform an additional exposure assessment under the biocide regime.

Moreover, the applicant provided the following information:

"Products of the Wolmanit CX-10_family are produced in a highly automated system thereby minimising exposure. Workers are specifically trained and expected to wear adequate personal protective equipment according to the risk classification and the safety recommendations given in the safety data sheet.

The manufacturing of the end product consists in a simple mixing of the different constituents of the product in a mixing tank. The process is automated to the greatest possible extent. After mixing, the product is filled in the appropriate containers and stored. Filling of the transport containers occurs also fully automatically. At least any dermal exposure during filling is excluded. Inhalative exposure is marginal.

Exposure calculation considers therefore only inhalative exposure during production / formulation of the product. The worst-case calculation is based on the saturated vapour pressure of the active substances.

Exposure during disposal is considered to be negligible because any direct exposure to the product is excluded. Emptied containers are given back to the producer for recycling. Dermal exposure is therefore excluded. As a worst-case scenario, inhalative exposure has been considered."

Aggregated exposure

The methodology how to assess aggregated exposure has not been developed yet. This chapter might be subject to revision at product authorisation renewal stage.

Summary of exposure assessment

Scenarios and values to be used in risk assessment							
Scenario number	**Exposed group**	**Tier/PPE**	**Estimated total uptake [mg/kg bw/day]**				
			Cu-HDO	Cu-Carbonate	Boric acid	2-EHA	2-MEA
[1]	Industrials	Tier 2 / gloves, coated overall – worst case model formualtion	*0.0355*	*0.0337*	*0.0245*	*0.2023*	*0.8502*
		Tier 3 / gloves, coated overall – meta SPC 1	*0.0178*	*0.0172*	*0.0123*	*0.1011*	*0.3741*
		Tier 3 / gloves, coated overall – meta SPC 2	*0.0178*	*0.0172*	*0.0123*	*0.0948*	*0.4247*
		Tier 3 / gloves, coated overall – meta SPC 3	*0.0178*	*0.0172*	*0.0123*	*0.0000*	*0.4249*
[1]+[5]	Industrials	Tier 3 / gloves, coated overall - meta SPC 1	*0.0178*	*0.0172*	*0.0123*	*0.1110*	*0.3789*
		Tier 3 / gloves, coated overall	*0.0178*	*0.0172*	*0.0123*	*0.1047*	*0.4295*

Scenarios and values to be used in risk assessment							
Scenario number	**Exposed group**	**Tier/PPE**	**Estimated total uptake [mg/kg bw/day]**				
			Cu-HDO	Cu-Carbonate	Boric acid	2-EHA	2-MEA
		- meta SPC 2					
		Tier 3 / gloves, coated overall - meta SPC 3	*0.0178*	*0.0172*	*0.0123*	*0.0099*	*0.4297*
[2] UC 4 special	Professionals (adults)	Tier 1 / no PPE	*0.5997*	*0.5654*	*0.6859*	*3.4219*	*14.3718*
		Tier 2 / no PPE	*0.0138*	*0.0196*	*0.0163*	*0.0735*	*0.3088*
[2] UC 4 normal	General Public (adults)	Tier 1 / no PPE	*0.4318*	*0.4071*	*0.4939*	*2.4637*	*n.r.*
		Tier 2 / no PPE	*0.0099*	*0.0141*	*0.0117*	*0.0529*	*n.r.*
[3]	General public (toddler)	Tier 1 / no PPE	*0.1008*	*0.4694*	*0.1440*	*0.2880*	---
		Tier 2 / no PPE	*0.0254*	*0.0019*	*Not calculated*	*Not calculated*	---
[4]	General public (toddler)	Tier 1 / no PPE	*2.9030*	*4.8672*	*4.1472*	*8.2944*	*n.r.*
		Tier 2 / no PPE	*0.0581*	*0.0973*	*0.0829*	*0.1659*	*n.r.*
		Tier 3 / no PPE	*0.0017*	*0.0132*	*n.r.*	*n.r.*	*n.r.*
[3]+[4]+[5]	General public (toddler)	*Tier 2+3 / no PPE*	*0.0271*	*0.0151*	*0.2269*	*0.4835*	*n.r.*

Scenarios and values to be used in risk assessment							
Scenario number	**Exposed group**	**Tier/PPE**	**Estimated total uptake [mg/kg bw/day]**				
			Cu-HDO	Cu-Carbonate	Boric acid	2-EHA	2-MEA
[5]	*General public (toddler)*	*Tier 1*	*n.r.*	*n.r.*	*n.r.*	*189.4135*	*1002.8933*
		Tier 3	*n.r.*	*n.r.*	*n.r.*	*0.0296*	*0.0144*
[5]	*General Public (adult)*	*Tier 3*	*n.r.*	*n.r.*	*n.r.*	*0.0099*	*0.0048*
[6]	Livestock exposure (horses)	*Tier 1 horse*	*0.0147*	*0.0612*	*0.0188*	*25.4899*	*n.r.*
		Tier 1 lactating goat	*0.0334*	*0.1451*	*0.0445*	*37.2952*	
		Tier 1 slaughter goat	*0.1103*	*0.4986*	*0.1529*	*54.9443*	
		Tier 1 fattening pig	*0.0138*	*0.0551*	*0.0169*	*33.1811*	
		Tier 1 breeding pig	*0.0101*	*0.0396*	*0.0121*	*27.3435*	
		Tier 1 beef cattle	*0.0090*	*0.0353*	*0.0108*	*24.1718*	
		Tier 1 dairy cattle	*0.0082*	*0.0317*	*0.0097*	*22.6033*	
		Tier 1 calf cattle	*0.2232*	*1.0313*	*0.3163*	*30.2285*	
		Tier 2 horse	*0.0147*	*0.0525*	*0.0188*	*25.4899*	*n.r*
		Tier 2 lactating goat	*0.0334*	*0.0953*	*0.0445*	*37.2952*	

Scenarios and values to be used in risk assessment							
Scenario number	**Exposed group**	**Tier/PPE**	**Estimated total uptake [mg/kg bw/day]**				
			Cu-HDO	Cu-Carbonate	Boric acid	2-EHA	2-MEA
		Tier 2 slaughter goat	*0.1103*	*0.2306*	*0.1529*	*54.9443*	
		Tier 2 fattening pig	*0.0138*	*0.0551*	*0.0169*	*33.1811*	
		Tier 2 breeding pig	*0.0101*	*0.0396*	*0.0121*	*27.3435*	
		Tier 2 beef cattle	*0.0090*	*0.0353*	*0.0108*	*24.1718*	
		Tier 2 dairy cattle	*0.0082*	*0.0317*	*0.0097*	*22.6033*	
		Tier 2 calf cattle	*0.2232*	*0.2978*	*0.3163*	*30.2285*	
		Tier 3 horse	*0.0147*	*0.0525*	*0.0188*	*0.0415*	*n.r.*
		Tier 3 lactating goat	*0.0334*	*0.0953*	*0.0445*	*0.0947*	
		Tier 3 slaughter goat	*0.1103*	*0.2306*	*0.1529*	*0.3143*	
		Tier 3 fattening pig	*0.0138*	*0.0551*	*0.0169*	*0.0389*	
		Tier 3 breeding pig	*0.0101*	*0.0396*	*0.0121*	*0.0285*	
		Tier 3 beef cattle	*0.0090*	*0.0353*	*0.0108*	*0.0254*	
		Tier 3 dairy cattle	*0.0082*	*0.0317*	*0.0097*	*0.0229*	
		Tier 3 calf cattle	*0.2232*	*0.2978*	*0.3163*	*0.6373*	

2.2.6.3 Risk characterisation for human health

2.2.6.3.1 Risk characterisation for local effects

The products of the Wolmanit CX-10_family are regarded to cause burns to the skin (and bear therefore a risk for severe eye damage). A NOAEC was not defined for these effects. Therefore, adequate personal protective equipment has to be used in order to mitigate this risk for primary exposure situations. According to the hazard categorisation of local effects, this classification of the undiluted products corresponds to the hazard category high (ECHA 2017a). A qualitative risk assessment for potential local effects is provided in chapter 2.2.6.3.1.

Exposure to the products of the Wolmanit CX-10_family may appear in practice primarily to the diluted product. Exposure during mixing and loading operations is considered negligible as automated dilution by pumping transfer means exposure would be very low in scenario 1. Dilution depends on the use classes (cf. table below).

The expected local effects of the application solutions of products of the Wolmanit CX-10_family are mainly based on a few substances with a content of these substances below 3% of the in-use dilutions (cf. confidential annex). This value is below the classification limit for skin corrosion and eye damage. Consequently, the maximum Wolmanit CX-10_family application solution for special application (UC4) is likely to rather cause irritant effects for skin and eyes. In addition, the maximum application solution is relevant in practice only for special applications of the product like impregnation of poles.

An overview of the concentration of the treatment or application solutions and classification relevant substances in those solutions was compiled (based on highest concentrations of the ranges of co-formulants in meta SPC 1, 2 and 3, cf. also confidential annex). The theoretically "resulting classification" and hazard categorisation for local effects is given in the table below:

Products	**Use class**	**Application solution**	**Concentrations of classification relevant substances in the application solution**	
Meta SPC 1, 2, 3	4 (special)	4.17 - 5.21%	≥1% - ≤3%	Skin Irrit. 2, Eye Irrit. 2
	4 (normal)	1.57 – 3.75%	≤1% - ≤3%	no class - Skin Irrit. 2/Eye Irrit. 2
	3	0.8 - 1.5%	≤1%	no class

Dermal transfer measurements from treatment plants are available providing a local exposure estimate of 0.2 mg product/cm² (see 2.2.6.2, further information and considerations on scenario [1]). This represents a relatively low amount, if compared e.g. with the testing requirements in OECD TG 404 (dermal irritation test), where an application rate of 83 mg/cm² is recommended (500 mg/6 cm²). This might be considered as indication that the risk for local irritation effects from exposure to treated surfaces is low. However no NOAEC or AEC is available for local dermal effects (or eye effects from hand to eye transfer) from repeated exposure to the products.

A qualitative risk assessment for local effects of treated wood is provided in the table below.

Hazard		**Exposure**					
Hazard Category	**effects in terms of C&L**	**Who is exposed?**	**Tasks, uses, processes**	**Potential exposure route**	**Frequency and duration of potential exposure**	**Relevant RMM & PPE**	**Conclusion on risk**
high	Skin Corr.1B (H314) or Skin Irrit. 2 (H315) Eye dam. 1 (H318) Corrosive to the respiratory tract (EUH071) (H335)	Industrial worker	Exposure during mixing and loading operations is considered to be negligible as automated dilution by pumping transfer	Skin Eye RT (respire-atory tract)	Few minutes per day or less	Technical and organisational RMM for work with high hazard category, including, high ventilation, automated dosing device and use of appropriate gloves, face shield, footwear and coverall.	No exposure expected since technical and organisational RMM adequate for the high hazard category are achievable: + short duration of potential exposure + practically closed system + use of PPE
low	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319)	Industrial worker	Intermittent manual handling of water-wet wood and (associated) equipment (human exposure scenario 1)	Skin Eye RT	Daily; varying between 20 minutes and 3 hours per day	Adequate technical and organisational RMM are achievable: + minimisation of manual phases + minimisation of splashes and spills + good ventilation expected within industrial applications + regular cleaning of equipment and work area + use of PPE	Acceptable: + acceptable duration of potential exposure + reversible effects + installed RMM at place + trained workers + use of appropriate PPE + cleaning of the treatment chamber and pressure treatment of wood shall not be performed by the same operator on the same day.

Hazard		**Exposure**					
Hazard Category	**effects in terms of C&L**	**Who is exposed?**	**Tasks, uses, processes**	**Potential exposure route**	**Frequency and duration of potential exposure**	**Relevant RMM & PPE**	**Conclusion on risk**
						(coverall, face shield, boots, chemical resistant gloves) + training for staff on good practice. + good standard of personal hygiene	
low	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319)	Professionals	Dermal contact from sawing and sanding dry treated wood (human exposure scenario 2)	Skin Eye (from hand to eye transfer)	May be daily, for several hours/day dermal contact with dry treated wood 0.2 mg/cm² skin	- use of gloves by professionals expected to protect for mechanical injury	- relevant for treated wood at the highest application rate for UC3 and UC4 - inside contamination of gloves cannot be excluded Nevertheless use appears acceptable since: + reversible effects + low exposure expected in terms of mg/cm^2 due to contact with usually dry wood
low	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319)	General public	Dermal contact with dry, treated wood (human exposure scenario 2, 4)	Skin Eye (from hand to eye transfer)	Maybe daily, unlikely more than 1 hour dermal contact with dry treated wood per day, except for short term work of cutting and sanding treated wood	- no RMM possible for treated wood (in service)	- relevant for treated wood at the highest application rate for UC3 and UC4 - contact with weathered (wet) outdoor wood cannot be excluded - daily dermal contact for more than 1 hour unlikely

Hazard		Exposure					
Hazard Category	**effects in terms of C&L**	**Who is exposed?**	**Tasks, uses, processes**	**Potential exposure route**	**Frequency and duration of potential exposure**	**Relevant RMM & PPE**	**Conclusion on risk**
					Use of treated wood according to the authorised use (cf. section 2.1.4) 0.2 mg/cm² skin		except for cutting and sanding treated wood e.g. for horticulture and playground equipment - for cutting and sanding treated wood gloves by non-professionals likely worn to protect for mechanical injury - if gloves were used: inside contamination of gloves cannot be excluded Nevertheless use appears acceptable since: + reversible effects + low exposure expected in terms of mg/cm^2

Conclusion

Based on the overview of potential exposure and RMM provided in the table above it is concluded that the risk for local corrosive/irritant effects to skin, eye or the respiratory tract is acceptably low. In addition adequate P-phrases including P280 are proposed (cf. chapter 2.1.3).

2.2.6.3.2 Risk characterisation for systemic effects

Reference values to be used in Risk Characterisation

Cu-HDO (Austria, 2013)

Reference	**Study**	**NOAEL (LOAEL)**	**AF**[1]	**Correction for oral absorption**	**Value** (mg/kg bw/day)
AEL_short-term	Rabbit developmental toxicity study	Maternal NOAEL = 10 mg/kg Developmental NOAEL = 10 mg/kg	100	-	0.1
AEL_medium-term	Rabbit developmental toxicity study		300	-	0.033
AEL_long-term	Rabbit developmental toxicity study		300	-	0.033
ARfD	not relevant				
ADI	not relevant				

Basic copper carbonate (France, 2011)

For basic copper carbonate, the toxicologically relevant moiety for systemic toxicity is the Cu^{2+} ion, which is released to a different degree from all the copper compounds. No repeated dose toxicity studies were available for basic copper carbonate during active substance evaluation. Therefore read-across for systemic toxicity endpoints to copper sulphate data and other more soluble copper compounds were proposed representing a worst-case for the determination of the systemic toxicity of relatively insoluble copper compounds (RAC, 2014). However, RAC noted that differences in solubility and other physico-chemical properties may potentially impact the toxicity of the various copper compounds (RAC, 2014).

The short term and long term AELs for basic copper carbonate were calculated for Cu^{2+} (based on read-across to copper sulphate) and were 0.082 and 0.041 mg/kg bw/d, respectively. (France, 2011).

The current calculations for basic copper carbonate in this Wolmanit CX-10 family were based on the active substance basic copper carbonate applying an adjustment from copper concerning the molecular weight (221.1 for basic copper carbonate to 2*63.5 for Cu^{2+}) while it is important to stress that AEL values in the CAR were expressed in Cu^{2+} equivalents (cf. France, 2011). However, this adjustment did not affect in any way the risk characterisation ratios (despite dermal absorption value was set for copper). For basic copper carbonate oral absorption of 36% for humans and 25% for animals were determined (France, 2011). These values defined for the a.s. are also the values of the copper.

For renewal of the BPF exposure and risk characterisation ratios should be performed based on Cu^{2+}.

Reference	**Study**	**NOAEL (LOAEL)**	**AF^1**	**Correction for oral absorption**	**Value** (mg/kg bw/day)	
					Referring to Cu	**Referring to Cu-Carb.**
AEL_short-term	90-day oral rat study with copper sulphate	16.3 mg Cu/kg bw/d NOAEL$_{systemic}$ = 4.1 mg Cu/kg bw/d	50	25%	0.082	0.143
AEL_medium-term			50	25%	0.082	0.143
AEL_long-term			100	25%	0.041	0.071
ARfD	Not applicable					
ADI	As no food risk assessment was deemed necessary because of the negligible exposure through food, no ADI was derived. An ADI value of 0.15 mg Cu/kg bw/d is nevertheless available in the literature (EFSA, 2018)					
AEC	Although basic copper carbonate induced local effects (eye irritation) no local AEC was derived as far as no local effect was detected in the absence of systemic effects.					

Boric acid (Netherlands, 2009)

Reference	**Study**	**NOAEL (LOAEL)**	**AF^1**	**Correction for oral absorption**	**Value** (mg/kg bw/day)	
					Referring to boron	**Referring to Boric acid**
AEL_short-term	Developmental study rat	NOAEL for embryotoxic / teratogenic effects of 55 mg/kg bw/d or 9.6 mg Boron/kg bw/day	100	-	~ 0.1	0.572
AEL_medium-term						
AEL_long-term						
ARfD	not relevant					
ADI	EFSA ANS Panel (2013) established a group ADI of 0.16 mg boron/kg bw/day					

2-Ethylhexanoic acid

Reference	**Route of expsoure**	**Endpoint**	**NOAEL (LOAEL)**	**AF**		**Value**	
				Worker	**Consumer**	**Worker**	**Consumer**
DNEL $_{\text{long-term}}$ (Spain, 2017 and submitted SDS)	Inhalation	developmental toxicity / teratogenicity	176.21 mg/m^3	12.5	25	14 mg/m^3	3.5 mg/m^3
	Dermal	developmental toxicity / teratogenicity	100 mg/kg bw /day	50	100	2 mg/kg bw /day	1 mg/kg bw /day
	Oral	developmental toxicity / teratogenicity	100 mg/kg bw /day	-	100	-	1 mg/kg bw /day

2-Aminoethanol

Reference	**Route of exposure**	**Source**	**Value**
			Worker
IOELV	Inhalation	8-Hour TWA Directive 2006/15/EC	2.5 mg/m^3 or 0.416 mg/kg bw/day[3]
DNEL $_{\text{long-term}}$	Dermal	SDS submitted by the applicant	1 mg/kg

For 2-MEA (2-aminoethanol) IOELVs of 2.5 mg/m^3 (8-hour TWA) and 7.6 mg/m^3 (15-minute TWA) STEL have been established for under the 2nd IOELV Directive (2006/15/EC). The Scientific Committee on Occupational Exposure Limits (SCOEL) used a LOAEC of 5 ppm (13 mg/m^3) from an inhalation study in rats, dogs and guinea pigs based on the critical effects of irritation and behavioural changes (lethargy after two to three weeks of exposure). This LOAEC was very close to the NOAEC of 10 mg/m^3 from the 28-day inhalation study included in the registration dossier (UK, 2016b).

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[3] Calculated from Worker DNEL$_{\text{\_long-term\_inhalation}}$*human respiration volume under light activity for workers (wRV) of 10 m^3/person / body weight of 60 kg. Respiratory volume is taken from ECHA (2012).

Maximum residue limits or equivalent

Based on the use of treated wood (no direct contact with food or feed) and the exposure estimates for livestock no dietary risk assessment is necessary. However, for copper carbonate the European Medicine Agency (EMA) published in 2016 a European public MRL assessment report (EPMAR) for all food producing species. The conclusion of this evaluation is that the establishment of MRL values for copper carbonate is not needed for the protection of the consumer. The substance can thus be included in the list of substances approved for use in all food-producing species with a 'No MRL required' classification (EMA, 2016).

Specific reference value for groundwater

Reference is made to the respective assessment reports of the active substances Cu-HDO (Austria, 2013), boric acid (Netherlands, 2009) and basic copper carbonate (France, 2011).

Scenario 1: Risk for industrial users from vacuum pressure treatment / oscillating pressure process for active substances

Risk ratios (hazard quotients, HQ) and mixture risk assessment hazard index (HI) values for the active substances Cu-HDO, basic copper carbonate (expressed as copper) and boric acid were calculated. The exposure calculations were based on UC 4 special application as this represented the highest application rates. However, based on the wide dilution range of the Wolmanit CX-10_family a higher dermal absorption value for UC 1 to UC 4 for boric acid (cf. chapter 3.2.6.1 and 3.2.6.2) would be justified. As with increased dilutions and thus increased dermal absorption decreased application rates are implicit, some calculations were also performed on UC 4 application solution of 3% and 3.75% for boric acid to show if these two trends counterbalance each other. As the exposure estimate was only marginally higher (third decimal place) hazard indexes were not affected.

The Guidance on the Biocidal Products Regulation, Volume III Human Health - Part B Risk Assessment (ECHA, 2017a), suggests that "as there is little experience of applying mixture RA methodology at present, it has been proposed that for the time being a combined risk assessment should only be applied to multiple (2 or more) active substances and not to SoCs. When sufficient experience has been gained, the combined risk assessment methodology could be extended to include SoCs." However, the guidance on SoCs further specifies, "regardless of band, for SoCs classified for the same endpoint, the potential exists that they act additively with other SoCs and/or with the active substance(s) and that a combined risk assessment would be required."

Thus, a combined risk assessment on SoCs that were determined for a quantitative risk assessment for this scenario were included: 2-EHA based on CMR properties and 2-MEA based on a Union occupational exposure limit (OEL). Please see confidential annex for additional information on SoCs.

Based that the inhalation route contributes only marginally to the estimated body burden in scenario 1 (factor 100 and lower compared to the dermal route) the two exposure routes were summed up and compared to the dermal reference values for 2-MEA and 2-EHA. However, for 2-MEA the inhalation route was assessed separately and the inhalation exposure from 2-MEA was compared to its respective IOELV. For 2-EHA the bases for DNEL derivation was the oral route and due to high uncertainties for route-to-route extrapolation the inhalation exposure was not assessed separately.

Scenario 1 takes into account exposure of professionals within vacuum-pressure preservative plants. Exposure to the products of Wolmanit CX-10_family as such must be avoided due to the corrosive properties of the product. The treatment process is automated, but dermal contamination with the in use solution may occur through direct contact with the surface of treated timber and through contact with ancillary equipment and contaminated process plant. Since the model provides only exposure values underneath gloves, no tier 1 assessment is presented. For tier 2 assessment the use of safety shoes, gloves, boots and coated coveralls were considered as RMM. Tier 2 exposure values were calculated with the worst case model formulation that cover all the meta SPCs. Tier 3 assessment includes RMM (use of safety shoes, gloves, boots and coated coveralls) measured exposure data combined with modelled exposure data and presented for each meta SPC of the Wolmanit CX-10_family.

For exposure estimates the highest content of each of the substances within meta SPC 1, 2 and 3 products were used (“worst case model formulation”; differences within meta SPC 1 and 2 were only marginally).

Scenario	**Tier**	**AEL $_{\text{long term}}$ or DNEL $_{\text{long term}}$ [mg/kg bw/d]**					**Estimated total uptake [mg/kg bw/d]**					**Estimated uptake / AEL (HQ)**					**Hazard index (HI)**	**Accept-able (yes / no)**
		Cu-HDO	Cu-Carb/ Cu	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb./ Cu	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb / Cu	Boric acid	2-EHA	2-MEA		
1 industrial vacuum pressure application	2 / PPE, worst case model formulation	0.033	0.071	0.572	2	1	0.035	0.034	0.024	0.204	0.85	1.06	0.47	0.04	0.10	0.85	2.53	No
	3 / PPE: measured data combined with modelled data/ meta SPC 1	0.033	0.071	0.572	2	1	0.018	0.017	0.012*	0.101	0.37	0.54	0.24	0.02	0.05	0.37	1.23	No
	3 / PPE: measured data combined with modelled data/ meta SPC 2	0.033	0.071	0.572	2	1	0.018	0.017	0.012*	0.095	0.43	0.54	0.24	0.02	0.05	0.42	1.28	No
	3 / PPE: measured data combined with modelled data/ meta SPC 3	0.033	0.071	0.572	--	1	0.018	0.017	0.012*	--	0.425	0.54	0.24	0.02	0.00	0.42	1.23	No

* Exposure estimates for UC 4 and 20% dermal absorption would result in 0.047 mg/kg bw/d. Based on the change in the third decimal place this does not affect the HI values.

Based on the screening approach for mixture risk assessment the hazard index of >1 for all meta SPC products indicate a need for further refinement. Meta SPC 1 products are covered within meta SPC 2 and 3 (please see table above), therefore the refinement was performed for these two meta SPCs only.

According to ECHA (2017a), the next tier includes the following refinement:
- Tier 3A: Combined exposure assessment by grouping the substances with common target organ/mode of action (with the non-refined AEL/DNEL of each substance).

Therefor as a next step in the evaluation, a compilation table of target organ(s)/mode of action(s) for each substance was made below including effects relevant for the point of departure (PoD).

Comparison of target organs and point of departures

Substance	**Point of Departure (PoD)/ study/species**	**PoD (organs and organ systems) for systemic toxicity, MoA (if known)**	**Additional target organs observed at higher doses**	**Remarks/ specific DNEL**
CU-HDO	Maternal NOAEL 10 mg/kg Developmental NOAEL 10 mg/kg PNDT study, rabbit	NOAEL was based on the primary effect of reduced food consumption (temporarily to 20% of control in the high dose and to 60% of the control in medium dose) with subsequent maternal and fetal effects (reduced body weight gain, post-implantation loss, skeletal variations and retardations)	Liver (histopathological changes, necrosis), kidney (histopathological changes), GI (Austria, 2013)	RAC concluded on STOT RE 2 (liver)[4] Cu-HDO is not classified for developmental toxicity
Basic copper carbonate	$NOAEL_{systemic}$ 4.1 mg Cu/kg bw/d 90-day Repeated dose toxicity, rat	NOAEL was based on forestomach and kidney damages.	Oral, rat: target organs of copper were the liver (inflammation), kidneys (histopathological changes) and forestomach (hyperplasia and hyperkeratos	RAC concluded on no STOT RE classification[5]

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[4] https://echa.europa.eu/documents/10162/559efa48-ceaa-65f9-03a4-1a762112e55f

[5] https://echa.europa.eu/documents/10162/0e017799-6d68-7498-9aff-799b80ca0475

Substance	Point of Departure (PoD)/ study/species	PoD (organs and organ systems) for systemic toxicity, MoA (if known)	Additional target organs observed at higher doses	Remarks/ specific DNEL
			is), with some evidence of haematological changes (RAC 2014).	
Boric acid	NOAEL of 9.6 mg Boron/kg bw/day, PNDT, rat	The NOAEL embryotoxic/teratogenic effects of boric acid was 55 mg/kg bw/day (9.6 mg B/kg bw/day), based on a reduction in mean foetal body weight/litter, in a 2-genertion study also fertility effects were observed.	RDT: Hematopetic system, testes (Netherlands, 2009)	--
2-EHA	NOAEL 100 mg/kg bw/d, PNDT study, rats	NOAEL based on reduced skeletal ossification, reduction of foetal weight, skeletal variations, (clubfoot); MoA not fully elucidated, but modulation of Zn metabolism shown (Spain, 2017).	Fatty acid metabolism (cholesterol) and liver hypertrophy	--
2-MEA	NOAEL 300 mg/kg bw/d (2-generation reproduction study), fertility, rat NOAEL 500 mg/kg/d for developmental, PNDT, rats	Reduced epididymal and prostate weight (UK, 2016b) For endpoints on fertility and development an AF of 50 were applied, whereas for systemic effects the AF was 100 (UK, 2016b)	Reproduction reduced number of implantation sites, some evidence of decreased sperm head count in cauda epididymidis	Worker (UK, 2016b p.50) $DNEL_{long\text{-}term\ dermal\ -\ systemic}$ = 3 mg/kg bw/d Based on the NOAEL of the 2-gen. study in rats and an AF of 100 (for systemic effects). $DNEL_{long\text{-}term\ fertility}$ = 6 mg/kg bw/d

Substances were grouped related to their common target organ(s)/mode of action(s). For each group of target organ, HQ were summarized for each substance and subsequent HI are calculated.
Taking a conservative approach for the refinement Cu-HDO, basic copper carbonate and 2-EHA were considered for liver toxicity, despite 2-EHA showed less or adaptive liver responses (from the provided data it was not clear if these effects were considered adverse).

The second group related to reproductive toxicity including Cu-HDO, boric acid, 2-EHA and 2-MEA.

If the mixture risk assessment was still not acceptable, the guidance defined a next step in the refinement in each group:
- Tier 3B: Determination of specific AELs for each identified target organ/mode of action and each substance on the basis of the data used for the European assessment of each active substance or data available for SoC (ECHA, 2017a).

For the refinement of the mixture risk assessment (reproduction) the $DNEL_{long-term\ dermal-systemic}$ of 2-MEA was set to 3 mg/kg bw/d in tier 3B. The value was derived from the substance evlaution report (UK, 2016b) for systemic effects in worker, however for fertility a higher DNEL of 6 mg/kg bw/d was determinted based on the reduction of the AF, but using the same study and NOAEL.

Scenario 1: Mixture risk characterisation liver toxicity: Cu-HDO, basic copper carbonate, 2-EHA

Scenario/Tier	**AEL $_{\text{long term}}$ or DNEL $_{\text{long term}}$ [mg/kg bw/d]**			**Estimated total uptake [mg/kg bw/d]**			**Estimated uptake / AEL (HQ)**			**HI**	**Acceptable (yes / no)**
	Cu-HDO	Cu-Carb. / Cu	2-EHA	Cu-HDO	Cu-Carb. / Cu	2-EHA	Cu-HDO	Cu-Carb. / Cu	2-EHA		
1/3: PPE: measured data combined with modelled data / meta SPC 2	0.033	0.071	2.00	0.018	0.0172	0.095	0.43	0.19	0.05	0.83	Yes
1/3: PPE: measured data combined with modelled data / meta SPC 3	0.033	0.071	--	0.018	0.0172	--	0.54	0.24	--	0.78	Yes

Scenario 1: Mixture risk characterisation reproduction: Cu-HDO, boric acid, 2-MEA, 2-EHA

Scenario/Tier	**AEL $_{\text{long term}}$ or DNEL $_{\text{long term}}$ [mg/kg bw/d]**				**Estimated total uptake [mg/kg bw/d]**				**Estimated uptake / AEL (HQ)**				**HI**	**Acceptable (yes / no)**
	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA		
1/3: PPE: measured data combined with modelled data / meta SPC 2 / Tier 3B mix. RA	0.03	0.572	3.00	2.00	0.0178	0.012	0.425	0.095	0.54	0.02	0.14	0.05	0.76	Yes
1/3: PPE: measured data combined with modelled data / meta SPC 3 / Tier 3A mix. RA	0.03	0.572	1.00	--	0.0178	0.012	0.425	--	0.54	0.02	0.42	--	0.99	Yes

Based on the CG 45 Guidance "Harmonized approach to consider a co-formulant as a substance of concern (SoC) based on its workplace exposure limits" dated 2021 also an assessment was performed, if the estimated inhalation exposure for worker is compatible with the IOELV for 2-MEA as set in Directive 2006/15/EC.
The realistic worst case for 2-MEA inhalation exposure is 0.0021 mg/kg bw/day for the scenario "industrial vacuum pressure application". This internal exposure value is compared to the IOELV (indicative occupational exposure limit value, converted to mg/kg bw/d) assuming 100% inhalative absorption.

Scenario 1: Risk for industrial users from vacuum pressure treatment / oscillating pressure process for 2-MEA for the inhalation route

Scenario	**Tier**	**IOELV expressed in [mg/kg bw/d]**	**Estimated systemic inhalation exposure for 2-MEA [mg/kg bw/d]**	**Hazard Quotient (HQ)**	**Acceptable (yes/no)**
1 industrial vacuum pressure application	3 / PPE: measured data combined with modelled data meta SPC 3	0.416	0.0021	0.005	Yes

Conclusion for scenario 1:
The risk from systemic exposure during the application of the biocidal product (i.e. primary exposure) for industrial users from vacuum pressure treatment is acceptable for mixture risk assessment for active biocidal substances and SoCs.
Hazard quotients (HQ) and hazard indexes (HI) in the refined mixture risk characterisation (tier 3A or 3B) are below 1. For 2-MEA the DNEL for workers $_{\text{long-term systemic}}$ of 3 mg/kg bw/d resulted already in acceptable risks, therefore the DNEL for fertility of 6 mg/kg bw/d was not applied.
In addition, 2-MEA does not exceed the harmonized occupational exposure limited for the authorised use for products within the Wolmanit CX-10_family.

For the risk characterisation also a combination of scenarios for workers exposed at home through volatilised residues were calculated (secondary exposure).
Therefore, in a first step scenario 5 (adults) resulted in 0.0048 and 0.0099 mg/kg bw/d exposure of 2-MEA and 2-EHA. Compared to the DNELs of 2 and 1 mg/kg bw/d for 2-EHA and 2-MEA, respectively, the HQ values were very low (0.005 and 0.0048 mg/kg bw/d) and risks from volatilised resides for adults are acceptable.

Combined scenario 1 and 5: The risk characterisation combines exposure arising from tier 3 industrial application and indoor volatilised residues for workers.

Scenarios	**AEL $_{long\ term}$ or DNEL $_{long\ term}$ [mg/kg bw/d]**					**Estimated total uptake [mg/kg bw/d]**					**Estimated uptake / AEL (HQ)**					**HI (Σ HQ)**	**Acceptable (yes / no)**
	Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA	2-MEA		
1+5/Industrial / meta SPC 1	0.033	0.071	0.572	2	1	0.018	0.017	0.012	0.111	0.379	0.54	0.24	0.02	0.06	0.38	1.23	No
1+5/Industrial / meta SPC 2	0.033	0.071	0.572	2	1	0.018	0.017	0.012	0.105	0.430	0.54	0.24	0.02	0.05	0.43	1.28	No
1+5/Industrial / meta SPC 3	0.033	0.071	0.572	2	1	0.018	0.017	0.012	--	0.430	0.54	0.24	0.02	0.00	0.43	1.23	No

While all HQ values are <1 the HI values for all meta SPC products are slightly exceeding the limit of 1. Therefore a refinement of the mixture risk characterisation was performed. Meta SPC 1 calculations gave the least exceedance, therefore mixture refinement presented in the PAR were limited to meta SPC 2 and meta SPC 3 (please see below).

Scenario 1+5: Mixture risk characterisation liver toxicity: Cu-HDO, basic copper carbonate, 2-EHA

Scenario/Tier	**AEL $_{long\ term}$ or DNEL $_{long\ term}$ [mg/kg bw/d]**			**Estimated total uptake [mg/kg bw/d]**			**Estimated uptake / AEL (HQ)**			**HI**	**Acceptable (yes / no)**
	Cu-HDO	Cu-Carb. / Cu	2-EHA	Cu-HDO	Cu-Carb. / Cu	2-EHA	Cu-HDO	Cu-Carb. / Cu	2-EHA		
1+5/3: PPE, measured data combined with modelled data / meta SPC 2	0.033	0.071	2	0.018	0.017	0.105	0.54	0.24	0.05	0.83	Yes
1+5/3: PPE, measured data combined with modelled data / meta SPC 3	0.033	0.071	--	0.018	0.017	0.010	0.54	0.24	--	0.79	Yes

Scenario 1+5: Mixture risk characterisation reproduction: Cu-HDO, boric acid, 2-MEA, 2-EHA

Scenario/Tier	AEL $_{\text{long term}}$ or DNEL $_{\text{long term}}$ [mg/kg bw/d]				Estimated total uptake [mg/kg bw/d]				Estimated uptake / AEL (HQ)				HI	Acceptable (yes / no)
	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA		
1+5/3: PPE, measured data combined with modelled data / meta SPC 2 / tier 3B mixture RA	0.03	0.572	3.00	2.00	0.018	0.012	0.430	0.095	0.54	0.02	0.14	0.05	0.75	Yes
1+5/3: PPE. measured data combined with modelled data / meta SPC 3 / tier 3A mixture RA	0.03	0.572	1.00	--	0.018	0.012	0.430	0.010	0.54	0.02	0.43	--	0.99	Yes

Conclusion for combined scenario 1 and 5:

The risk from systemic exposure during the application of the biocidal products for industrial users including volatilised indoor residues that adds to the chemical body burden of workers is acceptable based on hazard quotients (HQ) and hazard indexes (HI) below 1 in the refined mixture risk characterisation (tier 3A or tier 3B).

The **secondary exposure scenarios** considered in the risk characterisation are presented in the tables below. For exposure estimates the highest content of each of the substances within meta SPC 1, 2 and 3 products were used ("worst case model formulation"; differences within meta SPC 1 and 2 were only marginally).

For 2-MEA risks are characterised by the local risk assessment that reflects the corrosive and acute toxicity hazards. Based on the CG 45 Guidance "Harmonized approach to consider a co-formulant as a substance of concern (SoC) based on its workplace exposure limits" it is concluded that IOELVs are not relevant for the general public. All other classified hazard endpoints do not require a qualitative risk assessment for this SoC according to the banding schema of ECHA (2017a).

In addition, potency considerations do not qualify for a quantitative risk assessment based that the substance is less potent than the active substances (cf. Table on target organs, lack of classification for reproduction or STOT). Please see the confidential annex for further information. Therefor, the risk of 2-MEA was assessed only for professionals in secondary exposure scenarios.

For **scenario 2 (risk from sanding/sawing of treated wood)** the realistic worst case describes a **professional** sanding/sawing wood. The scenario is based on the assumption that an adult worker without protective equipment (special application transmission poles) sands a wooden post. It is assumed that the wood is completely dry at this stage. For tier 2 assessment, a transfer coefficient (dislogable residues) of 2% was taken into consideration. Risk ratio calculations were performed with the active substances as well as the SoCs 2-EHA (based on CMR properties) and 2-MEA (based on an EU indicative occupational exposure limit).

In addition, exposure (through inhalation and dermal contact) from treated wood (use class 4) for the **general public** was considered in scenario 2. Infrequent occurrence of this work represents more an acute exposure situation; however, as conservative estimate the chronic AELs and DNELs were used. Risk characterisation ratio calculations were performed with the active substances as well as the SoC 2-EHA.

Scenario 2: Risk for professionals from sanding/sawing of treated wood

Scenario	**Tier**	**AEL$_{\text{long term}}$ or DNEL$_{\text{long term}}$ [mg/kg bw/d]**					**Estimated total uptake [mg/kg bw/d]**					**Estimated uptake / AEL (HQ)**					**HI (Σ HQ)**	**Acceptable (yes / no)**
		Cu-HDO	Cu-Carb. /Cu	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb.	Boric acid	2-EHA	2-MEA	Cu-HDO	Cu-Carb. /Cu	Boric acid	2-EHA	2-MEA		
2 Sanding / sawing of treated wood	1 / no PPE	0.033	0.071	0.572	1	1	0.60	0.57	0.49	3.42	14.4	18.17	7.96	1.2	3.42	14.37	45.13	No
	2 / no PPE	0.033	0.071	0.572	1	1	0.01	0.02	0.02	0.07	0.31	0.42	0.28	0.03	0.07	0.31	1.10	No

The risk from systemic exposure during contact with treated wood (i.e. secondary exposure) for professionals is acceptable for the individual compounds. Hazard quotients (HQ) are below 1, however based on the high estimated exposure of 2-MEA (vapour pressure 50 Pa) the hazard index value (HI) indicate an unaccepted risk for tier 2 estimations. While the default assumption is that no PPE are applied, it is very likely that professionals wear gloves during work. Based on HI >1 a refinement and grouping of the substances with common target organ/mode of action was performed.

Scenario 2 - Professionals: Mixture risk characterisation liver toxicity: Cu-HDO, basic copper carbonate, 2-EHA

Scenario /Tier	AEL long term or DNEL long term [mg/kg bw/d]			Estimated total uptake [mg/kg bw/d]			Estimated uptake / AEL (HQ)			HI (Σ HQ)	Acceptable (yes / no)
	Cu-HDO	Cu-Carb./ Cu	2-EHA	Cu-HDO	Cu-Carb./ Cu	2-EHA	Cu-HDO	Cu-Carb./ Cu	2-EHA		
2/2: no PPE, worst case model formulation	0.033	0.071	1	0.014	0.020	0.074	0.42	0.28	0.07	0.77	Yes

Scenario 2 - Professionals: Mixture risk characterisation reproduction: Cu-HDO, boric acid, 2-MEA, 2-EHA

Scenario/ Tier	AEL long term or DNEL long term [mg/kg bw/d]				Estimated total uptake [mg/kg bw/d]				Estimated uptake / AEL (HQ)				HI (Σ HQ)	Accept-able (yes / no)
	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA	Cu-HDO	Boric acid	2-MEA	2-EHA		
2/2: no PPE, worst case model formulation	0.033	0.572	1	1	0.014	0.016	0.308	0.074	0.42	0.03	0.31	0.07	0.75	Yes

Scenario 2: Risk for the public

Scenario	**Tier**	**AEL $_{long\ term}$ or DNEL $_{long\ term}$ [mg/kg bw/d]**				**Estimated total uptake [mg/kg bw/d]**				**Estimated uptake / AEL (HQ)**				**HI (Σ HQ)**	**Accept-able (yes / no)**
		Cu-HDO	Cu-Carb /Cu	Boric acid	2-EHA	Cu-HDO	Cu-Carb./ Cu	Boric acid	2-EHA	Cu-HDO	Cu-Carb / Cu	Boric acid	2-EHA		
2 Sanding / sawing of treated wood	1 / no PPE	0.033	0.071	0.572	1	0.432	0.407	0.494	2.464	13.09	5.73	0.86	2.46	22.15	No
	2 / no PPE worst case model formulation	0.033	0.071	0.572	1	0.010	0.014	0.012	0.053	0.30	0.20	0.02	0.05	0.57	Yes

Conclusion for scenario 2:

The risk from systemic exposure during contact with treated wood for UC4, special application (i.e. secondary exposure) for professionals is acceptable for tier 2 and after refinement of the mixture risk assessment approach (tier 3A).

Also for the public (UC4, normal use) no risk was identified in tier 2. Hazard quotient (HQ) and hazard index (HI) values are below 1 for active biocidal substances and for substances of concern.

Scenario 3: Risk for toddlers mouthing a treated wood chips (secondary exposure)

For mouthing exposure, it was assumed that a toddler picks up and chews a wood off-cut. Within tier 1 assessment, the highest treatment rate was taken into consideration (22.5 kg/m^3 corresponding to UC4, low likelihood of exposure). Tier 2 assessment is unrealistic considering the low likelihood of unattended toddlers close to working places and raw surface of wood and bad taste.

Risk characterisation ratios were calculated for the active substances Cu-HDO, basic copper carbonate, boric acid and the SoC 2-EHA. For exposure estimates the highest content of each of the substances within meta SPC 1, 2 and 3 products were used ("worst case model formulation", differences within meta SPC 1 and 2 were only marginally). For refinement meta SPC 3 was considered separately.

Scenario 4: Toddler playing on treated wood structures for active substances

For exposure via treated playground structures standard skin, surface exposure assumptions were considered in tier 1. As a worst case, it is assumed that all of the contamination of the infant's hand is ingested during mouthing behaviour for a.s. and substances of concern, 2-EHA and 2-MEA. For tier 2 a transfer coefficient for dislogable residues of 2% was considered, tier 3 relied on measured data for these active substances.

Risk characterisation ratios were calculated for the active substances Cu-HDO, basic copper carbonate, boric acid and the SoC 2-EHA. For exposure estimates the highest content of each of the substances within meta SPC 1, 2 and 3 products were used ("worst case model formulation", differences within meta SPC 1 and 2 were only marginally). For refinement meta SPC 3 was considered separately.

Scenario 5: Inhalation of volatilised residues indoors

Chronic inhalation exposure can occur from treated wood installed indoors.

For the active substances Cu-HDO and basic copper carbonate long-term exposure to volatilised residues is neglected for adults (presented before the combined scenario 1+5 in the primary exposure section), infants and children based on HEEG Opinion 13 (cf. Chapter 2.2.6.2).

As a worst case, secondary exposure of a toddler by inhalation of volatilised residues indoors - released in the living area of a domestic house for 24 hours- were calculated for 2-EHA. Tier 3 relied on measured exposure data.

Combined scenario: For risks of combined exposure of scenario 3, 4 and 5 the short term AEL for Cu-HDO and basic copper carbonate was used because the combination of the exposure scenarios is likely to occur on an intermittent/acute exposure basis.

Scenario 3, 4 and 5: Risk for toddlers picking up and mouthing a piece of treated wood; children playing on treated wood structures for active substances; inhalation of volatilised residues indoors (toddler)

Scenario	**Tier**	**AEL** $_{\text{short term}}$ (scenario 3) or **AEL/ DNEL** $_{\text{long term}}$ (scenario 4, 5) **[mg/kg bw/d]**				**Estimated total uptake (per a.s.) [mg/kg bw/d]**				**Estimated uptake / AEL (HQ)**				**HI (Σ HQ)**	**Accept-able (yes / no)**
		Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA	Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA	Cu-HDO	Cu-Carb. / Cu	Boric acid	2-EHA		
3 Mouthing wood chips	1 / no PPE	0.1	0.143	0.572	1.00	0.101	0.469	0.144	0.288	1.01	3.28	0.25	0.29	4.83	No
	2 / no PPE	0.1	0.143	0.572	1.00	0.025	0.002	0.144	0.288	0.25	0.01	0.25	0.29	0.81	yes
4 Playing on treated wood structures	1 / no PPE	0.033	0.071	0.572	1.00	2.903	4.867	4.147	7.465	87.97	68.55	7.25	7.47	171.24	No
	2 / no PPE	0.033	0.071	0.572	1.00	0.058	0.097	0.083	0.166	1.76	1.37	0.14	0.17	3.44	No
	3 / no PPE	0.033	0.071	0.572	1.00	0.002	0.013	0.083	0.166	0.05	0.19	0.14	0.17	0.55	yes
5 Inhalation of volatilized residues	1 / no PPE	0.033	0.071	0.572	1.00	0.012	0.0007	0.0002	189.41	0.35	0.01	0.00	189.41	189.77	No
	3 / no PPE	0.033	0.071	0.572	1.00	0.000	0.000	0.000	0.0296	0.00	0.00	0.00	0.03	0.03	yes
3 + 4 + 5 / worst case model formulation	2+3 / no PPE	0.1	0.143	0.6	1	0.027	0.015	0.227	0.484	0.27	0.11	0.40	0.48	1.26	No

Combined scenario 3+4+5 meta SPC 3 products:

Scenario	**AEL $_{short term}$ or DNEL $_{long term}$ [mg/kg bw/d]**			**Estimated total uptake [mg/kg bw/d]**			**Estimated uptake / AEL (HQ)**			**HI (Σ HQ)**	**Acceptable (yes / no)**
	Cu-HDO	Cu-Carb./Cu	Boric acid	Cu-HDO	Cu-Carb./Cu	Boric acid	Cu-HDO	Cu-Carb./Cu	Boric acid		
3 + 4 + 5 / Meta SPC 3	0.1	0.143	0.572	0.027	0.015	0.227	0.27	0.11	0.40	0.77	Yes

The combined scenario 3, 4 and 5 calculation (based on the "worst case model formulation" representative for meta SPC 1 and 2) resulted in a slight exceedance of the hazard index suggesting a probable risk. For meta SPC 3 products the screening mixture risk assessment resulted in an acceptable risk.

However, it is quite unlikely the the combined scenario represents a realistic worst case based on the fact, that each scenario is based on a worst case (e.g. 5 hour mouthing on a wood chip in scenario 3). A refinement of the mixture risk assessment representative for meta SPC 1 and 2 was performed (see below).

Scenario 3+4+5 meta SPC 1 and 2 products: Mixture risk characterisation liver toxicity: Cu-HDO, basic copper carbonate, 2-EHA

Scenario	**AEL $_{short term}$ or DNEL $_{long term}$ [mg/kg bw/d]**			**Estimated total uptake [mg/kg bw/d]**			**Estimated uptake / AEL (HQ)**			**HI (Σ HQ)**	**Acceptable (yes / no)**
	Cu-HDO	Cu-Carb./Cu	2-EHA	Cu-HDO	Cu-Carb./Cu	2-EHA	Cu-HDO	Cu-Carb./Cu	2-EHA		
3 + 4 + 5 / meta SPC 1 & 2	0.1	0.143	1	0.027	0.015	0.484	0.27	0.11	0.48	0.86	Yes

Scenario 3+4+5 meta SPC 1 and 2 products: Mixture risk characterisation reproduction: Cu-HDO, boric acid, 2-EHA

Scenarios	**AEL $_{short\ term}$ or DNEL $_{long\ term}$ [mg/kg bw/d]**			**Estimated total uptake [mg/kg bw/d]**			**Estimated uptake / AEL (HQ)**			**HI (Σ HQ)**	**Acceptable (yes / no)**
	Cu-HDO	Boric acid	2-EHA	Cu-HDO	Boric acid	2-EHA	Cu-HDO	Boric acid	2-EHA		
3 + 4 + 5 / meta SPC 1 & 2	0.1	0.572	1	0.027	0.227	0.484	0.27	0.40	0.48	1.15	No

Conclusion for scenario 3, 4 and 5:

For the secondary exposure scenarios toddlers picking up and mouthing a piece of treated wood (scenario 3) and children (toddlers) playing on treated wood structures (scenario 4) risks are acceptable at tier 3 level, all HQ and HI values are ≤1.

For the secondary exposure scenario inhalation to volatilised residues indoors (scenario 5) for toddlers, covering also adults and children, an acceptable risk at tier 3 (for 2-EHA) was calculated.

The combined scenario 3, 4 and 5 calculation for meta SPC 1 and 2 resulted in a slight exceedance of the hazard index suggesting a probable risk by combined exposure and effects. For meta SPC 3 products the screening mixture risk assessment resulted in an acceptable risk for active biocidal substances and for the SoC 2-EHA.

The refinement of the mixture risk assessment for the combined scenarios 3+4+5 for meta SPC 1 and 2 products indicated acceptable risks for systemic toxicity for the endpoint hepatotoxicity, but not for reproduction.

Based on the very conservative assumptions for the exposure calculations that adds up within the combination of the three scenarios and the slight exceedance of the hazard index (all hazard quotients are <1) risks are considered acceptable. However, a risk management measure (RMM) is proposed for meta SPC 1 and 2 products. Based that scenario 3 contributes most to the exceedance of the HI value the following measure is proposed: “Only for the treatment of wood, which is handled in an appropriate workplace without the reach of children.” This measure is also proposed for UC 4 special application.

Risk for consumers via residues in food

The products of the Wolmanit CX-10_family must not be used for treatment of wood that may come in contact with food or feed. A risk for consumers via residues in food is thus excluded.

External exposure estimates for livestock were calculated in chapter 2.2.6.2.

For the active substances Cu-HDO, basic copper carbonate, boric acid and the SoC 2-EHA the values are above the trigger of 0.004 mg/as/kg bw/d (cf. chapter 2.2.6.2, scenario 6).

Therefore, worst-case consumer exposures were calculated. The worst-case consumer exposure (WCCE) was performed assuming residues in milk (lactating goats) and meat: calf for Cu-HDO, basic copper carbonate, boric acid and 2-EHA. Correction for oral absorption (for goat, horse und calf) were considered for basic copper carbonate and for the other substances with 25% and 100%, respectively.

The ECHA (2017a) guidance states: "... an estimation of the worst case consumer exposure (WCCE) is undertaken and compared to the acceptable daily intake (ADI). If the WCCE is lower than 30% of the ADI, and in case where there is no particular concern in relation to the toxicity of the active substance, then a MRL evaluation may not be required."

Scenario	**ADI or AEL/DNEL $_{\text{oral, long term}}$ [mg/kg bw/d]**				**WCCE [mg/kg bw/d]**				**% ADI/AEL/DNEL**			
	Cu-HDO	Cu	Boron	2-EHA	Cu-HDO	Cu in Cu-Carb.	Boron in boric acid	2-EHA	Cu-HDO	Cu in Cu-Carb.	Boron in boric acid	2-EHA
6 / WCCE milk+meat	0.033	0.15	0.16	1	0.0027	0.0028[6]	0.0007[7]	0.0077	8.2	1.9	0.4	0.8

As a worst case, the AEL$_{\text{long term}}$ was used for Cu-HDO WCCE comparison indicating 8.2% utilization of the AEL. If the ADI for copper was applied, residues for copper in Cu-HDO would reach 0.3% as a rough estimate (WCCE corrected for molecular weight: 0.0027*63.5/349.9 - WCCE would even be lower).

Concerning basic copper carbonate, residues are also very low. In addition the European Medicine Agency (EMA) published in 2016 a European public MRL assessment report (EPMAR) for all food producing species. The conclusion of this evaluation is that the establishment of MRL values for basic copper carbonate is not needed for the protection of the consumer (EMA, 2016).

For boric acid, the ADI set by EFSA (2013) was used. A comparison with the WCCE boric acid converted to boron indicate only 0.4% of the ADI was utilized. However, according to the EFSA Panel exposure to boron from its natural occurrence in the diet and from other sources (food supplements, food contact materials, feed for food-producing animals,

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[6] WCCE Cu-Carb.: 0.0048645 mg/kg bw/d or WCCE Cu in Cu-Carb.: 0.002794 (=0.00486*(63.5*2)/221.1) mg/kg bw/d

[7] WCCE boric acid: 0.003741 mg/kg bw/d or WCCE boron in boric acid: 0.0007 (=0.003741*(10.8115)/61.83) mg/kg bw/d

cosmetics, oral hygiene products, etc.) may already lead to exposures exceeding the ADI (EFSA, 2013).

Concerning the residues of 2-EHA less than 1% of the DNEL derived from long term studies were reached indicating a high margin of safety.

Conclusion: The exposure calculations for residues in food relied on very conservative default values and clearly represented an overestimation. The risk for consumers via residues of the active substances Cu-HDO, basic copper carbonate, boric acid and 2-EHA in food is considered to be of low concern.

2.2.7 Risk assessment for animal health

The treated wood structural timber is intended for indoor and outdoor use, in particular for timber used in horticulture and landscape gardening, posts, fences, palisades and wood paving. Therefore, potential exposure to livestock can be envisaged from the use on e.g. fences and chewing on wood used for paddocks.

The risk assessment for animal health includes the active substances and a quantitative exposure and risk characterisation of 2-EHA.

Polyethyleneimine was identified as SoC based on the local effects in the Wolmanit CX-10_family. 2-MEA had a Union Occupational Exposure Limit warranting a quantitative risk assessment for professionals and contributed to local effects. The SoCs banding scheme A and B apply (ECHA, 2017a). However, concentrations of these two substances in the in-use dilutions are low and thus, a qualitative evaluation or a local risk assessment for animals is not necessary.

Scenario 6: Livestock exposure of active substances

For this scenario tier 1 exposure estimates for Cu-HDO, basic copper carbonate and boric acid as well as tier 3 (including measured data) for 2-EHA were calculated for different livestock species. NOAEL values as compiled in section 2.2.6.3.2 were used for the substances. For basic copper carbonate the NOAEL of 16.3 Cu mg/kg bw/d was converted to 28.37 mg/kg bw/d (correction for molecular weight: 16.3*221.1/(63.5*2)).

Based on the uncertainties concerning the assessment factor the margin of exposure approach is presented in the following table. The comparison of the exposure and the toxicity level is calculated as: MoE = $\text{NOAEL}_{\text{systemic}}$ / exposure.

Scenario 6: Livestock exposure of active substances

Scenario	Tier	NOAEL $_{\text{long term}}$ [mg/kg bw/d]				Estimated total uptake [mg/kg bw/d]				Margin of exposure (MOE)			
		Cu-HDO	Cu-carb./Cu	Boric acid	2-EHA	Cu-HDO	Cu-carb./Cu	Boric acid	2-EHA	Cu-HDO	Cu-carb./Cu	Boric acid	2-EHA
Horse	3	10	28.27	55	100	0.015	0.053	0.019	0.041	682	538	2929	2411
lactating goat	3	10	28.27	55	100	0.033	0.095	0.045	0.095	300	297	1236	1055
slaughter goat	3	10	28.27	55	100	0.110	0.231	0.153	0.314	91	123	360	318
fattening pig	3	10	28.27	55	100	0.014	0.055	0.017	0.039	723	513	3252	2569
breeding pig	3	10	28.27	55	100	0.010	0.040	0.012	0.029	986	714	4529	3509
beef cattle	3	10	28.27	55	100	0.009	0.035	0.011	0.025	1108	801	5080	3941
dairy cattle	3	10	28.27	55	100	0.008	0.032	0.010	0.023	1226	892	5660	4364
calf	3	10	28.27	55	100	0.223	0.298	0.316	0.637	45	95	174	157

Conclusion

Risk characterisation that followed the margin of exposure approach calculations for almost all substances and livestock combinations resulted in quite high MOEs and were considered protective. For the active substances, the majority of scenarios also indicated a high MOE above or slightly below 100 with the exception of the MOE for Cu-HDO in scenario 6 – calf of 45. However, based on the very conservative assumptions and overestimation of the exposure calculations for the scenario 6 (cf. section2.2.6.2) risks for animal health are acceptable.

2.2.8 Risk assessment for the environment

2.2.8.1 Effects assessment on the environment

The active substances Cu-HDO (Austria, 2013), basic copper carbonate (France, 2011) and boric acid (Netherlands, 2009) were evaluated for their use as wood preservatives (PT 8), according to Regulation (EU) No 528/2012. For these active substances final competent authority reports are available to which the applicant has access via LoAs (Letter of Access). Beside the active substances the biocidal product contains 2-aminoethanol and polyethylenimine which were identified as substances of concern with respect to environmental hazards. 2-aminoethanol was included in the quantitative assessment. For polyethylenimine a qualitative assessment is provided in the confidential annex. The PNECs for 2-aminoethanol (2-MEA) are based on the information that is publicly available on the REACH registered substance database. Additionally, in the SDS submitted by the applicant PNECs for 2-aminoethanol were reported. The underlying studies for the derived PNECs from the REACH dossier were not evaluated by the eCA and are within the responsibility of the registrants of 2-aminoethanol.

The following agreed PNECs were used in the environmental risk assessment:

Used PNECs in the environmental risk assessment					
Compartment	**Boric acid** [b]	**Cu-HDO**	**Basic copper carbonate**	**2-Aminoethanol**	**Unit**
STP	1.8	0.09	0.23	100	mg/L
Freshwater	0.18	5.6E-03	7.8E-03	7.0E-02	mg/L
Sediment	0.24[a]	5.17[a]	18.9	7.7E-02[a]	mg/kg_{wwt}
Soil	0.35	0.255	40.35	1.14	mg/kg_{wwt}

[a] based on the Equilibrium Partioning Method (EPM)

[b] The PNEC values are added concentrations (i.e. they do not include the background concentrations) and are related to boron (NL, 2008)

Bioaccumulation - Secondary poisoning

The risk for bioaccumulation of Cu-HDO entering the aquatic and/or terrestrial food chain can be regarded as negligible, since the reported BCF values for fish with 32.36 and earthworms with 5.6 are very low (Austria, 2013). Furthermore, the log Kow value for Cu-HDO of <3 does not indicate a bioaccumulation potential for the substance, either (Austria, 2013).

The potential for bioaccumulation and biomagnification for basic copper carbonate is also considered negligible due to the homeostastic regulation process in organisms such as fish and invertebrates (France, 2011).

Boric acid does not bioconcentrate or bioaccumulate along the aquatic or terrestrial foodchain either (Netherlands, 2009).

Based on the information available for 2-aminoethanol on the REACH registered substance database a potential for bioaccumulation and biomagnification is not to be expected since the reported log Kow of -2.3 and the BCF of 2.5 (QSAR) are very low.

Based on the available information an assessment for secondary poisoning was not performed for the biocidal product family Wolmanit CX-10.

Metabolites

Cu-HDO

In the CAR for Cu-HDO (Austria, 2013) no relevant metabolite in the water and soil degradation studies was idenfied. Although copper was not explicitly detected it is clear that copper will also add to the transformation products profile (Austria, 2013). Furthermore it was stated that "*An exposure and risk assessment for Copper stemming from Cu-HDO was not performed, because 94% of the total Copper in the product stems from Cu-salts and only 6% from Cu-HDO. At product authorisation a respective exposure/risk assessment should be performed for the product*" (Austria, 2013).

Basic copper carbonate

In the CAR for basic copper carbonate (FR, 2011) it was stated the "*environmentally relevant moiety and the active principle of Copper carbonate is the cupric ion (Cu2+),which may be released to the environment at a low rate".* No other relevant metabolites were reported in the CAR for basic copper carbonate (FR, 2011).

Hence the environmental assessment fur Cu-HDO and basic copper carbonate was based on copper as a relevant metabolite.

Boric acid

In the assessment report for boric acid (NL, 2008) no relevant metabolite was reported.

Information relating to the ecotoxicity of the biocidal product which is sufficient to enable a decision to be made concerning the classification of the product is required

The eco-toxicological effects of the biocidal product family Wolmanit CX-10 are driven by the active substances Cu-HDO (Austria, 2013), basic copper carbonate (France, 2011), boric acid (Netherlands, 2009) and the co-formulants 2-aminoethanol and polyethylenimine, which were identified as substances of concern for the environment.

For the active substance Cu-HDO a harmonised classification (15.ATP) as Aquatic Acute 1, M=1 and Aquatic Chronic 1, M=1 is available.

The active substance basic copper carbonate has a harmonised classification with Aquatic Acute 1 (M=10) and Aquatic Chronic 1 without a separate specification of an M-factor (9th ATP to Reg. (EC) No 1272/2008). According to a RAC opinion on basic copper carbonate (14th March 2019) an M-Factor of 10 has to be applied for the chronic classifaction.

Therefore, basic copper carbonate has to be classified as Aquatic Acute 1 (M=10) and Aquatic Chronic 1 (M=10). The additional M-factor for the chronic classification is reflected in the 17th ATP to Reg. (EC) No 1272/2008.

For boric acid no classification is warranted for the environment.

The co-formulants 2-aminoethanol and polyethylenimine trigger classification of all products within the different meta SPCs of the biocidal product family Wolmanit CX-10 with Aquatic Chronic 3.

At product authorisation stage new acute and/or chronic toxicity studies for the biodical product family Wolmanit CX-10 were not performed. However, the applicant submitted aquatic ecotoxicity studies with the representative product (Wolmanit CX-LP-1572), which were already submitted for active substance approval of Cu-HDO (Austria, 2013).

Based on the bridging principles laid down in Reg. (EC) No 1272/2008 the concentrations of Cu-HDO, basic copper carbonate, boric acid and 2-aminoethanol (substance of concern) in Wolmanit CX LP-15172 are within the permitted variation of the initial concentration compared to the concentrations in the product in meta SPC 3 (ECHA, 2017b).
The classification for the product in meta SPC 3 is therefore based on the product data.

For meta SPC 1 and 2 the concentrations of Cu-HDO, basic copper carbonate, boric acid and the substances of concern 2-aminoethanol and polyethylenimine in Wolmanit CX LP-15172 are out of the permitted variation of the initial concentration (ECHA 2017b). Therefore, the studies performed with Wolmanit CX LP-15172 cannot be used for classification of the products in meta SPC 1 and 2.
The classifications for the products in meta SPC 1 and 2 are therefore based on the content of the active substances Cu-HDO, basic copper-carbonate, boric acid and the substances of concern.

This leads to a classification of all products in meta SPC 1, 2 and 3 with Aquatic Acute 1, H400 and Aquatic Chronic 1, H410. Hence, the products have to be labelled with the hazard statement H400 Very toxic to aquatic life and H410 Very toxic to aquatic life with long lasting effects (H400 may be omitted), the precautionary statements P273 Avoid release to the environment, P391 Collect spillage and P501 Dispose of contents/container according to national legislation and the GHS pictogram 09.

Further Ecotoxicological studies

As mentioned above study reports for the representative product (Wolmanit CX-LP-1572), at active substance approval stage of Cu-HDO (Austria, 2013) were resubmitted for product authorisation.
The studies were evaluated and considered as valid with Klimisch Scores of 1 or 2. For details see the table below.

Guideline / Test method / GLP status / reliability	**Species/Inocolum**	**End point**	**Exposure**		**Results [mg/L]**			**Reference**
			Design	Duration	LC / EC0	LC / EC50	LC / EC100	
OECD 203, GLP, Klimisch =2	Zebrafish (Brachydanio rerio)	Mortality	static	96 h	0.6	0.9	1.8	B 9.2.1.1
OECD 202, GLP, Klimisch =2	Daphnia magna	Immobilisation	static	48 h	0.056	0.31	0.56	B 9.2.1.2
OECD 201, GLP, Klimisch =2	*Selenastrum capricornutum*	Growth and biomass inhibition	static	72 h	0.087	0.166	0.224	B 9.2.1.3
OECD 209 /Activated Sludge. Respiration Inhibition Test,GLP, Klimisch =1	Activated sludge	Oxygen measurement / Respiration inhibition	-	180 min	21	45	96	B 9.2.1.5
EPA OPPTS 850.4250 EPA OPPTS 850.4225/ GLP / Klimisch =1	*Oryza sativa L.*	Emergence, growth, morphological changes, fresh and dry weight	-	14 days	>3 kg/ha	-	-	B 9.2.2.3

Conclusion used in Risk Assessment – Acute aquatic toxicity	
Conclusion	The submitted studies were used for classification of the product in meta SPC 3, but they were not used further in the risk assessment.

Effects on any other specific, non-target organisms (flora and fauna) believed to be at risk (ADS)

Testing was performed by the applicant to assess the environmental impact of treated wood in contact with soil and water.
In two field studies, the effects of treated timber were monitored in two relevant local exposure scenarios. The fence post and the jetty in lake scenarios were used for the soil (Ref.: B 10.2-01) and water/sediment (Ref.: B 10.2-02) compartment.

Soil field test:
The soil exposure of Wolmanit CX-8 was measured in a field trial with treated palisades. Wolmanit CX-8 is similar to the Wolmanit CX-10 Family. Therefore, a study using Wolmanit CX-8 can be used for the Wolmanit CX-10 Family. The aim of the study is the determination of the total content of the active ingredients in the receiving soil compartment at different dates (please refer chapter 2.2.8.2 Exposure Assessment; Monitoring data). Additionally the surrounding plant growth was monitored during the 27 months exposure period and after 35 months of exposure. No adverse effects on growth of the plants surrounding the treated posts were observed.

Water/Sediment Field test
The field monitoring study was performed to assess the environmental impact of Wolmanit CX-8 freshly treated timber in contact with fresh water. Wolmanit CX-8 is similar to the Wolmanit CX-10 Family. Therefore, a study using Wolmanit CX-8 can be used for the Wolmanit CX-10 Family. A jetty scenario, which is proposed by the OECD emission scenario document for fresh water, was built up in a quarry pond and the aquatic environment was monitored under natural weather conditions over a period of approx. 2 years (please refer chapter 2.2.8.2 Exposure Assessment; Monitoring data). After one year, the growth of water plants at stones and poles was monitored. Green algae wereobserved at all six poles in contact with water at the water/air contact zone. Considering the vegetation around the jetty, an impact on the aquatic plants of the quarry pond was not observed in the aqueous environment of the jetty.

Conclusion used in Risk Assessment – Effect on specific, non target organisms	
Conclusion	The results of the field monitoring studies were in a similar range as the results from the scenarios calculated. However, the application rate used in the field tests was lower than the application rate used for the predicted environmental concentrations. Therefore, the study results were not used for the further assessment.

Supervised trials to assess risks to non-target organisms under field conditions

There was no new data submitted, neither for the active substances nor for the biocidal products.

Studies on acceptance by ingestion of the biocidal product by any non-target organisms thought to be at risk

There was no new data submitted, neither for the active substances nor for the biocidal products.

Secondary ecological effect e.g. when a large proportion of a specific habitat type is treated (ADS)

There was no new data submitted, neither for the active substances nor for the biocidal products.

Foreseeable routes of entry into the environment on the basis of the use envisaged

Please refer to section "Fate and distribution in exposed environmental compartments".

Further studies on fate and behaviour in the environment (ADS)

No new data was submitted.

Leaching behaviour (ADS)

Two studies have been carried out to support the application of the Wolmanit CX-10_family by vacuum pressure treatment to wood that will be available for use up to use class 4. For UC3 a semi-field study (Ref.: B 10.3-01) was carried out with reference to NTBuild 509 methodology. For UC4 a laboratory study (Ref.: B 10.3-02) was carried out following the study protocol according to OECD Test No. 313 (OECD 2007).

These studies according to standard protocols were performed with products of the biocidal product family. The OECD 313 study was conducted using Wolmanit CX-8, the NTBuild study using Wolmanit CX-10.
In product Wolmanit CX-10, the concentration of each active ingredient is a factor 1.25 higher than in the other products of the product family. Therefore, the results of the leaching test are expected to represent worst case results for use class 4.
Wolmanit CX-8 contains the same amount of active ingredients as the other products grouped in meta SPC 1 and 2 but less compared to Wolmanit CX-10 (meta SPC 3).
During the 2nd EU leaching workshop for wood preservatives, held in Varese, Italy on 12th June 2013, it was agreed that leaching studies according to standard protocols, available for one formulation can be transferred to a similar formulation, if based on test results from EN 84 studies for example, it can be shown that the leaching behaviours of both formulations are similar.
The applicant has undertaken a study (Ref.: B 10.3-03) to confirm that the leaching behaviour of all Wolmanit CX products is similar in order to be able to transfer the OECD 313 study and NTBuild study carried out with Wolmanit CX-8 and Wolmanit CX-10 to all other product family members. In this study the leaching behaviour of the different products of the Wolmanit CX-10_family, Wolmanit 8WB family and Wolmanit CX-8FP are compared according to EN 84. Further details on this study can be found in the confidential annex of this document.

Use class 3: Wood exposed to weather, but not directly in contact with water or soil

According to the 2nd leaching workshop for PT 8, the NTBuild 509 semi-field study is the most preferred leaching study protocol. This study protocol allows the determination of realistic worst case emission values for time 1 (30 days) and time 2 (365 days), whereas only the long term emission time 3 must be extrapolated to 20 years (40 years for special applications) for vacuum pressure application.

A study was undertaken with pine sapwood blocks treated with 1.79% Wolmanit CX-10 solution (diluent: water) to an average retention rate of 12.82 kg/m^3 of product, which isn´t equal to the maximum proposed product retention rate for UC3. Where the applicant supplies leaching data from a lower leaching application rate, the approach agreed at the first and second leaching workshop is: “If the application rate is less than 2 times the maximum application rate, linear extrapolation can be used.”

Therefore, the provided leaching test can be used for the whole concentration range in the different use classes.

Leaching rates used for risk assessment

Mean cumulative leaching data for both active substances and the metabolite copper are presented within the below table.

Average cumulative loss (mg/m²) for Copper, Cu-HDO and Boron							
Test duration [days]	**Cumulated precipitation [mm]**	**Cumulated loss of a.s.**					
		Copper		**Cu-HDO**		**Boron**	
		[mg/m²]	**[%]**	**[mg/m²]**	**[%]**	**[mg/m²]**	**[%]**
38	59	29.94	0.12	3.10	0.04	14.46	0.79
70	124	139.65	0.67	18.16	0.25	100.72	5.54
177	239	186.64	0.89	25.92	0.35	143.13	7.87
310	479	196.64	0.94	26.06	0.36	150.35	8.26
365	543	197.23	0.94	26.06	0.36	150.67	8.28

After the first 30 days 59 mm of rainfall were observed which correspond to the assumption of the average rainfall quite well. During the last both rainfall events an increase of < 0,5 % is observed only. An plateau emission is reached for the active ingredients after this timepoint. Therefore, no significant effect is expected by average rainfall correction. Hence, the values of the daily emission were used for extrapolation.

The emission rate is calculated based on a polynomial regression of second order, which has been proposed in the ESD for wood preservatives (OECD 2013a) to the following equation:

$$\mathrm{Log}_{10}\mathrm{Flux}(t) = a + b \times \log_{10}(t) + c \times \log_{10}(t)^2$$

Once the parameter a, b and c are determined, the experimental Flux(t)=f(t) curve can be calculated.

The calculation of $Q^*_{leach,time}$ can be done by summation of daily FLUX(t) for the time period considered for assessment. Fitting with a polynomial regression of second order will not take into account the saturation term, that occurs, when time approaches 0. However, it is possible to calculate the total quantity leached starting from time zero of the leaching experiment by adding to the $Q^*_{leach,time}$, calculated according to the below equation, the quantity experimentally determined during the first day of the experiment $\mathrm{Qleach}_{,0-1}$. In this case the equation will read:

$$Q*_{\text{leach,time}}=(\sum_{t=1day}^{nday} FLUX(\text{t}))+(\frac{Q_{leach,0-1}^{exp}}{AREA_{wood}^{exp}})$$

The polynomial regression of second order determines the following parameters of the fit function for Copper, Cu-HDO and Boron which are summarized in the below table:

Summary of polynomial fit parameter			
Parameter	**Copper**	**Cu-HDO**	**Boron**
A	-8.3807	-14.768	- 10.7294
B	10.543	17.305	+ 12.5
C	-3.1619	-5.17	- 3.7667
Corr. coefficient r²	0.9786	0.9992	0.9843

The parameters are well confirmed by the above mentioned correlation coefficients.
Based on these fit parameters the leached cumulative amount Q* is extrapolated for time 3, which corresponds to 20 years (40 years for special applications). The calculated leached amount Q* of Copper is 20.83 mg/m² after 30 days and 215.2 mg/m² after 365 days. The extrapolated leached amount Q* is 215.7 mg/m² after 7300 and 14600 days. The leached amount Q* of Cu-HDO after 30 days is 2.45 mg/m² and is derived from the measured values on day 38 (3.10/38*30=2.45). The measured leached amount Q* of Cu-HDO is 26.1 mg/m² after 365 days. The extrapolated leached amount Q* of Cu-HDO is 32.2 mg/m² after 7300 and 14600 days. The leached amount Q* of Boron after 30 days is 11.4 mg/m² and is derived from the measured values on day 38 (14.46/38*30=11.4). The measured leached amount Q* of Boron is 150.7 mg/m² after 365 days. The extrapolated leached amount Q* of Boron is 172.3 mg/m² after 7300 and 14600 days.
The emission is corrected to the requested worst case retention of the Wolmanit CX-10_family for each use class, which is 13.6 kg/m³ in UC3, corresponding to the maximum retention including the protection against termites. For UC4, the retention has been set at 22.5 kg/m³ for normal use and at 31.25 kg/m³ for special applications such as transmission poles for example.

Emission rates for time 1,2 and time 3 for UC3 in different scenarios				
	Time period	**Cumulated Cu-HDO emission Q (mg/m²)**	**Cumulated total Cu emission Q (mg/m²)**	**Cumulated Boron emission Q (mg/m²)**
NTBuild 509 study, retention 12.82 kg/m³	30 days	2.45	20.83	11.4
	365 days	26.1	215.2	150.7
	7300 days	32.2	215.7	172.3
Wolmanit CX-10 product Family, max. retention UC3 13.6 kg/m³ [a]	30 days	2.60	22.10	12.09
	365 days	27.69	228.29	159.87
	7300 days	34.16	228.82	182.77
Wolmanit CX-10 product Family, max. retention UC4 22.5 kg/m³ [a]	30 days	4.30	36.56	20.01
	365 days	45.81	377.69	264.49
	7300 days	56.52	406.86	302.38
Wolmanit CX-10 product Family, max. retention storage area 31.25 kg/m³ [b]	30 days	11.94	101.49	55.56
	365 days	127.24	1049.14	734.7
	7300 days	156.98	1051.58	839.95

[a] As the application rate used in the leaching test is less than 2 times the maximum application rate of the product, emission rates were adapted to the requested retentions by linear extrapolation. This is in line with the approach agreed during the 1st leaching working shop (EC 2005)

[b] The maximum application rate for special applications is 2.43 times the application rate used in the leaching test. If the application rate is between 2 and 10 times lower than the maximum application rate linear extrapolation and an additional assessment factor shall be applied (EC 2005). As a precautionary measure, an assessment factor of 2 has been applied to the extrapolated data to account for differences between the applied concentration in the leaching test and the intended maximum retention rates. The factor of 2 has been chosen as the deviation from the cut of level is small.

Use class 4: Wood directly in contact with soil or water

For UC4 timbers, intended for use outdoors in direct contact with soil or water, a study was carried out in accordance with the OECD protocol for hazard class 4 environments. The test involved timber specimens (pine sapwood blocks) pre-treated to a loading of 19.91 kg/m³ which are fully and continuously immersed in water for 29 days, with periodic exchange and analysis of the leachate for the active substances. Water was exchanged after 6 hours, 1, 2, 4, 8, 15, 22 and 29 days. As the average retention rate of product used in this study was less the maximum proposed product retention rate for UC4 timbers, adjustment of the leach rate data was necessary. Where the applicant supplies leaching data from a lower leaching application rate, the approach agreed at the first and second leaching workshop is: “If the application rate is less than 2 times the maximum application rate, linear extrapolation can be used.”

Therefore, the provided leaching test can be used for the whole concentration range in the different UC4.

Leaching rates used for risk assessment

Mean cumulative leaching data for both active substances and the metabolite copper are presented within the below table.

Average cumulative loss (mg/m²) for Copper, Cu-HDO and Boron			
Sample point	**Cumulated loss of a.s.**		
	Copper [mg/m²]	**Cu-HDO [mg/m²]**	**Boron [mg/m²]**
6h	89.3	55.9	128.1
24h	118.5	76.51	199.7
2d	130.9	90.45	249.9
4d	148.9	109.73	326.0
8d	186.4	134.84	445.6
15d	235.7	155.70	570.9
22d	260.5	170.32	642.3
29d	271.5	184.51	681.8[a]

[a] The measured leached amount of Boron coresponts to 105.8% of the total Boron retention

The emission rate is calculated based on a polynomial regression of second order that has been proposed in the ESD for wood preservatives (OECD 2013a) to the following equation:

$$\mathrm{Log_{10}Flux}(t) = a + b \times \log_{10}(t) + c \times \log_{10}(t)^2$$

Once the parameter a, b and c are determined, the experimental Flux(t)=f(t) curve can be calculated.

The calculation of $Q*_{\text{leach,time}}$ can be done by summation of daily FLUX(t) for the time period considered for assessment. Fitting with a polynomial regression of second order will not take into account the saturation term, that occurs, when time approaches 0. However, it is possible to calculate the total quantity leached starting from time zero of the leaching experiment by adding to the $Q*_{\text{leach,time}}$, calculated according to the below equation, the quantity experimentally determined during the first day of the experiment $\text{Qleach}_{,0-1}$. In this case equation will read:

$$Q*_{\text{leach,time}}=(\sum_{t=1day}^{nday} FLUX(\text{t}))+(\frac{Q^{exp}_{leach,0-1}}{AREA^{exp}_{wood}})$$

The polynomial regression of second order determines the following parameters of the fit function for Copper and Cu-HDO which are summarized in the below table:

Summary of polynominal fit parameter		
Parameter	**Copper**	**Cu-HDO**
A	1.3658	1.2962
B	-0.5511	-0.6783
C	-0.1107	-0.0432
Corr. coefficient r²	0.8772	0.9893

Based on these fit parameters the leached cumulative amount Q* is calculated for different time points. The calculated leached amount Q* of Copper is 278.5 mg/m², 439 mg/m² and 575 mg/m² after 30, 365 and 7300 days. The calculated leached amount Q* of Cu-HDO is 199.8 mg/m², 345.6 mg/m² and 571.7 mg/m² after 30, 365 and 7300 days.

The emission is corrected to the requested worst case retention of the Wolmanit CX-10 for use class 4, which is 22.5 kg/m³ for normal use and at 31.25 kg/m³ for special applications such as transmission poles for example.
The measured leached amount Q* of Boron is 681.6 mg/m² after 30 days and corresponds to 105.8% of the total Boron retention. Therefore, the Boron leaching is assumed to be 100% after 30, 365 and 7300 days.

Emission rates for time 1,2 and time 3 for UC4 in different scenarios			
	Time period	**Cumulated Cu-HDO emission Q (mg/m²)**	**Total Cu emission Q (mg/m²)**
OECD 313 study, retention 19.91 kg/m^3	30 days	199.8	278.5
	365 days	345.6	439
	7300 days	571.7	575
Wolmanit CX-10 product Family, maximum retention UC4 22.5 kg/m³ [a]	30 days	225.8	314.7
	365 days	390.6	496.1
	7300 days	646.1	649.8
Wolmanit CX-10 product Family, max. retention special application 31.25 kg/m³ [a]	30 days	313.6	437.1
	365 days	542.4	689.0
	7300 days	897.3	902.5
	14600 days[b]	982.1	930.4

[a] As the application rate used in the leaching test is less than 2 times the maximum application rate of the product, emission rates were adapted to the requested retentions by linear extrapolation. This is in line with the approach agreed during the 1st leaching working shop (EC 2005)

[b] Increased service life time for UC4 special applications.

Testing for distribution and dissipation in soil (ADS)

The supplier of the active substance submitted an expert opinion concerning the dissipation of boron in soil (Garreyn F., Eliat-Eliat M., 2014). For further details please refer to 3.3 new active substance data.

Testing for distribution and dissipation in water and sediment (ADS)

There was no new data submitted, neither for the active substances nor for the biocidal products.

Testing for distribution and dissipation in air (ADS)

There was no new data submitted, neither for the active substances nor for the biocidal products.

If the biocidal product is to be sprayed near to surface waters then an overspray study may be required to assess risks to aquatic organisms or plants under field conditions (ADS)

No data is available and is not required as the BPF family Wolmanit CX-10 is not intended to be sprayed near to surface waters.

If the biocidal product is to be sprayed outside or if potential for large scale formation of dust is given then data on overspray behaviour may be required to assess risks to bees and non-target arthropods under field conditions (ADS)

There was no new data submitted, neither for the active substances nor for the biocidal products.

2.2.8.2 Exposure assessment

The products of the Wolmanit CX-10 product family are water-based products containing copper (as basic copper carbonate), Cu-HDO and boron (as boric acid) used as wood preservatives (PT 8) against fungi and insects, including termites. The products are intended for industrial use only as a preventive treatment by vacuum pressure application intended for use in use class 1-4. Environmental exposure is expected in UC3 and UC4, only. In UC4a distinction is made between retention rates for 'normal use' and special use such as transmission poles.

General information

Assessed PT	PT 8
Assessed scenarios	Scenario [1]: Product application and storage phase Scenario [2a]: Wood in service, house for UC3 Scenario [2b]: Wood in service, noise barrier for UC3 Scenario [2c]: Wood in service: bridge over pond for UC3 Scenario [3a]: Transmission pole for UC4, special application[a] Scenario [4a]: Jetty in lake for UC4 Scenario [4b]: Sheet piling for UC4
ESD(s) used	ESD for PT 8: Revised Emission Scenario Document for Wood Preservatives (OECD 2013a)
Approach	Average consumption
Distribution in the environment	Calculated in EUSES 2.1.2 based on TGD 2003 calculations
Groundwater simulation	PEARL 4.4.4.
Confidential Annexes	--
Life cycle steps assessed	Production: No Formulation: No Use: Yes Service life: Yes
Remarks	--

[a] For UC4a special application with increased retention rate has been requested, which is used in practice only for example for the impregnation of transmission poles.

Emission estimation

For the environmental risk assessment, the relevant compartments for emissions have to be defined and an assessment of the potential residues in each area of importance has to be conducted. Emission Scenario Documents (ESDs) have been prepared for a number of product types.
The emission estimation for the Wolmanit CX-10_family is based on the recommendations of the OECD emission scenario document "Revised Emission Scenario Document for Wood Preservatives" (OECD 2013a).
Environmental exposure during production and formulation of the biocidal product is not assessed under the requirements of the BPR. These life cycle steps are already covered by REACH legislation, where the registrants (manufacturers/importers) of substances are obliged to consider environmental hazard and exposure and to provide RMMs/exposure scenarios for ensuring safe use (e.g. via SDS in the supply chain). Moreover, it is assumed that industrial production sites are subject to permit for installation. Therefore, it is not considered relevant to perform an additional exposure assessment under the biocide regime.

Assessed Scenarios

Emissions to the environment can occur during industrial timber treatment and the service life of the treated timber.

Generally, no emission of Copper Cu-HDO and boron from wood in service is expected in situations where wood or wood-based products are under cover, protected from the weather and are not exposed to wetting (even where high environmental humidity leads to occasional but not persistent wetting). In situations where wood or wood-based products are not covered and in contact with the ground, either continually exposed to the weather or subject to frequent wetting, or in contact with water, emissions to soil and water are possible and subject of the following scenarios.

Relevant emission scenarios for use of the Wolmanit CX-10_family	
Main exposure scenario	**Subcategory**
Emission estimation for industrial timber treatment	
Scenario [1]: Emission scenario for vacuum pressure and double vacuum	A. Product application B. Storage of treated wood prior to shipping (including removal processes in the receiving environmental compartment - soil)
Emission estimation for treated wood in service	
Scenario [2]: Emission scenario for UC3	A. House scenario including removal processes B. Noise barrier scenario including removal processes C. Bridge over pond scenario including removal processes

Scenario [3]: Emission scenario for UC4a	A. Transmission pole, special application
Scenario [4]: Emission scenario for UC4b	A. Jetty in lake B. Sheet piling

Scenario [1]
Concerning the vacuum pressure scenario, the primary receiving compartments are considered to be local air and facility drain or soil and surface water for treatment process or storage of treated wood prior to shipping, respectively.

Scenario [2a]
Concerning the house scenario, the primary receiving compartment is considered to be soil via rain run-off. In urban areas product residues from outdoor use might also be emitted to the sewer due to rainfall. Concerning the applicability of the city scenario as a representative for the STP for wood applied in an urban environment above pavements the applicant stated:
"A city scenario has been described by the ECHA working group in the document "Leaching from paints, plasters, and fillers applied in urban areas"; revised November 2015, for paints and coatings (PT 7). This document should also be applicable for PT 8-PT 10.
The document describes a city scenario and possible emission from biocides due to leaching from houses to a standard STP. For PT 8 biocidal products, some significant defaults/factors are not defined in the latest document version and should be agreed and validated before calculations are possible for European applications, e.g.:

- *The number of treated wooden houses should be defined (the number should be significantly lower than the assumed 4000 houses for paints).*
- *The amount of treated wood surface per house with contact to rain water.*
- *The time period of leaching and the leaching rate. If an averaged time period is defined, the emission value from leaching studies could be applied. Currently no proposal is given for PT 8 products within the ECHA working group document.*
- *The emission is an indirect emission via leachates. The expected low concentration of active substances within the leaching water is further diluted by rainfall. The dilution factors of the leachates should be defined.*
- *The low mobility of active ingredients for PT 8 should be taken into account for a realistic worst case assessment. Currently no proposal is available in the document.*
- *The degradation behavior of the active substances should be taken into account. No proposal is currently available in the ECHA working group document.*

Currently the proposal of the city scenario is not included in the revised OECD ESD for wood preservatives, which was updated from OECD expert group end of 2013. The document of the working group itself was published end of 2015, which time span is too short to implement it in the approval process of Wolmanit CX products without validation. It should be kept in mind that the application for approval of Wolmanit CX was submitted on August, 1st 2015.
Moreover the current risk assessment of Wolmanit CX as a Use class 3 and 4 wood preservative considers the environmental risk to surface water in different scenarios. The environmental risk for the STP and the subsequent surface water is calculated within the "industrial application" and the "noise barrier" scenario. The environmental risk for surface water is also considered in "the bridge over pond", the "Jetty in lake" and the "sheet

piling" scenario. Therefore the risk to the surface water as receiving compartment is well addressed within the original application of Wolmanit CX. A more detailed consideration is currently not possible."
Emissions to the air are considered negligible from environmental point of view. The house scenario is considered as the worst case wood in service scenario for the soil compartment under UC3 conditions. Therefore, the fence scenario is not assessed separately.

Scenario [2b]
Concerning the noise barrier scenario, it is assumed that the leachate resulting from the rainfall either ends up directly in the adjacent soil in a proportion of 30% or is collected in the gutter and sewer (70%), and finally enters a municipal sewage treatment plant (STP). Emissions to the air are considered negligible from the environmental point of view. The noise barrier scenario is considered as the most critical wood in service scenario for the STP under UC3 conditions.

Scenario [2c]
Concerning the bridge over pond scenario, it is assumed that the leachate of the bridge resulting from the rainfall ends up directly in the adjacent water body. Emissions to the air are considered negligible from the environmental point of view. The bridge over pond scenario is considered as the most critical wood in service scenario for freshwater under UC3 conditions.

Scenario [3a]
Concerning the transmission pole, it is assumed that the emission from the treated wood to soil is a result of rainfall for the above soil part and permanent contact with the soil water phase for the below ground part. The transmission pole scenario is considered as the worst case wood in service scenario for the soil compartment under UC4 conditions. Therefore, the fence post scenario is not assessed separately.
The use class "UC4 special" specifically targets treated timber with applications having an increased service life time (e.g. transmission poles). For the intended use class "UC4 special" a service life of 40 years was assessed.

Scenario [4a]
Concerning the jetty in a lake, it is assumed that the emission from the treated jetty describe the emission in a static water body e.g. a lake or pond. Emissions from the treated wood to surface water are a result of rainfall for the above water part (planks) and the poles in permanent contact with the water. The jetty in a lake scenario is considered as the worst case with respect to the wood surface area under UC4b conditions.

Scenario [4b]
The scenario describes a sheet piling of poles in a small streaming waterway. It is assumed that the total surface of the poles is in contact with water even if this may result in an overestimation of the emission since only approximately 50% of the poles are permanently exposed to water. The sheet piling scenario represents a worst case because of the wood being mainly exposed under water.

Assessed Substances:
The product contains three biocidal active substances, i.e. boric acid, Cu-HDO and basic copper carbonate.

Once borates are released to the environment, the predominant species is undissociated boric acid. For practical reasons boric acid and other borates are usually expressed on the basis of boron. This is in line with the CAR for Boric acid (Netherlands 2009).
Cu-HDO and basic copper carbonate were decomposed to Cu, identified as a relevant metabolite in water, sediment and soil (please also refer to chapter 2.2.8.1 Effects assessment on the environment subchapter Metabolites).
Besides the active substances the biocidal product contains 2-Aminoetanol and Polyethyleneimine as substances of concern with respect to environmental hazards. 2-Aminoethanol was included into the quantitative assessment. A qualitative assessment to Polyethyleneimine is provided in the confidential annex of this document. The AT CA considers the contribution of Polyehtyleneimine to the overall toxicity of the biocidal product family Wolmanit CX-10 to be minor. Hence, the risk assessment is carried out on the basis of maximum total concentrations (covering termite protection) of boron, copper (from basic copper carbonate and Cu-HDO), the maximum concentrations of Cu-HDO and the maximum concentrations of 2-Aminoethanol.
Pease note that no significant differences are expected for risk assessment using the retentions with or without termites in UC 3 and 4.
This is reasoned as follows: In UC 4 the highest retention remains constant with and without termites. For UC 3, the retention is reduced from 13.6 kg product/m³ with termites to the highest retention of 9 kg product/m³ without termites which corresponds to a minor reduction factor of 1.5.

Assessed Service Life
During the Arona Leaching Workshop in June 2005 (EC 2005), it was agreed that a long-term assessment of in-service uses of wood should be carried out. For vacuum pressure treatments an assessment of cumulative leaching from treated wood in-service over a 20 year period was proposed. Hence, the assessment times are 30 days (TIME 1) for short term consideration and 20 years for the longer time period (TIME 2). At the follow-up leaching workshop in Varese (held 12th of June 2013), the Environment Working Group has agreed to implement a further TIME 2 value of 365 days (ECHA 2014) if a risk for the initial assessment period of 30 days is identified.
Hence, the environmental behaviour of the active substances from the Wolmanit CX-10_family was assessed for the use as a wood preservative for TIME 1 (30 days), TIME 2 (365 days) and for a long-term exposure TIME 3 (20 years) corresponding to the service life time.
The use class "UC4 special" specifically targets treated timber with applications having an increased service life time (e.g. transmission poles). In accordance with the use intended by the applicant, for "UC4 special" applications a service life of 40 years was assessed.

Calculations for Scenario [1]&[2]&[2]&[3]&[4]
Treatment of wood is concluded via vacuum pressure / oscillating pressure process treatment by industrial users. The worst-case use rate of the Wolmanit CX-10_family is 13.6 kg/m³ in UC3, corresponding to the maximum retention including the protection against termites. For UC4, the worst-case use rate has been set to 22.5 kg/m³ for normal use and at 31.25 kg/m³ for special applications such as transmission poles for example.
A summary of leaching behaviour of the active substances in the biocidal Product from treated wood is presented in chapter EFFECTS ASSESSMENT ON THE ENVIRONMENT subchapter Leaching behaviour.

All Input parameters used for calculating the local emission are described in annex 3.2 of this document.
A short summary of the values which have been indicated as "Set values" in the emission scenarios or default values to be selected from a list are summarised here:

Input parameters for calculating the local emission					
Input		**Value**			**Unit**
	Symlol	**Total Copper**	**Cu-HDO**	**Boron**	
Volume of wood treated per day - product application	$VOLUME_{wood-treated}$	30			$m^3.d^{-1}$
Quantity of a substance applied per m^3 of wood	Q_{ai}	2.5	1.09	0.273	$kg.m^{-3}$
Fraction released to facility drain - product application	$F_{facilitydrain}$	0.003			[-]
Fraction released to air - product application	F_{air}	0.001			[-]
Surface area of the storage place	$AREA_{storage}$	525			m^2
Duration of an intermediate assessment period not dependent of the service life	TIME2	365			d
Duration of a longer assessment period (service life)	TIME3	7300			d
Duration of an increased assessment period for special applications	$TIME3_{special application}$	14600			d

Calculations for local emission to relevant environmental compartments

The calculations and used parameters are described in annex 3.2 of this document. A short summary of the resulting local emissions is presented here:

Resulting local emission to relevant environmental compartments				
Compartment	**Local emission ElocalCompartment**			
	Symbol	**Total Copper**	**Cu-HDO**	**Boron**
Scenario [1]: Industrial application and storage phase				
Local emission rate to air $[kg.d^{-1}]$	$Elocal_{air}$	7.50E-02	3.28E-02	8.19E-03
Local emission rate to facility drain $[kg.d^{-1}]$	$Elocal_{facilitydrain}$	2.25E-01	9.84E-02	2.46E-01
Average daily release onto soil per m2 of storage area $[kg.m^{-2}.d^{-1}]$	$Elocal_{soil}$	3.72E-05	4.38E-06	2.04E-05

Resulting local emission to relevant environmental compartments				
Compartment	**Local emission ElocalCompartment**			
	Symbol	**Total Copper**	**Cu-HDO**	**Boron**
Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over the initial assessment period [kg.d^{-1}]	$Elocal_{surfcewater}$	9.78E-03	1.15E-03	5.35E-03
Scenario [2a]: House scenario UC3				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{soil,leach,TIME1}$	92.1	10.8	50.4
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{soil,leach,TIME2}$	78.2	9.48	54.8
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{soil,leach,TIME3}$	3.92	5.85E-01	3.13
Scenario [2b]: Noise barrier UC3				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{soil,leach,TIME1}$	663	78.0	387
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{soil,leach,TIME2}$	563	68.3	394
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{soil,leach,TIME3}$	28.2	4.21	22.5
Local daily emission rate to the STP following leaching from treated wood during the initial assessment period [mg.d^{-1}]	$E_{STP,TIME1}$	1547	182	903
Local daily emission rate to the STP following leaching from treated wood during the intermediate assessment period [mg.d^{-1}]	$E_{STP,TIME2}$	1313	159	920
Local daily emission rate to the STP following leaching from treated wood during the longer assessment period[mg.d^{-1}]	$E_{STP,TIME3}$	65.8	9.83	52.6
Scenario [2c]: Bridge over pond UC3				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{water,leach,TIME1}$	7.37	8.67E-01	4.03
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{water,leach,TIME2}$	6.25	7.59E-01	4.38

Resulting local emission to relevant environmental compartments				
Compartment	**Local emission ElocalCompartment**			
	Symbol	**Total Copper**	**Cu-HDO**	**Boron**
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{water,leach,TIME3}$	3.13E-01	4.68E-02	2.55E-01
Scenario [3a]: Transmission pole UC4 – special application				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{soil,leach,TIME1}$	41.7	18.7	77.6
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{soil,leach,TIME2}$	18.9	4.27	16.7
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{soil,leach,TIME3}$	9.91E-01	3.13E-01	8.54E-11.23
Average daily emission due to leaching over an increased assessment period for special applications [mg.d^{-1}]	$E_{soil,leach,TIME3}$ special application	4.98E-01	1.65E-01	6.17E-01
Scenario [4a]: Jetty in lake UC4				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{water,leach,TIME1}$	125	77.6	318
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{water,leach,TIME2}$	30.4	12.7	37.0
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{water,leach,TIME3}$	1.79	1.01	1.94
Scenario [4b]: Sheet piling UC4				
Average daily emission due to leaching over the initial assessment period [mg.d^{-1}]	$E_{water,leach,TIME1}$	49.4	35.5	145
Average daily emission due to leaching over the intermediate assessment period [mg.d^{-1}]	$E_{water,leach,TIME2}$	6.40	5.04	11.9
Average daily emission due to leaching over a longer duration [mg.d^{-1}]	$E_{water,leach,TIME3}$	4.19E-01	4.17E-01	5.95E-01

Fate and distribution in exposed environmental compartments

Various phases in the life cycle of a product may cause emissions and environmental exposure. The enclosed table summarises all receiving environmental compartments that have been identified as potentially exposed during the use of the Wolmanit CX-10_family for the different applications.

The routes of entry into the environment are explained in more detail in the before mentioned emission assessment.

Identification of relevant receiving compartments based on the exposure pathway					
Scenario		**Environmental compartments and groups of organisms exposed**			
		STP	**Freshwater**[1]	**Soil**	**Air**
Scenario [1]: Industrial application and storage phase	application	++	+	+[3]	++
	storage	-	++	++[2]	-
Scenario [2a]: House scenario UC3		-	-	++[2]	-
Scenario [2b]: Noise barrier UC3		++	+	++[2]	-
Scenario [2c]: Bridge over pond UC3		-	++	-	-
Scenario [3a]: Transmission pole UC4		-	-	++[2]	-
Scenario [4a]: Jetty in lake UC4		-	++	-	-
Scenario [4b]: Sheet piling UC4		-	++	-	-

++ Compartment directly exposed, + Compartment indirectly exposed, - Compartment not exposed

[1] Including sediment, [2] Including groundwater via leaching from soil, [3] Including soil and groundwater via STP surplus sludge application

<u>Assessment of direct emission to surface water in urban areas</u>

The current document "The assessment of direct emission to surface water in urban areas (PT 6.2/6.3 and 7-10)" was developed for PT 7 and PT10. According to this document, the environmental release estimation assumes that always a mixed sewer system is present. It is suggested to consider a direct emission due to a storm water event and a separate sewer systems with direct discharge of rainwater.

The applicant justified the non submission of a scenario on direct emissions to surface water via rainfall or storm water events, respectively:

"The document contains information about the size of STP in Germany and the EU STP bypass scenario from (EU TGD 2003) but no proposal for a detailed PT-8 scenario.

For PT 8 biocidal products, some significant defaults/factors should be agreed and validated before calculations are possible for European applications, e.g.:

- *The amount of treated wood or the total wood surface with contact to rain water should be defined for the considered area.*
- *The time period of leaching and the leaching rate. If an averaged time period is defined, the emission value from leaching studies could be applied. Currently no proposal is given for PT 8 products within the ECHA working group document.*
- *The emission is an indirect emission via leachates. The expected low concentration of active substances within the leaching water is further diluted by rainfall. The dilution factors of the leachates should be defined.*
- *The low mobility of active ingredients for PT 8 should be taken into account for a realistic worst case assessment. Currently no proposal is available in the document.*

- *The degradation behavior of the active substances should be taken into account. No proposal is currently available in the ECHA working group document.*

Currently the proposal is not included in the revised OECD ESD for wood preservatives, which was updated from OECD expert group end of 2013. The document of the working group itself was published end of 2014, which time span is too short to implement it in the approval process of Wolmanit CX products without validation. It should be kept in mind that the application for approval of Wolmanit CX was submitted on August, 1st 2015.

Moreover the current risk assessment of Wolmanit CX as a Use class 3 and 4 wood preservative considers the environmental risk to surface water in different scenarios. The environmental risk for the STP and the subsequent surface water is calculated within the "industrial application" and the "noise barrier" scenario. The environmental risk for surface water is also considered in "the bridge over pond", the "Jetty in lake" and the "sheet piling" scenario. Therefore the risk to the surface water as receiving compartment is well addressed within the original application of Wolmanit CX. A more detailed consideration is currently not possible."

The applicant's statement is accepted for product authorization of the Wolmanit CX-8WB Family.

Input parameters (only set values) for calculating the fate and distribution in the environment[a]				
Input	**Total Copper**	**Cu-HDO**	**Boron**	**Unit**
Molecular weight	n.a.	349.9	61.83	g/mol
Vapour pressure (at 20° C)	<1.00E-05	< 0.0001	n.a.	Pa
Water solubility	100000[b] at 20°C	6.1 at pH=7 and 23°C	54130 at pH=7 and 20°C	mg/L
Organic carbon/water partition coefficient (K_{OC})	106000	30277.4	2.6	L/kg
Henry's Law Constant	n.a.	0.0057	n.a.	Pa/m3/mol
Readily biodegradable	not biodegradable	not biodegradable	not biodegradable	--
DT_{50} for biodegradation in surface water	n.a.	6.8	n.a.	d
DT_{50} for degradation in soil (at 12ºC)	n.a.	5.7	n.a.	d
Log Octanol/water partition coefficient (log K_{OW})	8.50E-07	2.6	-1.09	Log 10
BCF fish	n.a.	n.a.	BAF < 10 L/kg	$L/kg_{wet fish}$
BCFearthworm	n.a.	n.a.	n.a.	--
DT_{50} degradation, total system (12°C)	n.a.	41	n.a.	d

n.a. not available or not applicable (copper)

[a] Endpoints are taken from the Assessment Reports (PT-8) boric acid (Netherlands 2009) for basic copper carbonate (France 2011) and Cu-HDO (Austria 2013) and their Lists of Endpoints

[b] Based on soluble copper iones. Data obtained from VRAR of copper (ECHA 2008)

The elimination of basic copper carbonate and Cu-HDO in the environment after release to the sewer system was simulated using SimpleTreat module of EUSES 2.1.2. EUSES. Output reports concerning the release pathway via sewage treatment plant (STP) are reported in annex 3.2 of this report. The distribution in the STP is summarised in the following table:

Calculated fate and distribution in the STP				
Compartment	**Percentage [%]**			**Remarks**
	Basic copper carbonate	**Cu-HDO**	**Boron**	
Air	4.15E-6	1.46E-05	1.44E-06	-
Water	13.9	25.9	99.97	-
Sludge	86.1	74.1	0.0325	-
Degraded in STP	0	0	0	-

Calculated PEC values

The Predicted Environmental Concentration (PEC) calculations follow the available guidance literature (Revised Emission Scenario Document for Wood Preservatives (OECD 2013a) and Guidance on the Biocidal Products Regulation Volume IV Part B+C (ECHA 2017b).

Emissions of Boron (from Boric acid) Cu-HDO and total copper (from basic copper carbonate and Cu-HDO) to the environment were calculated using spreadsheets produced by Royal Haskoning and the ECB on the basis of the OECD emission scenarios for wood preservatives.

The PECs for in the environmental compartments derived in the following sections are calculated taking into account degradation processes and/or dilution (where applicable).

The values presented in the following tables are rounded values from the EXCEL calculation sheet provided by ECHA.. The calculations for the different PECs within EXCEL are always carried out with unrounded values. Distribution after release to the sewer system is calculated using EUSES 2.1.2.

PEC for sewage treatment plant (STP)

The ESD considers direct exposure to STP from the industrial application process and due to rain run-off from a noise barrier.

The distribution after release to the sewer system is calculated using EUSES 2.1.2. and is summarised in the below tables. The calculated daily local emissions of boron, copper and Cu-HDO to the STP were used as input parameter (set value) in EUSES 2.1.2.

PEC calculations and used parameters are described in annex 3.2 of this document.

The calculated PEC_{STP} for boron, Cu-HDO and total copper are presented in the table below:

Summary of PEC_{stp} for Boron, Cu-HDO and total Copper				
SCENARIO		**PEC_{stp} (mg/L)**		
		Total Copper	**Cu-HDO**	**Boron**
Scenario [1]: Industrial application and storage phase	**APPLICATION**	1.56 E-02	1.02E-02	0.123
Scenario [2b]: Noise barrier UC3	**TIME 3**	1.07E-04	2.33E-05	4.51E-04
	TIME 2	3.91E-05	2.05E-05	4.6E-04
	TIME 3	4.57E-06	1.27E-06	2.68E-05

PEC for surface water

The scenario in the ESD suggests indirect release via sewage treatment plant from the industrial application process and due to rain run-off from a noise barrier.

Direct emissions during service life (Bridge over pond, Jetty in lake or Sheet piling) or storage of treated wood prior shipping by leaching of the active substances due to rainfall is done for TIME 1 (30 days), TIME 2 (365) and TIME 3 (20 years = 7300 days). Degradation is taken into account for Cu-HDO. In the case of boron and copper, total concentration in water at the end of the assessment periods are calculated using the

EXCEL calculation sheet provided by ECHA. The calculations and used parameters for the storage scenario and the assessment of leaching during service life are described in annex 3.2 of this document.

The calculated PEC values for surface water for boron, Cu-HDO and total copper are presented in the table below:

Summary of PEC_{sw} for Boron, Cu-HDO and total Copper				
SCENARIO		**PEC_{sw} (mg/L)**		
		Total Copper	**Cu-HDO**	**Boron**
Scenario [1]: Industrial application and storage phase	**APPLICATION**	1.35E-03	9.74E-04	1.23E-02
	STORAGE	3.77E-04	4.43E-05	2.06E-04
Scenario [2b]: Noise barrier UC3	**TIME 1**	9.27E-06	2.23E-06	4.51E-05
	TIME 2	3.38E-06	1.96E-06	4.6E-05
	TIME 3	3.95E-07	1.22E-07	2.68E-06
Scenario [2c]: Bridge over pond UC3	**TIME 1**	2.21E-04	5.85E-06	1.21E-04
	TIME 2	2.28E-03	7.24E-06	1.60E-03
	TIME 3	2.29E-03	4.59E-07	1.83E-03
Scenario [4a]: Jetty in lake UC4	**TIME 1**	2.34E-04	3.28E-05	5.97E-04
	TIME 2	6.92E-04	7.60E-06	8.45E-04
	TIME 3	8.18E-04	6.19E-07	8.83E-04
Scenario [4b]: Sheet piling UC4	**TIME 1**	1.32E-01	2.66E-02	3.86E-01
	TIME 2	1.71E-02	3.78E-03	3.18E-02
	TIME 3	1.12E-03	3.13E-04	1.59E-03

PEC for sediment

In the Assessment Reports for boric acid (Netherlands 2009) and Cu-HDO (Austria 2013) the reported PNEC for the sediment was derived using the equilibrium method. So, the risk of the sediment compartment is the same as that assessed for surface water. Therefore, the calculation of $PEC_{sediment}$ values is not considered for boric acid and Cu-HDO. For total copper a solids-water partitioning coefficient for suspended matter value of 30246 $L.kg^{-1}$ has been applied. The calculations and used parameters for the storage scenario and the assessment of leaching during service life are described in annex 3.2 of this document.

Summary of PEC_{sed} for total Copper		
SCENARIO		**$PEC_{sediment}$ (mg/kg_{wwt})**
Scenario [1]: Industrial application and storage phase	**APPLICATION**	3.11
	STORAGE	2.48
Scenario [2b]: Noise barrier UC3	**TIME 1**	0.021
	TIME 2	0.0078
	TIME 3	0.0009
Scenario [2c]: Bridge over pond UC3	**TIME 1**	1.45
	TIME 2	14.99
	TIME 3	15.06
Scenario [4a]: Jetty in lake UC4	**TIME 1**	1.54
	TIME 2	4.55
	TIME 3	5.38
Scenario [4b]: Sheet piling UC4	**TIME 1**	868.03
	TIME 2	112.45
	TIME 3	7.37

Calculation formulas for total concentrations in water at the end of assessment periods used in the ECHA sheet takes only dilution into account. Therfore a refined assessment (i.e. including adsorption of Cu on suspended particles) is performed for scenarios suggesting direct release to surfacewater. This applies to sediment bridge over pond, as well as sediment jetty in lake and sediment sheet piling. The calculations and used parameters are described in annex 3.2 of this document.

Summary of refined PEC_{sed} for total Copper		
SCENARIO		**refined $PEC_{sediment}$ (mg/kg_{wwt})**
		Total copper
Scenario [2c]: Bridge over pond UC3	**TIME 1**	4.22E-02
	TIME 2	4.36E-01
	TIME 3	4.37E-01
Scenario [4a]: Jetty in lake UC4	**TIME 1**	8.71E-02
	TIME 2	2.59E-01
	TIME 3	3.05E-01
Scenario [4b]: Sheet piling UC4	**TIME 1**	596
	TIME 2	77.2
	TIME 3	5.06

PEC for soil

Predicted Environmental Concentrations for boron, Cu-HDO and total copper in soil are calculated for the noise barrier, house, transmission pole and the storage scenarios. A 50 cm distance and soil depth from the treated wood is defined as the receiving soil compartment. Removal processes in the soil are taken into account. All calculations and used parameters are described in annex 3.2 of this document.

The calculated PEC values for soil for the substances Cu-HDO and total copper are summarised in the table below.

Summary of PEC_{soil} for Boron, Cu-HDO and total Copper (values include degradation in soil)				
SCENARIO		**PEC_{soil} (mg/kg_{wwt})**		
		Total Copper	**Cu-HDO**	**Boron**
Scenario [1]: Industrial application and storage phase	**APPLICATION**	3.6	2.9E-02	1.56E-04
	STORAGE 30 days	6.57E-01	2.15E-02[b]	52.1
	STORAGE 20 years	160		
Scenario [2a]: House scenario UC3	**TIME 1**	1.25E-01	3.97E-03	6.82E-02
	TIME 2	1.29	3.58E-03	8.67E-01
	TIME 3	6.45E-01[a]	2.21E-04	5.01E-01
Scenario [2b]: Noise barrier UC3	**TIME 1**	4.68E-02	1.49E-03	2.72E-02
	TIME 2	4.83E-01	1.34E-03	3.25E-01
	TIME 3	2.43E-01[a]	8.26E-05	1.88E-01

Scenario [3a]: Transmission pole UC4	**TIME 1**	2.48E-01	3.00E-02	4.95E-01
	TIME 2	1.36	7.04E-03	1.15
	TIME 3	7.15 E-01[a]	5.16E-04	6.39E-1
	TIME 3$_{\text{special application}}$	7.20 E-01[a]	2.73E-04	3.86E-1

[a] In order to consider the phenomenon of copper ageing in soil, an ageing factor of 2 was applied on the total copper concentrations in soil for the values calculated over a longer assessment period (TIME 3). This strategy was validated at TMIII08.

[b] Steady state concentration in soil

PEC for groundwater

Copper has a significant natural background concentration groundwater. For copper the groundwater value is defined in the European drinking water directive as 2 mg/L Cu, for organic biocides it is 0.1 µg/L. According to the Assessment report of copper carbonate (FR, 2011) Cu as element is considered to be strongly absorbed and immobile in soil. Therefore, copper is not expected to pose a risk for groundwater contamination, and no special risk assessment for Cu was performed for product authorisation.

According to the assessment report of boric acid (Netherlands 2009), the local concentration in porewater may initially be used as an indication for the concentration in groundwater. The PEC's in local groundwater are calculated by equilibrium partitioning from the PECsoil. The Kp$_{soil}$ is 2.6 L/kg, the K$_{soil\text{-}water}$ 4.16 m^3/m^3, assuming that partitioning into air is negligible. Resulting PECgroundwater are summarised in the table below.

Summary of PEC$_{Groundwater}$ for Boron		
SCENARIO		**PEC$_{Groundwater}$ (mg/L)**
Scenario [1]: Industrial application	**APPLICATION**	6.00E-4
Scenario [2a]: House scenario UC3	**TIME 1**	4.46E-02
	TIME 2	5.67E-01
	TIME 3	2.05E-01
Scenario [2b]: Noise barrier UC3	**TIME 1**	1.78E-02
	TIME 2	2.12E-01
	TIME 3	7.68E-02
Scenario [3a]: Transmission pole UC4	**TIME 1**	1.88E-01
	TIME 2	4.72E-01
	TIME 3	2.61E-01
	TIME 3$_{\text{special application}}$	1.58E-01

Refinement of the PEC$_{groundwater}$ with FOCUS-PEARL model calculations have not been carried out, as agreed at TM III-06. This is reasoned as follows: the available groundwater models are designed for organic substances. According to the experts, running the models for inorganic compounds will not have any predictive value for the actual field situation. Furthermore, the models are highly dependent on the binding to organic matter. Since for boron no clear relationship of sorption with organic carbon exists, this would imply additional uncertainty to the outcome of the model calculations.

The fate and behaviour for Cu-HDO suggest that it is not expected to reach groundwater since this compound has been shown a low mobility in soil.
However, the models for estimation of concentrations in groundwater as well as the receiving compartment size in some models, were discussed on EU level in several Technical Meetings. As result of these discussions, a separate scenario was prepared for groundwater exposure assessment. The ground water assessment was performed by the applicant with the model FOCUS Pearl 4.4.4 acc. to the ESD (OECD 2013a).

When considering industrial application and use of treated wood, a groundwater assessment is only necessary for the house scenario, which can be considered to be the worst-case for soil exposure, thus covering all other scenarios.
A density of 16 houses per hectare is assumed. Each of the 16 houses is assumed to have an outer wooden area treated with wood preservatives and relevant for leaching of 125 m², resulting in a total (leachable) area of 2000 m² per hectare. The leaching rate of Cu-HDO is measured in a semi-field leaching test. For this wood in service scenario, the daily release can be calculated as follows:

Release (kg/ha/day) = 16 (houses/ha) x 125 (wood surface per house m²) x 34.69 mg Cu-HDO/m² /7300 days = 9.5 mg Cu-HDO /ha day.

These daily average releases are multiplied by 365 days and divided by 4 due to the four times repeated application onto soil. The application dates are 1st of March, 23rd of April, 15th of June and 7th of August. The scenario "grassland" is chosen as ground cover. For modelling the following parameters are used:

Parameter for Cu-HDO	**Unit**	**Value**
Molecular weight	$g.mol^{-1}$	349.9
Saturated vapour pressure	Pa - measured at 50°C and 20°C	0.0001
Solubility in water	$mg.L^{-1}$ - measured at 20°C	6.1
K_{oc}	$L.kg^{-1}$	30277.4
$K_{om} = K_{oc} / 1.724$	$L.kg^{-1}$	17562.3
Half-life (groundwater)	d - measured at 12°C	41
Henry Law Constant	$Pa.m^3.mol^{-1}$ - measured at 20°C	0.0057
Freundlich sorption exponent	-	0.9
Coefficient for uptake by plant	-	0

All values of input parameters of FOCUS Pearl groundwater model, which are not listed in the above table, were set to default values.
The parameter „coefficient for uptake by plants" is set to zero for a worst case scenario. The data generates a value for the 80th percentile of levels of substance present in groundwater at a depth of 1 m as an annual average in µg/L. In fact, the simulated value is the concentration in pore water in a depth of 1 m and therefore it is the potential

concentration in groundwater. Values that exceed the threshold of 0.1 µg/L are unacceptable according to the EU Drinking Water Directive.

Potential groundwater concentrations of Cu-HDO calculated using FOCUS Pearl 4.4.4: Use Class 3, house scenario

Scenario	**Unit**	**Local $PEC_{groundwater}$ house scenario: Use Class 3**
Chateaudun	$\mu g.L^{-1}$	<0.001
Hamburg	$\mu g.L^{-1}$	<0.001
Kremsmünster	$\mu g.L^{-1}$	<0.001
Jokioinen	$\mu g.L^{-1}$	<0.001
Okehampton	$\mu g.L^{-1}$	<0.001
Porto	$\mu g.L^{-1}$	<0.001
Piacenza	$\mu g.L^{-1}$	<0.001
Sevilla	$\mu g.L^{-1}$	<0.001
Thiva	$\mu g.L^{-1}$	<0.001

The FOCUS Pearl simulation outputs for every scenario provided the result namely: "average concentration of Cu-HDO closest to the 80th percentile of 0.000000 µg/L" (<0.000001 µg.L-1). Hence, all values are well below the threshold value of the EU Drinking Water Directive of 0.1 µg/L.

PEC for air

According to the ESD the concentration of the active substances in air is only estimated for industrial preventive treatment. Due to fast degradation and the low vapour pressure (<1x10^{-4} Pa) of Cu-HDO the air compartment is not considered as relevant.

Primary and secondary poisoning

Primary poisoning

In addition to the ‘secondary poisoning’, in some cases primary poisoning (e.g. for rodenticides or insecticides), may take place and needs to be assessed. The product is a wood preservative (Product Type 8) and is applied in liquid form in industrial treatment plants. Therefore, direct uptake of the product is unlikely. In addition for primary poisoning no guidance is given in the ESD for PT 8 (OECD 2013a). PEC values from primary poisoning have therefore not been calculated.

For information on considerations referring to the risks posed to animals from the biocidal product, please also refer to the risk assessment for animal health.

Secondary poisoning:

According to Guidance on the Biocidal Products Regulation Volume IV Environment (ECHA 2017b) the calculation of a possible risk to man via the food chain ($PECoral_{predator}$) should be conducted if an substance shows a potential for bio-accumulation, indicated by a log K_{ow} value >3, BCF >100 L/kg_{wwt} or if a substance is highly adsorptive.

Boron:

The bioaccumulation factors for Boron according to the Assessment Report (Netherlands, 2009) are < 10 L/kg (fish) and < 30 L/kg (plankton and invertebrates). Therefore, “Boron is not bioconcentrated or bioaccumulated along the food chain in both aquatic and terrestrial ecosystems” (Netherlands, 2009).

Cu-HDO:

The octanol/water partition coefficient for Cu-HDO has been determined with 2.6 which results in very low BCFs in fish and earthworms. The risk of secondary poisoning by ingestion of contaminated food (fish or earthworms) is therefore very limited to non-existent. So this exposure route was not assessed further and no calculations were performed. This is in line with the Assessment report of Cu-HDO (Austria 2013).

Copper:

According to the Assessment report of Copper Carbonate (France 2011) bioaccumulation and biomagnification phenomenons are considered as not applicable for copper. Therefore, copper is not expected to pose a risk for secondary poisoning, and no special risk assessment for was performed for product authorisation.

Risk Assessment of 2-Aminoethanol (2-MEA) for the environment

A risk assessment was performed for 2-Aminoethanol (2-MEA), which is an important component in the biocidal Wolmanit CX-10_family for PT 8 (wood preservatives), in order to describe possible effects to the environment.
It has been decided to perform a risk assessment for different exposure scenarios, e.g. the bridge over pond scenario and the noise barrier scenario, which are well known exposure scenarios acc. to the OECD ESD for wood preservatives, (OECD 2013a).
The noise barrier scenario is considered as the most critical wood in service scenario for the STP under UC3 conditions. The bridge over pond scenario is considered as the most critical wood in service scenario for freshwater under UC3 conditions. As worst case wood in service scenario for the soil compartment the house (UC3 conditions) and the transmission pole scenario (UC4a conditions) are considered.
UC4b conditions, industrial application and storage phase are not considered in the assessment, as risk mitigations for the active substance already cover any risk that might be present for 2-MEA.

Leaching behaviour
A leaching study is required for the determination of the quantitative emission of 2-MEA from treated wood. For UC3 a semi-field study (Ref.: B 10.3-04) was carried out with reference to NTBuild 509 methodology.
The study was performed using Wolmanit CX-8WB. Wolmanit CX-8WB contains the lowest amount of 2-MEA in comparison to the other products grouped in the family. The composition of tested formulation and the full composition of the product family are provided in the confidential annex. However, the required emission data of 2-MEA are calculated from the 2-MEA study acc. to NTBuild 509 and are used as a starting point for quantitative assessment for use class 3 .
No leaching study was submitted for use class 4. In the absence of leaching data for the UC4 conditions, the leaching rate was set to 50% or 75% from the application rate for short term considerations (30 or 365 days) and 100% from the application rate for the longer time period of the service life:.

Leaching rates for time 1,2 and time 3 for UC4		
	Time period	**2-MEA emission (mg/m²)**
Default leaching rates as no leaching study is available	30 days	125000
	365 days	187500
	7300 days	250000

Use class 3: Wood exposed to weather, but not directly in contact with water or soil
According to the 2nd leaching workshop for PT 8, the NTBuild 509 semi-field study is the most preferred leaching study protocol. This study protocol allows the determination of realistic worst case emission values for time 1 (30 days) and time 2 (365 days), whereas only the long term emission time 3 must be extrapolated to 20 years for vacuum pressure application.
A study was undertaken with pine sapwood blocks treated with 1.27% Wolmanit CX-8WB solution (diluent: water) to an average retention rate of 9.84 kg/m^3 of product, which isn´t equal to the maximum proposed product retention rate for UC3. Where the applicant

supplies leaching data from a lower leaching application rate, the approach agreed at the first and second leaching workshop is: "If the application rate is less than 2 times the maximum application rate, linear extrapolation can be used. If the application rate is between 2 and 10 times lower than the maximum application rate linear extrapolation and an additional assessment factor shall be applied"
Therefore, the provided leaching test can be used for the whole concentration range in the different use classes.

Leaching rates used for risk assessment
Mean cumulative leaching data for 2-MEA are presented within the below table.

Average cumulative loss (mg/m²) for MEA			
Test duration [days]	**Cumulated precipitation [mm]**	**Cumulated loss of a.s.**	
		[mg/m²]	**[%]**
28	51	<0.02	<0.00004
70	105	283.47	0.618
124	194	857.99	1.870
262	399	958.63	2.090
306	635	983.88	2.145
365	740	985.54	2.148

The emission rate is calculated based on a polynomial regression of second order, which has been proposed in the ESD for wood preservatives (OECD 2013a) to the following equation:

$$\text{Log}_{10}\text{Flux}(t) = a + b \times \log_{10}(t) + c \times \log_{10}(t)^2$$

Once the parameter a, b and c are determined, the experimental Flux(t)=f(t) curve can be calculated.
The calculation of $Q*_{\text{leach,time}}$ can be done by summation of daily FLUX(t) for the time period considered for assessment. Fitting with a polynomial regression of second order will not take into account the saturation term, that occurs, when time approaches 0. However, it is possible to calculate the total quantity leached starting from time zero of the leaching experiment by adding to the $Q*_{\text{leach,time}}$, calculated according to the below equation, the quantity experimentally determined during the first day of the experiment $\text{Qleach}_{,0-1}$. In this case the equation will read:

$$Q*_{\text{leach,time}}=\left(\sum_{t=1day}^{nday} FLUX(\text{t})\right)+\left(\frac{Q_{leach,0-1}^{exp}}{AREA_{wood}^{exp}}\right)$$

The polynomial regression of second order determines the following parameters of the fit function for 2-MEA which are summarized in the below table:

Summary of polynomial fit parameter	
Parameter	**2-MEA**
A	-26.068
B	27.936
C	-7.1949
Corr. coefficient r²	0.9638

The parameters are well confirmed by the above mentioned correlation coefficients.
Based on these fit parameters the leached cumulative amount Q* is extrapolated for time 3, which corresponds to 20 years.

The measured leached amount Q* of 2-MEA is 162 mg/m² or 0.35% after 30 days and 932.3 mg/m² or 2.03% after 365 days. The extrapolated leached amount Q* of 2-MEA is 1204 mg/m² or 2.62% after 7300 days.

The emission is corrected to the requested worst case retention of the Wolmanit CX-10_family for each use class, which is 13.6 kg/m³ in UC3, corresponding to the maximum retention including the protection against termites. For UC4, the retention has been set at 22.5 kg/m³ for normal use and at 31.25 kg/m³ for special applications such as transmission poles for example.

Emission rates for time 1,2 and time 3 for UC3 in different scenarios

	Time period	**Cumulated 2-MEA emission Q (mg/m²)**
NTBuild 509 study, Wolmanit CX-8WB; retention 9.84 kg/m³	30 days	162
	365 days	932.3
	7300 days	1204
Wolmanit CX-10 product Family, maximum retention UC3 13.6 kg/m³ [a]	30 days	223.9
	365 days	1288.5
	7300 days	1664.1
Wolmanit CX-10 product Family, maximum retention UC4 22.5 kg/m³ [b]	30 days	743.1
	365 days	4276.6
	7300 days	5523
Wolmanit CX-10 product Family, max. retention storage area 31.25 kg/m³ [b]	30 days	1029
	365 days	5919.7
	7300 days	7647

[a] As the application rate used in the leaching test is less than 2 times the maximum application rate of the product, emission rates were adapted to the requested retentions by linear extrapolation. This is in line with the approach agreed during the 1st leaching working shop (EC 2005)

[b] The maximum application rate for special applications is 2.29 - 3.17 times the application rate used in the leaching test. If the application rate is between 2 and 10 times lower than the maximum application rate linear extrapolation and an additional assessment factor shall be applied (EC 2005). As a precautionary measure, an assessment factor of 2 has been applied to the extrapolated data to account for differences between the applied concentration in the leaching test and the intended maximum retention rates. The factor of 2 has been chosen as the deviation from the cut-off level is small.

Calculated PEC values

The Predicted Environmental Concentration (PEC) calculations follow the available guidance literature (Revised Emission Scenario Document for Wood Preservatives; OECD 2013a) and Guidance on the Biocidal Products Regulation Volume IV Part B+C (ECHA 2017c).
Emissions of 2-MEA to the environment were calculated using spreadsheets produced by Royal Haskoning and the ECB on the basis of the OECD emission scenarios for wood preservatives.

The PECs for in the environmental compartments derived in the following sections are calculated taking into account degradation processes and/or dilution (where applicable).
The values presented in the following tables are rounded values from the EXCEL calculation sheet provided by ECHA.. The calculations for the different PECs within EXCEL are always carried out with unrounded values.
PEC calculations and used parameters are described in annex 3.2 of this document.
The calculated PECs for 2-MEA are presented in the tables below.

PEC for sewage treatment plant (STP)
The ESD considers direct exposure to STP from the industrial application process and due to rain run-off from a noise barrier. However, industrial application is not considered in the assessment of the substance of concern, as risk mitigations for the active substance already cover any risk that might be present for 2-MEA.

The PEC_{STP} is calculated from the local emission to wastewater from the EXCEL calculation sheet provided by ECHA. and the effluent discharge rate of STP (ESD Equation 35):

Summary of PEC_{stp} for 2-MEA		
SCENARIO		**PEC_{stp} (mg/L)**
		2-MEA
Noise barrier UC3	**TIME 3**	7.59 E-03
	TIME 2	3.77 E-03
	TIME 3	2.43 E-04

PEC for surface water
As a worst case consideration direct emissions during use class 3 and 4 service life are assessed for TIME 1 (30 days), TIME 2 (365) and TIME 3 (20 years =7300 days). An DT_{50} for biodegradation in surface water of 15 days is taken into account (REACH registered substance data base, dated December 2020).
Industrial application and storage phase are not considered in the assessment, as risk mitigations for the active substance already cover any risk that might be present for 2-MEA.

Summary of PEC_{sw} for 2-MEA		
SCENARIO		**PEC_{sw} (mg/L)**
		2-MEA
Bridge over pond UC3	**TIME 1**	7.53E-04
	TIME 2	7.30E-04
	TIME 3	4.99E-05
Scenario [4a]: Jetty in lake UC4	**TIME 1**	2.93E-03
	TIME 2	6.87E-03

	TIME 3	4.85E-04
Scenario [4b]: Sheet piling UC4	**TIME 1**	1.97E+00
	TIME 2	2.43E-01
	TIME 3	1.62E-01

PEC for sediment

The reported PNEC for the sediment was derived using the equilibrium method. So the risk of the sediment compartment is the same as that assessed for surface water. Therefore, the calculation of $PEC_{sediment}$ values is not considered for 2-MEA.

PEC for soil

Predicted Environmental Concentrations for 2-MEA in soil are calculated for use class 3 (noise barrier, house) and use class 4a service life (transmission pole). A 50 cm distance and soil depth from the treated wood is defined as the receiving soil compartment and an DT_{50} for degradation in soil of 7 days is taken into account (REACH registered substance data base, dated December 2020).
In the absence of leaching data for the UC4 conditions, the leaching rate was set to 50% or 75% at TIME1 and TIME 2 (30 or 365 days) and 100% from the application rate at TIME3 of the service life. However, we would like to point out that this overestimates the risk for the transmission pole scenario.
UC4b conditions, industrial application and storage phase are not considered in the assessment, as risk mitigations for the active substance already cover any risk that might be present for 2-MEA.

Summary of PEC_{soil} for 2-MEA (values include degradation in soil)		
SCENARIO		**PEC_{soil} (mg/kg_{wwt})**
		2-MEA
House scenario UC3	**TIME 1**	4.11E-01
	TIME 2	2.05E-01
	TIME 3	1.32E-02
Noise barrier UC3	**TIME 1**	1.54E-01
	TIME 2	7.67E-02
	TIME 3	4.95E-03
Transmission pole UC4	**TIME 1**	13.2
	TIME 2	1.80
	TIME 3	1.31E-01
	TIME $3_{special\ application}$ [a]	6.56E-02

[a] The use class “UC4 special application” specifically targets treated timber with applications having an increased service life time (e.g. transmission poles). For the intended use class a service up to 40 years is to be expected.

PEC for groundwater

The ground water assessment is performed with the model FOCUS Pearl 4.4.4 acc. to the OECD ESD (OECD 2013a) for wood preservatives 2013.

When considering the use of treated wood in service UC3, a groundwater assessment is only necessary for the house scenario, which can be considered to be worst-case for soil exposure, thus covering all other scenarios.

An additional assessment of emissions to groundwater from UC4 applications is not considered necessary as no agreements has been made on the number of poles per hectare. The house scenario is considered sufficiently protective.

Following assumptions are considered appropriate for the assessment of groundwater exposure resulting from leaching from timber cladded houses treated with wood preservatives:

The dose to be applied in PEARL is derived by multiplying the amount leached per house with 365 days and 16 houses/hectare. A correction factor of E-06 is necessary to covert to kg/ha.

The leaching rate of MEA is measured in a semi-field leaching test. For the calculation of the annual leaching, the service life (i.e. 20-years' service life period) is used as basis and approach 2 of TAB entry A3 (Equations to be used for PEC calculation for wood and other preservatives applied outdoors) is applied. Therefore, the daily release can be calculated as follows:

Release (kg/ha/day) = 16 (houses/ha) x 125 (wood surface per house m²) x 380,6 mg 2-MEA/m² /7300 days = 104,27 mg 2-MEA/ha day =1,04E-04 2-MEA kg/ha per day

These daily average releases are multiplied by 365 days and divided by 10 due to 10 times repeated application onto soil. The application dates are first of each month except July and August. The scenario "grassland" is chosen as ground cover. For modelling the following parameters are used:

Parameter for MEA	**Unit**	**Value**
Molecular weight	$g.mol^{-1}$	61.08
Saturated vapour pressure	Pa	50
Solubility in water	$g.L^{-1}$	1000
K_{OC}	$L.kg^{-1}$	15
$K_{OM} = K_{OC} / 1.724$	$L.kg^{-1}$	8.7
Half-life (groundwater)	d	7
Henry Law Constant	$Pa.m^3.mol^{-1}$ calculated	0.00305
Freundlich sorption exponent	-	1
Coefficient for uptake by plant	-	0

All values of input parameters of FOCUS Pearl groundwater model which are not listed in the above table were set to default values. The parameter „coefficient for uptake by plants‟ is set to zero for a worst-case scenario. The data generates a value for the 80th percentile of levels of substance present in groundwater at a depth of 1 m as an annual average in µg/L. In fact, the simulated value is the concentration in pore water in a depth of 1 m and therefore it is the potential concentration in groundwater.

The detailed calculations are included in Annex 3.2. A short summary of the resulting groundwater concentrations is presented here:

Potential groundwater concentrations of 2-MEA calculated using FOCUS Pearl 4.4.4: 16 houses per ha scenario

Scenario	**Unit**	**Local PEC$_{groundwater}$ house scenario: Use Class 3**
Chateaudun	µg.L^{-1}	0.001782
Hamburg	µg.L^{-1}	0.030830
Kremsmünster	µg.L^{-1}	0.057447
Jokioinen	µg.L^{-1}	0.006103
Okehampton	µg.L^{-1}	0.017454
Porto	µg.L^{-1}	0.017650
Piacenza	µg.L^{-1}	0.018197
Sevilla	µg.L^{-1}	0.003925
Thiva	µg.L^{-1}	0.001950

The FOCUS Pearl simulation outputs for every scenario the "average concentration" of 2-MEA. Hence, all values for all nine scenarios are below (at least a factor of 16.8) the threshold value of the EU Drinking Water Directive of 0.1 µg/L.

TAB entry ENV-A3 states that where approach 2 is used, also approach 1 should be presented. Therefore, and to facilitate comparing with other PARs, in a second assessment the cumulated emission for 20 years was set to 1664.1 mg 2-MEA/m² /7300 days instead of 380.6 mg 2-MEA/m² /7300 days. All other input parameters remain unchanged. The daily release was calculated as follows:

Release (kg/ha/day) = 16 (houses/ha) x 125 (wood surface per house m²) x 1664.1 mg 2-MEA/m² /7300 days = 455.92 mg 2-MEA/ha day = 4.56E-04 2-MEA kg/ha per day

Potential groundwater concentrations of 2-MEA calculated using FOCUS Pearl 4.4.4: 16 houses per ha scenario

Scenario	**Unit**	**Local PEC$_{groundwater}$ house scenario: Use Class 3**
Chateaudun	µg.L^{-1}	0.006403
Hamburg	µg.L^{-1}	0.109209
Kremsmünster	µg.L^{-1}	0.020180
Jokioinen	µg.L^{-1}	0.169756
Okehampton	µg.L^{-1}	0.058951
Porto	µg.L^{-1}	0.075023

Potential groundwater concentrations of 2-MEA calculated using FOCUS Pearl 4.4.4: 16 houses per ha scenario

Scenario	**Unit**	**Local $\text{PEC}_{\text{groundwater}}$ house scenario: Use Class 3**
Piacenza	μg.L^{-1}	0.073055
Sevilla	μg.L^{-1}	0.016569
Thiva	μg.L^{-1}	0.009441

The values of two (Jokioinen, Hamburg) of nine scenarios are above the threshold value of the EU Drinking Water Directive of 0.1 μg/L.

Monitoring data

Experimental testing was performed by the applicant to assess the environmental impact of treated wood in contact with soil and water.
In two field studies, the effect of treated timber were monitored in two relevant local exposure scenarios. The jetty in lake and the fence post scenario were used for the water/sediment (Ref.: B 10.2-01) and soil (Ref.: B 10.2-02) compartment.

Soil field test:
The soil exposure of Wolmanit CX-8 was measured in a field trial with treated palisades. Wolmanit CX-8 is part of the Wolmanit CX-10 Family. Therefore, a study using Wolmanit CX-8 is used for the Wolmanit CX-10 Family. The measured retention is 12.5 kg/m³ Wolmanit CX-8 for the palisades, roughly reflecting the recommended product retention for use class 3.
The aim of the study is the determination of the total content of the active ingredients in the receiving soil compartment at different dates. Therefore, a container setup (three test containers, one post per container) was used as receiving soil compartment to simulate the 50 cm distance around the pole. Moreover, the spatial distribution of the active ingredients was monitored. For that purpose a special soil sampler (depth 1 m, diameter 16 mm) has been driven into the soil in order to reach the required depths of sampling (0-20 cm, 20-40 cm, 40-60 cm, 60-80 cm and 80-100 cm). Samples were taken at different distances around the palisade (at 5, 20 and 40 cm distance).
The sampling was repeated at four different dates to determine the time dependent change of the environmental impact. At each sampling day two diagonally opposite drillings were performed for each distance and container and the samples of each depth and distance were pooled to minimize natural fluctuation and disturbances of the soil content.
In this way, during the study duration of 27 months and a rainfall of 1824 mm, the distribution of the active ingredients in different soil distances and depths were monitored. From these data the averaged content for each active ingredient in the soil adjacent to treated posts was calculated for the four sampling time points.

Summary of averaged concentrations of the active ingredients Cu, B and Cu-HDO in the soil adjacent to treated posts

Average Container 1-3	**Total Copper (mg/kg_{dwt})**	**Boron (mg/kg_{dwt})**	**Cu-HDO (mg/kg_{dwt})**
First sampling, August 2009	17.34	0.97	<0.064
Second sampling, November 2009	23.65	1.22	<0.064
Third sampling, August 2010	14.88	1.21	<0.09
Fourth sampling, October 2011	9.31	0.94	<0.064

Test results must be compared with the natural background content of Copper and Boron, which was measured before start of the field test.

The averaged concentration of the active ingredient Copper and Boron for the 50 cm compartment reached a maximum during the second sampling date (corresponding to an emission duration of approx. 4 months).
The maximum observed Cu concentration for the 0-50 cm compartment was 23.64 mg/kg dwt including a background concentration of 18.68 mg/kg dwt at the sampling date 2.

The maximum observed B concentration for the 0-50 cm compartment was 1.19 mg/kg dwt including a background concentration of 0.29 mg/kg dwt at the sampling event 2.
The averaged concentration of the active ingredient Cu-HDO did not show a significant increase for the 0-50 cm compartment and was given by the limit of detection of the used analytical method during the study duration.

Additionally to the monitoring of the time dependent concentration of active ingredients in soil a plant growth of the soil compartment around the posts was monitored after three years of exposure. (please refer to chapter 2.2.8.1 Effects assessment on the environment; Effects on any other specific, non-target organisms (flora and fauna) believed to be at risk)

Water/sediment field test:
The field monitoring study was performed to assess the environmental impact of Wolmanit CX-8 freshly treated timber in contact with fresh water. Wolmanit CX-8 is part of the Wolmanit CX-8WB Family. Therefore, a study using Wolmanit CX-8 is considered representativ for the Wolmanit CX-10 Family.
The measured retention is 10.7 kg/m³ Wolmanit CX-8 for the palisades, which is somewhat lower than the recommended product retention for use class 3 and thus does not meet the recommended use class 4 retention.
There are only a limited number of scenarios wherein treated timber is in direct contact with water. The OECD emission scenario document of wood preservatives suggested a jetty scenario for the direct fresh water contact (use class 4 B).
For this reason a jetty scenario, which is proposed by the OECD emission scenario document for fresh water, was built up in a quarry pond and the aquatic environment was monitored under natural weather conditions over a period of approx. 2 years.
The area of the weathered jetty surface corresponds to 50 m². The surface of the poles is 13.2 m². An overall amount of 1.27 m³ wood is used for the jetty. The quarry pond collects the indirect emission from the jetty. The quarry pond has a diameter of approx. 100 m and an averaged depth of approx. 7 m. Therefore, the overall water content is approx. 55000 m3 water.
The water and sediment compartment was monitored for the used biocides Copper, Cu-HDO and Boron.
Due to the ubiquitous presence of Copper and Boron, the natural background signal was monitored before and after the installation of the jetty.

The observed aqueous concentration of the biocides in the quarry pond fluctuates between 0.59 – 2.29 µg/L total Cu, (including the natural background Cu content of 1.46 µg/L), 11.8 – 34.42 µg/L B (including the natural background B content of 27.4 µg/L) and <1.7 – 2.4 µg/L Cu-HDO (taken into account a LoD of 1.7 µg/L).
The analytical results are randomly distributed around the background signal or the LoD of the used analytical method.
During the two years monitoring period no significant contamination, increase or accumulation of the biocides could be detected in the ambient water. The natural fluctuation during the season appears more relevant for the content of the natural biocides. However, this natural fluctuation could not be corrected, because a local area around the jetty was monitored only.

For the sediment compartment all measurements are below or similar to the limit of quantification or detection of the used analytical methods. Therefore, for a worst case the

monitored concentrations are given by the LoQ of the used method. The total Copper content is 0.7-0.71 mg/kg, the Boron content is 0.11 mg/kg and the Cu-HDO content is < 0.064 mg/kg.
An increase or an enrichment of the biocide concentration in the local sediment compartment around the jetty is not observed.

Additionally to the monitoring of the time dependent concentration of active ingredients in the aquatic compartment the growth of water plants and algae in the water compartment in close neighbourhood to the jetty was monitored after one year of exposure. (please refer to chapter 2.2.8.1 Effects assessment on the environment; Effects on any other specific, non-target organisms (flora and fauna) believed to be at risk).

2.2.8.3 Risk characterisation

Copper background concentrations

The risk assessment was carried out for the active substances Cu-HDO, boric acid and for the total copper concentration (basic copper carbonate and Cu-HDO) taking into account the natural/pristine and the regional background concentration of copper. The agreed natural/pristine and the regional background concentration of copper were added seperately to the calculated PECs for total copper, which is in line with the CAR for Basic Copper Carbonate (France, 2011).

Compartment	Pristine background concentration	Regional background concentration	Unit
Surface water	8.8E-04	2.9E-03	mg/L
Ground water	8.8E-04	2.9E-03	mg/L
Soil	12 10.6	24.4 21.6	mg/kg_{dwt} mg/kg_{wwt}
Sediment	21 4.56	67.5 14.7	mg/kg_{dwt} mg/kg_{wwt}

Atmosphere

For basic copper carbonate a determination of a Henry law constant is not applicable. As reported in the assessment report for basic copper carbonate (France, 2011) the theoretical assessed vapour pressure of $<10^{-5}$ Pa is very low. Therefore, a volatilization of the metal is not expected.

For Cu-HDO the reported vapour pressure of $<10^{-5}$ Pa and the Henry law constant of 5.7E-06 kPa m^3/mol indicate that emissions to the air compartment are considered to be insignificant (Austria, 2013). Biotic effects are not expected.

Due to the low vapour pressure releases of borates to the air is negligible (NL, 2009).

Thus, a risk assessment for the air compartment was not performed.

Sewage treatment plant (STP)

STP is the directly exposed compartment for scenario [1], Industrial application and scenario [2b] noise barrier. The risk ratios for total copper, Cu-HDO and boric acid were calculated.

Summary table PEC/PNEC values for total copper, Cu-HDO and Boric acid for STP				
SCENARIO		**$PEC/PNEC_{STP}$**		
		Total Copper	**Cu-HDO**	**Boric Acid**
Scenario [1]: Industrial application and storage phase	**APPLICATION**	6.78E-02	1.13E-01	6.8E-02
Scenario [2b]: Noise barrier UC3	**TIME 1**	4.65E-04	2.59E-04	2.51E-04
	TIME 2	1.70E-04	2.28E-04	2.56E-04
	TIME 3	1.99E-05	1.41E-05	1.49E-05

Conclusion:

The calculated risk ratios for the STP for all considered scenarios are <1 indicating an acceptable risk for microorganisms.

Aquatic compartment

For total copper the pristine and the regional background concentration were added to the calculated PEC values (France, 2011) (see table below).

Summary table calculated PEC values for total copper, total copper + added pristine and natural background concentration for surface water				
SCENARIO		**$PECs_{surface\ water}$ [mg/L]**		
		PEC_{sw} Total Copper	**PEC_{sw} Total Copper + Pristine Bakcground**	**PEC_{sw} Total Copper + Regional Background**
Scenario [1]: Industrial application and storage phase	**APPLICATION (via STP)**	1.35E-03	2.23E-03	4.25E-03
	STORAGE	3.77E-04	1.26E-03	3.28E-03
Scenario [2b]: Noise	**TIME 1**	9.27E-06	8.89E-04	2.91E-03
	TIME 2	3.38E-06	3.84E-03	2.90E-03

barrier UC3 (via STP)	**TIME 3**	3.95E-07	8.80E-04	2.90E-03
Scenario [2c]: Bridge over pond UC3	**TIME 1**	2.21E-04	1.10E-03	3.12E-03
	TIME 2	2.28E-03	3.16E-03	5.18E-03
	TIME 3	2.29E-03	3.17E-03	5.19E-03
Scenario [4a]: Jetty in lake UC4	**TIME 1**	2.34E-04	1.11E-03	3.13E-03
	TIME 2	6.92E-04	1.57E-03	3.59E-03
	TIME 3	8.18E-04	1.70E-03	3.72E-03
Scenario [4b]: Sheet piling UC4	**TIME 1**	1.32E-01	1.33E-01	1.35E-01
	TIME 2	1.71E-02	1.80E-02	2.00E-02
	TIME 3	1.12E-03	2.00E-03	4.02E-03

For the scenarios [1] Industrial storage, [2c] Bridge over pond, [4a] Jetty in Lake and [4b] Sheet piling the risk ratios for direct exposure of total copper, Cu-HDO and boric acid to surface water were calculated. For the scenarios [1] Industrial Application and [2b] Noise barrier the risk for indirect exposure via STP to the surface water for total copper, Cu-HDO and boric acid were calculated.

In the following table the calculated PEC/PNEC values are summarised.

Summary table PEC/PNEC values for Total Copper, Total Copper including pristine and natural background concentration, Cu-HDO and Boric acid for surface water						
SCENARIO		**PEC/PNEC surface water**				
		Total Copper	**Total Copper + Pristine Background**	**Total Copper + Regional Background**	**Cu-HDO**	**Boric acid**
Scenario [1]: Industrial application and storage phase	**APPLICATION (via STP)**	1.73E-01	2.86E-01	5.45E-01	1.74E-01	6.83E-02
	STORAGE	4.83E-02	1.61E-01	4.21E-01	7.91E-03	5.72E-05
Scenario	**TIME 1**	1.19E-03	1.14E-01	3.73E-01	3.98E-04	2.50E-04

[2b]: Noise barrier UC3 (via STP)	**TIME 2**	4.33E-04	4.92E-01	3.72E-01	3.50E-04	2.56E-04
	TIME 3	2.94E-01	1.13E-01	3.72E-01	2.18E-05	1.49E-05
Scenario [2c]: Bridge over pond UC3	**TIME 1**	2.83E-02	1.41E-01	4.00E-01	1.04E-03	6.72E-04
	TIME 2	2.92E-01	4.05E-01	6.64E-01	1.29E-03	8.89E-03
	TIME 3	2.94E-01	4.06E-01	6.65E-01	8.19E-05	1.02E-02
Scenario [4a]: Jetty in lake UC4	**TIME 1**	3.00E-02	1.42E-01	4.01E-01	5.86E-03	3.32E-03
	TIME 2	8.87E-02	2.01E-01	4.60E-01	1.36E-03	4.69E-03
	TIME 3	1.05E-01	2.18E-01	4.77E-01	1.10E-04	4.91E-03
Scenario [4b]: Sheet piling UC4	**TIME 1**	**16.92**	**17.05**	**17.31**	**4.75**	**2.14**
	TIME 2	**2.19**	**2.31**	**2.56**	6.75E-01	1.77E-01
	TIME 3	1.44E-01	2.56E-01	5.15E-01	5.58E-02	8.83E-04

Conclusion:

The PEC/PNEC ratios are >1 for scenario [4b] Sheet pilling for direct exposure to surface water at TIME 1 (30 days) and TIME 2 (365 days) for total copper, total copper + pristine background concentration, total copper+regional background concentration and TIME 1 for Cu-HDO and boric acid, indicating unacceptable risk for aquatic organisms. However, TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 10 years.

In order to reduce the identified risks to an acceptable level for TIME 2 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

All other calculated risk ratios are <1 indicating an acceptable risk for aquatic organisms.

Sediment compartment

The pristine and natural background concentration of copper were added to the calculated PECs for total copper which is in line with the assessment report for basic copper carbonate (France, 2011), (see table below).

Summary table on calculated PEC values for Total Copper, Total Copper including pristine and natural background concentration for sediment

SCENARIO		**PECs $_{sediment}$ [mg/kg $_{wwt}$]**		
		PEC Total Copper	**PEC Total Copper + Pristine Background**	**PEC Total Copper + Regional Background**
Scenario [1]: Industrial application and storage phase	**APPLICATION (via STP)**	3.11	7.67	17.81
	STORAGE	2.48	7.04	17.18
Scenario [2b]: Noise barrier UC3 (via STP)	**TIME 1**	0.021	4.58	14.72
	TIME 2	0.0078	4.57	14.78
	TIME 3	0.0009	4.56	14.71
Scenario [2c]: Bridge over pond UC3	**TIME 1**	1.45	6.01	16.15
	TIME 2	14.99	19.55	29.69
	TIME 3	15.06	19.62	29.76
Scenario [4a]: Jetty in lake UC4	**TIME 1**	1.54	6.10	16.24
	TIME 2	4.55	9.11	19.25
	TIME 3	5.38	9.94	20.08
Scenario [4b]: Sheet piling UC4	**TIME 1**	868.03	872.59	882.73
	TIME 2	112.45	117.01	127.15
	TIME 3	7.37	11,93	22.07

For the scenarios [1] Storage, [2c] Bridge over Pond, [4a] Jetty in Lake and [4b] Sheet piling the risk for direct exposure of the active substances to the sediment compartment were calculated. For scenarios [1] Industrial Application and [2b] Noise barrier the risk for indirect exposure to the sediment compartment for total copper, Cu-HDO and boric acid were calculated.

In the assessment report Boric acid (Netherlands, 2009) and Cu-HDO (Austria, 2013) the PECs and the PNECs for the sediment compartment were calculated according to the equilibrium partitionating method (EPM). Thus, the risk ratios for the sediment compartment for those active substances are identical to the ratios for the aquatic compartment. For the sake of completeness, these values were also presented in the environmental risk characterisation.

In the following table the calculated PEC/PNEC values for total copper, total copper + pristine background and total copper + natural background are summarised. The PEC/PNEC ratios for Cu-HDO and boric acid are the same as for the surface water.

Summary table on PEC/PNEC values for Total Copper, Cu-HDO and Boric acid for sediment

SCENARIO		**$PEC/PNEC_{sed}$**				
		Total Copper	**Total Copper + Pristine Background**	**Total Copper + Regional Background**	**Cu-HDO**	**Boric acid**
Scenario [1]: Industrial application and storage phase	**APPLICA-TION (via STP)**	1.64E-01	4.06E-01	9.42E-01	1.74E-01	6.83E-02
	STORAGE	1.31E-01	3.72E-01	9.09E-01	7.91E-03	5.72E-05
Scenario [2b]: Noise barrier UC3 (via STP)	**TIME 1**	1.11E-03	2.42E-01	7.79E-01	3.98E-04	2.50E-04
	TIME 2	4.13E-04	2.42E-01	7.82E-01	3.50E-04	2.56E-04
	TIME 3	4,76E-05	2.41E-01	7.78E-01	2.18E-05	1.49E-05
Scenario [2c]: Bridge over pond UC3	**TIME 1**	7.67E-02	3.18E-01	8.54E-01	1.04E-03	6.72E-04
	TIME 2	7.93E-01	**1.03**	**1.57**	1.29E-03	8.89E-03
	TIME 3	7.97E-01	**1.04**	**1.57**	8.19E-05	1.02E-02
Scenario [4a]: Jetty in lake UC4	**TIME 1**	8.15E-02	3.23E-01	8.59E-01	5.86E-03	3.32E-03
	TIME 2	2.41E-01	4.82E-01	**1.02**	1.36E-03	4.69E-03
	TIME 3	2.85E-01	5.26E-01	**1.06**	1.10E-04	4.91E-03
Scenario [4b]: Sheet	**TIME 1**	**45.93**	**46.17**	**46.70**	**4.75**	**2.14**
	TIME 2	**5.95**	**6.19**	**6.73**	6.75E-01	1.77E-01

piling UC4	**TIME 3**	3.90E-01	6.31E-01	**1.17**	5.58E-02	8.83E-04

A refined assessment (i.e. including adsorption of Cu on suspended particles) was performed for scenarios suggesting direct release to surface water.

Summary table of refined PEC_{sed} for total Copper				
SCENARIO		**refined $PEC_{sediment}$ (mg/kg_{wwt})**		
		PECsed Total copper	**PECsed Total Copper + Pristine Background**	**PEC_{sw} Total Copper + Regional Background**
Scenario [2c]: Bridge over pond UC3	**TIME 1**	4.22E-02	4.60	14.74
	TIME 2	4.36E-01	4.99	15.14
	TIME 3	4.37E-01	5.00	15.14
Scenario [4a]: Jetty in lake UC4	**TIME 1**	8.71E-02	4.65	14.79
	TIME 2	2.59E-01	4.82	14.96
	TIME 3	3.05E-01	4.87	15.01
Scenario [4b]: Sheet piling UC4	**TIME 1**	596	600.56	610.7
	TIME 2	77.2	81.76	91.9
	TIME 3	5.06	9.62	19.76

In the following table the calculated PEC/PNEC values with the refined PECs for the scenarios [2c] Bridge over pond, [4a] Jetty in lake and [4b] Sheet piling for total copper, total copper+pristine background and total copper+regional background are presented.

Summary table of PEC/PNEC values for Total Copper, Total Copper including pristine and natural background concentration (with refined PECs)				
SCENARIO		**PEC/PNECsed**		
		Total copper	**Copper + Pristine Background**	**Copper + Regional Background**
Scenario [2c]: Bridge over pond UC3	**TIME 1**	2.23E-03	2.43E-01	7.80E-01
	TIME 2	2.31E-02	2.64E-01	8.01E-01
	TIME 3	2.34E-02	2.64E-01	8.01E-01
Scenario [4a]: Jetty in lake UC4	**TIME 1**	4.61E-03	2.46E-01	7.82E-01
	TIME 2	1.37E-02	2.55E-02	7.91E-01
	TIME 3	1.61E-02	2.58E-01	7.94E-01
Scenario [4b]: Sheet piling UC4	**TIME 1**	**31.53**	**31.78**	**32.31**
	TIME 2	**4.08**	**4.32**	**4.86**
	TIME 3	2.68E-01	5.09E-01	**1.04**

Conclusion:

The PEC/PNEC ratios for scenario [4b] Sheet piling for the direct exposure to the sediment at TIME 1 (30 days) and TIME 2 (365 days) for total copper, total copper including the pristine background concentration are >1 indicates unacceptable risk. The risk ratios for total copper including the natural background concentration are >1 for TIME 1, 2 and 3. For Cu-HDO and boric acid the risk ratios at TIME 1 are also >1, however this is not a representative time scale for vacuum pressure treated wood, which can be used for more than 10 years. The long-term scenario indicates that recovery is possible.

In order to reduce the identified risks to an acceptable level the following RMM is proposed:

The proposed RMM for the aquatic compartment *"Treated timber must not be placed or used directly in water bodies"* covers also the sediment compartment. Hence the identified risks can be reduced to an acceptable level.

All other calculated risk ratios are <1 indicating an acceptable risk for aquatic organisms.

Terrestrial compartment

For total copper the pristine and the natural background concentration were added to the calculated PEC values (France, 2011) (see table below).

Summary table on calculated PEC values for Total Copper, Total Copper including pristine and natural background concentration for soil

SCENARIO		**PECs (mg/kg$_{wwt}$)**		
		PEC Total Copper	**PEC Total Copper + Pristine BG**	**PEC Total Copper + Regional BG**
Scenario [1]: Industrial application and storage phase	**APPLICATION (via STP)**	3.6	14.20	25.20
	STORAGE 30 days	6.57E-01	11.26	22.25
	STORAGE 20 years	160	170.6	181.6
Scenario [2a]: House scenario UC3	**TIME 1**	1.25E-01	10.72	21.72
	TIME 2	1.29	11.89	22.89
	TIME 3	6.45E-01	11.24	22.24
Scenario [2b]: Noise barrier UC3	**TIME 1**	4.68E-02	10.65	21.65
	TIME 2	4.83E-01	11.08	22.08
	TIME 3	2.43E-01	10.84	21.84
Scenario [3a]: Transmission pole UC4	**TIME 1**	2.48E-01	10.85	21.85
	TIME 2	1.36	11.96	22.96
	TIME 3	7.15E-01	11.31	22.31
	TIME 3$_{special\ application}$	7.20E-01	11.32	22.32

For scenarios [1] Storage Phase, [2a] House scenario, [2b] Noise Barrier, [2c] and [3a] Transmission pole the risk of direct exposure for total copper, Cu-HDO and fenpropimorph for the soil compartment were calculated. For scenario [1] Industrial application the risk for indirect exposure of total copper, Cu-HDO and boric acid via sludge application for the soil was performed.

In the following table the calculated PEC/PNEC values are summarised.

Summary table on PEC/PNEC values for Total Copper, Cu-HDO and Boric acid for soil						
SCENARIO		**PEC/PNEC$_{soil}$**				
		Total Copper	**Total Copper + Pristine BG**	**Total Copper + Regional BG**	**Cu-HDO**	**Boric acid**
Scenario [1]: Industrial application and storage phase	**APPLICATION (via STP)**	8.92E-02	3.52E-01	6.24E-01	1.14E-01	4.46E-04
	STORAGE 30 days	1.63E-02	2.79E-01	5.51E-01	8.43E-02	**149**
	STORAGE 20 years	**3.97**	**4.23**	**4.50**		
Scenario [2a]: House scenario UC3	**TIME 1**	3.10E-03	2.66E-01	5.38E-01	1.56E-02	1.95E-01
	TIME 2	3.20E-02	2.95E-01	5.67E-01	1.40E-02	**2.48**
	TIME 3	1.60E-02	2.79E-01	5.51E-01	8.67E-04	**1.43**
Scenario [2b]: Noise barrier UC3	**TIME 1**	1.16E-03	2.64E-01	5.37E-01	5.84E-03	7.77E-02
	TIME 2	1.20E-03	2.74E-01	5.47E-01	3.24E-04	9.29E-01
	TIME 3	6.02E-03	2.69E-01	5.41E-01	3.24E-04	5.37E-01
Scenario [3a]: Transmission pole UC4$_{\text{special application}}$	**TIME 1**	6.15E-03	2.69E-01	5.41E-01	1.18E.01	**1.41**
	TIME 2	3.37E-02	2.96E-01	5.69E-01	2.76E-02	**3.28**

	TIME 3	1.77E-02	2.80E-01	5.53E-01	2.02E-03	**1.83**
	TIME 3$_{\text{special application}}$	1.78E-02	2.80E-01	5.53E-01	1.07E-03	**1.10**

[a] steady state concentration in soil

Conclusion:

The risk ratios for scenario [1] storage 30 days for boric, the risk ratios for scenario [1] storage 20 years for Total Copper, Total Copper+pristine background concentration, Total Copper + regional background concentration and boric acid are >1 indicating unacceptable risk for terrestrial organisms.

To reduce the identified risks to an acceptable level the following RMM is proposed:

"Freshly treated timber must be stored after treatment under shelter and/or on impermeable hard standing to prevent direct losses to soil or water and any losses must be collected for reuse or disposal".

The risk ratios for scenario [2a] House (TIME 2 and 3), scenario [2b] Noise barrier (TIME 3) and Scenario [3a] Transmission pole (TIME 1, 2, 3 and TIME 3$_{\text{special application}}$) for boric acid are >1 indicating an unacceptable risk for soil organisms. As boric acid is an inorganic substance, biodegradation is not a relevant pathway (NL, 2009). For those identified risks no reliable RMM can be implemented to mitigate the risk to an acceptable level. Therefore, use of the products for treatment of wood that is intended for use classes 3 and 4 is not recommended.

All other calculated risk ratios are <1 indicating an acceptable risk for terrestrial organisms.

Groundwater

The calculated PEC values for the different European scenarios for the active substances Cu-HDO are well below the trigger for biocides of 0.1 µg/L, indicating acceptable risk for groundwater.

The calculated PEC values for the the different scenarios for the active substance boric acid are >0.1 µg/L except the Scenario [1] Application. However, this relies to organic substances. All values are below the trigger value for drinking water of 1 mg/L according to Directive 98/83/EC Annex I, part B.

According to the Assessment report of copper carbonate (2011, France) Cu as element is considered to be strongly absorbed and immobile in soil. Therefore, copper is not expected to pose a risk for groundwater contamination, and no special risk assessment for Cu was performed for product authorisation.

Risk characterisation of 2-Aminoethanol (2-MEA) for the environment

The risk assessment was carried out for all relevant compartments and scenarios where no risks were identified or RMMs were set previously for the active substances.

Atmosphere

Due to the information available for 2-Aminoethanol on the REACH registered substance data base, local air concentrations are considered to be insignificant. Biotic effects in the air compartment are not expected to pose a risk to the atmosphere.

Sewage treatment plant (STP)

For the scenario [2b] Noise Barrier UC3, the risk ratios for direct emissions of 2-Aminoethanol to surface water were calculated

In the following table, PEC/PNEC values are summarised.

Summary table on PEC/PNEC values for 2-Aminoethanol for STP		
SCENARIO		**$PEC_{stp}/PNEC_{stp}$**
Scenario [2b]: Noise barrier UC3	**TIME 1**	7.59E-05
	TIME 2	3.77E-05
	TIME 3	2.43E-06

Conclusion:

The calculated risk ratios for the STP are <1 indicating an acceptable risk for microorganisms.

Aquatic compartment

For the scenarios [2c] Bridge over pond UC3, [4a] Jetty in lake UC4 and [4b] Sheet Piling UC4" the risk ratios for direct emissions of 2-Aminoethanol to surface water were calculated.

In the following table, PEC/PNEC values are summarised.

Summary table on PEC/PNEC values for for 2-Aminoethanol for the surface water		
SCENARIO		**$PEC_{sw}/PNEC_{sw}$**
Scenario [2c]: Bridge over pond UC3	**TIME 1**	1.07E-02
	TIME 2	1.04E-02
	TIME 3	7.13E-04

Scenario [4a]: Jetty in lake UC4	**TIME 1**	4.19E-02
	TIME 2	9.81E-02
	TIME 3	6.93E-03
Scenario [4b]: Sheet piling UC4	**TIME 1**	**28.14**
	TIME 2	**3.47**
	TIME 3	**2.31**

Conclusion:

The PEC/PNEC ratios are >1 for scenario [4b] Sheet piling UC4 for direct exposure to surface water at TIME 1 (30 days), TIME 2 (365 days) and TIME 3 (20 years) indicating unacceptable risk for aquatic organisms. However, TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 10 years.

In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

The PEC/PNEC ratios for the scenarios [2c] Bridge over pond UC3 and and [4a] Jetty in Lake UC4 for direct exposure to surface water are <1 indicating an acceptable risk for aquatic organisms.

Sediment compartment

The PECs and the PNECs for the sediment compartment were calculated according to the equilibrium partitionating method (EPM). Thus the risk ratios for the sediment compartment for 2-Aminoethanol are identical to the ratios for the surface water compartment. Therefore the same conclusion as for the aquatic compartment can be drawn for the sediment compartment.

Conclusion:

The PEC/PNEC ratios are >1 for scenario [4b] Sheet piling UC4 for direct exposure to surface water at TIME 1 (30 days), TIME 2 (365 days) and TIME 3 (20 years) indicating unacceptable risk for aquatic organisms. However, TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 10 years.

In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

The PEC/PNEC ratios for the scenarios [2c] Bridge over UC3 pond and and [4a] Jetty in Lake UC4 for direct exposure to surface water are <1 indicating an acceptable risk for aquatic organisms.

Terrestrial compartment

For the UC3 scenarios (House scenario and Noise Barrier) and the UC4 scenario (Transmission pole) the risks of direct emissions of 2-Aminoethanol to the soil compartment were calculated.

In the following table, PEC/PNEC values are summarised.

Summary table on calculated PEC/PNEC values for 2-Aminoethanol for the terrestrial compartment

SCENARIO		**PEC/PNEC**
Scenario: House scenario UC3	**TIME 1**	0.361
	TIME 2	0.180
	TIME 3	1.16E-02
Scenario: Noise barrier UC3	**TIME 1**	0.135
	TIME 2	6.73E-02
	TIME 3	4.34E-03
Scenario: Transmission pole $\text{UC4}_{\text{special application}}$[a]	**TIME 1**	**11.6**
	TIME 2	**1.58**
	TIME 3	0.115
	$\text{TIME 3}_{\text{special application}}$	5.75E-03

[a] The use class "UC4 special application" specifically targets treated timber with applications having an increased service life time (e.g. transmission poles). For the intended use class a service up to 40 years is to be expected.

Conclusion:

Acceptable risk ratios for the UC3 scenarios for the soil compartment were identified.

The calculated risk ratios for Time 1 and Time 2 in Scenario: Transmission pole $\text{UC4}_{\text{special application}}$ are >1 indicating unacceptable risks for terrestrial organisms. TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 20 years. After the 2nd leaching workshop for PT 8, it was agreed to perform a risk assessment for the new TIME 2 (1 year). However, for wood in service, TIME 3 is the relevant time point for decision making, as service life is the main driver for risk assessment. Considering TIME 3, 20 and 40 years, acceptable risk ratios for Scenario Transmission pole $\text{UC4}_{\text{special application}}$ were identified.

Groundwater

The calculated PEC values (approach 2, refer to 2.2.8.2 Exposure assessment, Risk Assessment of 2-Aminoethanol (2-MEA) for the environment) for the different European scenarios for the substance of concern 2-Aminoethanol are below the trigger for biocides of 0.1 µg/L. This leads to the assumption that there is acceptable risk for groundwater.

In the calculated approach 1 (refer to 2.2.8.2 Exposure assessment, Risk Assessment of 2-Aminoethanol (2-MEA) for the environment) the PEC values of 2 scenarios are >0.1µg/L, indicating unacceptable risk for groundwater. However this exceedance is with 0.11 µg/L (scenario Hamburg) and 0.17 µg/L (scenario Jokioinen) slightly higher than the trigger value. For all other scenarios the calculated PEC values are <0.1µg/L indicating acceptable risk for the groundwater.

Primary and secondary poisoning

Primary poisoning

A direct uptake of the product is very unlikely. Therefore, PEC/PNEC ratios for primary poisoning were not calculated.

Secondary poisoning

Cu-HDO:
The octanol/water partition coefficient for Cu-HDO has been determined with 2.6 which results in very low BCFs in fish and earthworms. The risk of secondary poisoning by ingestion of contaminated food (fish or earthworms) is therefore very limited to non-existent. So this exposure route was not assessed further and no calculations were performed. This is in line with the Assessment report of Cu-HDO (Austria, 2013).

Copper:
According to the Assessment report of copper carbonate (France, 2011) bioaccumulation and biomagnification phenomenons are considered as not applicable for copper. Therefore, copper is not expected to pose a risk for secondary poisoning, and no special risk assessment was performed for product authorisation.

Boric acid:
Boric Acid is not expected to biocentrate or biaoccumulate along the aquatic and terrestrial food chain (NL, 2009).

Conclusion:
Summarising the risk characterisation, the risk of Cu-HDO and copper for birds and mammals via primary or secondary poisoning is acceptable.

Mixture toxicity

Following the Guidance Volume IV Environment (Part B+C) (ECHA, 2017) a mixture toxicity assessment is required. The required data and the necessity of a mixture toxicity assessment are described in the following screening steps. The decision of concerned environmental compartments are chosen based on the decision logic of the case study "Wood preservative" described in the Guidance Volume IV Environment (Part B+C-Appendix 12), (ECHA, 2017).

Screening step

Screening Step 1: Identification of the concerned environmental compartments

According to the intended use of the product and the applied RMMs a mixture toxicity assessment for the following scenarios is necessary:

STP - [2b] Noise Barrier (direct)

Surface water – [2b] Noise Barrier (indirect)

Surface water – [2c] Bridge over pond (direct)

Surface water – [4a] Jetty in lake (direct)

Surface water – [4b Sheet piling (direct)

Sediment - [2b] Noise Barrier (indirect)

Sediment – [2c] Bridge over pond (direct)

Soil - [2a] House scenario (direct)

Soil - [2b] Noise barrier (direct)

Soil - [3a] Transmission pole (direct)

Screening Step 2: Identification of relevant substances

Apart from the three active substance the SoC 2-Aminoethanol was taken into account for the mixture toxicity assessment.

Screening Step 3: Screen on synergistic interactions

The applicant stated that there are no synergistic effects between the active substances and the co-formulants contained in the biocidal product Wolmanit CX-8FP.

Screening step	
	Significant exposure of environmental compartments? Y
	Number of relevant substances >1? 4
	Indication for synergistic effects for the product or its constituents in the literature? N
	Conclusion: An assessment of mixture toxicity has to be performed for the biocidal product according to the criteria defined in the Guidance Volume IV Environment (Part B+C) (ECHA, 2017), since screening step 1 and 2 are answered with “Yes”. The environmental mixture toxicity assessment is based on all three active substances and the substance of concern 2-Aminoethanol.

Tiered approach

As Tier 1 approach PEC/PNEC summation of all three active substances for all concerned compartments was performed.

Tier 1. PEC/PNEC summation

Tier 1		
RQ product	Acceptable risk for the environment? (Y/N)	Y (STP, Surface water, Sediment) N (Soil)

Summary table PEC/PNEC values for total copper, Cu-HDO, boric acid and 2-Aminoethanol for STP		
SCENARIO		**PEC/PNEC summation**
Scenario [2b]: Noise barrier UC3	**TIME 1**	1.05E-03
	TIME 2	6.92E-04
	TIME 3	5.13E-05

Conclusion:

Acceptable cumulative risks for the STP were identified.

PEC/PNEC summation for total copper, Cu-HDO, boric acid and 2-Aminoethanol for surface water				
SCENARIO		**Total (without copper BG)**	**Total (with copper pristine BG concentration)**	**Total (with copper regional BG concentration)**
Scenario [2b]: Noise barrier UC3	**TIME 1**	3.73E-02	1.25E-01	3.84E-01
	TIME 2	1.14E-02	5.03E-01	3.83E-01
	TIME 3	2.95E-01	1.14E-01	3.72E-01
Scenario [2c]: Bridge over pond UC3	**TIME 1**	4.07E-02	1.53E-01	4.12E-01
	TIME 2	3.13E-01	4.25E-01	6.86E-01
	TIME 3	3.05E-01	4.16E-01	6.76E-01
Scenario [4a]: Jetty in lake UC4	**TIME 1**	8.11E-02	1.93E-01	4.52E-01
	TIME 2	1.93E-01	3.05E-01	5.64E-01
	TIME 3	1.17E-01	2.30E-01	4.89E-01
Scenario [4b]: Sheet piling UC4	**TIME 1**	**51.95**	**52.08**	**52.34**
	TIME 2	**6.51**	**6.63**	**6.88**
	TIME 3	**2.51**	**2.62**	**2.88**

Conclusion:

The cummulative PEC/PNEC ratios are >1 for scenario [4b] Sheet piling UC4 for direct exposure to surface water at TIME 1 (30 days), TIME 2 (365 days) and TIME 3 (20 years) indicating unacceptable risk for aquatic organisms. However, TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 10 years.

In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

The PEC/PNEC ratios for indirect exposure for the scenario [2b] Noise barrier UC3, and for the direct exposure for the scenarios [2c] Bridge over pond UC3 and [4a] Jetty in Lake UC4 the are <1 indicating an acceptable risk for aquatic organisms.

PEC/PNEC summation for total copper, Cu-HDO, boric acid and 2-Aminoethanol for sediment				
SCENARIO		**Total (without copper BG)**	**Total (with copper Pristine BG concentration)**	**Total (with copper regional BG concentration)**
Scenario [2b]: Noise barrier UC3	**TIME 1**	1.25E-02	2.53E-01	7.90E-01
	TIME 2	1.14E-02	2.53E-01	7.93E-01
	TIME 3	8.43E-05	2.41E-01	7.78E-01
Scenario [2c]: Bridge over pond UC3	**TIME 1**	1.46E-02	2.55E-01	7.92E-01
	TIME 2	4.37E-02	2.85E-01	8.22E-01
	TIME 3	3.44E-02	2.75E-01	8.12E-01
Scenario [4a]: Jetty in lake UC4	**TIME 1**	5.57E-02	2.97E-01	8.33E-01
	TIME 2	1.18E-01	1.30E-01	8.95E-01
	TIME 3	2.80E-02	2.70E-01	8.06E-01
Scenario [4b]: Sheet piling UC4	**TIME 1**	**66.56**	**66.81**	**67.34**
	TIME 2	**8.40**	**8.64**	**9.18**
	TIME 3	**2.63**	**2.88**	**3.41**

Conclusion:

The cumulative PEC/PNEC ratios are >1 for scenario [4b] Sheet piling UC4 for direct exposure to surface water at TIME 1 (30 days), TIME 2 (365 days) and TIME 3 (20 years) indicating unacceptable risk for aquatic organisms. However, TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 10 years.

In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

The PEC/PNEC ratios for indirect exposure for the scenario [2b] Noise barrier UC3, and for the direct exposure for the scenarios [2c] Bridge over pond and [4a] Jetty in Lake for are <1 indicating an acceptable risk for aquatic organisms.

PEC/PNEC summation for total copper, Cu-HDO, boric acid and 2-Aminoethanol for soil				
SCENARIO		**Total (without copper BG)**	**Total (with copper Pristine BG concentration)**	**Total (with copper regional BG concentration)**
Scenario [2a]: House scenario UC3	**TIME 1**	5.75E-01	8.38E-01	**1.11**
	TIME 2	**2.67**	**2.97**	**3.24**
	TIME 3	**1.46**	**1.72**	**1.99**
Scenario [2b]: Noise barrier UC3 (via STP)	**TIME 1**	2.20E-01	4.82E-01	7.56E-01
	TIME 2	9.98E-01	**1.27**	**1.54**
	TIME 3	5.48E-01	8.11E-01	**1.08**
Scenario [3a]: Transmission pole UC4	**TIME 1**	**13.13**	**13.39**	**13.67**
	TIME 2	**4.60**	**4.86**	**5.14**
	TIME 3	**1.96**	**2.23**	**2.50**

	TIME 3special application	**1.12**	**1.39**	**1.66**

For scenario [2a] House UC3 all cumulative risks except for Time 1 (total without copper BG and total+pristine BG concentration) are >1 indicating unacceptable risk. For scenario [2b] Noise Barrier UC3 Time 2 (total copper+ pristine BG concentration) and Time 2 and 3 (total without+regional background) are >1 indicating unacceptable risk. The cummulative risks for scenario [3a] transmission pole UC4 for all time scales are >1 indicating unacceptable risks.

For the identified cumulative risks no reliable RMM can be set to mitigate the risk to an acceptable level.

Conclusion:

Therefore, use of the products for treatment of wood that is intended for use classes 3 and 4 is not recommended.

Aggregated exposure (combined for relevant emmission sources)

At the time of preparation of this PAR, no EU agreed guidance was available on how to perform a full aggregated exposure assessment. Therefore, no assessment has been performed at this stage. This chapter of the PAR has to be reassesed once an agreed guidance has been made available. This could take place at active substance renewal stage or at product authorisation stage, depending on when such guidance becomes available.

Conclusion:

Not applicable

Overall conclusion on the risk assessment for the environment of the product
Active substances: Risk ratios were calculated for the direct emissions to STP, direct and indirect exposure to surface water, sediment soil and groundwater for total copper (including background concentration), CU-HDO and boric acid were calculated. For the STP the risk ratios are <1 indicating acceptable risk. For the surface water risks were identified for Scenario [4b] sheet piling for total copper (TIME 1 and 2), total copper+pristine BG concentration (TIME 1 and 2), total copper+regional background concentration (TIME 1 and 2), Cu-HDO (TIME 1) and for boric acid (TIME 1). For the sediment compartment risks were identified for Scenario [4b] sheet piling for total copper (TIME 1 and 2), total copper+pristine BG concentration (TIME 1 and 2), total copper+regional background concentration (TIME 1, 2 and 3), Cu-HDO (TIME 1) and for boric acid (TIME 1). TIME 1 is not a representative time scale for vacuum pressure treated wood, which is in use for more than 20 years. In order to reduce the identified risks for the aquatic compartment the following RMMs are proposed: *"Treated timber must not be placed or used directly in water bodies."* This information must be provided together with treated wood. *"All industrial application processes must be carried out within an area situated on impermeable hard standing with bunding to prevent run-off and a recovery system in place (e.g. sump)."* *"Do not discharge the biocidal product nor the application solution or any spills and residues of the biocidal product into the sewage system or the environment (in particular surface water)"".* For the soil compartment risks for total copper, total copper+pristine BG concentration and total copper+natural background concentration (Scenario 1, Application Storage after 20 years) and for boric acid (Scenario 1, Application Storage 30days and 20 years) were

identified. In order to reduce those identified risks to an acceptable level the following RMM is proposed:

"Freshly treated timber must be stored after treatment under shelter or on impermeable hard standing, or both, to prevent direct losses to soil, sewer or water, and that any losses of the product, including any contaminated water/soil must be collected for reuse or disposal in accordance with local/national/international requirements."

Further risks were identified for boric acid (Scenario 2a, TIME 2 and 3, Scenario 2b noise barrier TIME 3 and for Scenario 3a transmission pole for all calculated time points). For those identified risks no reliable RMM can be set. Therefore, use of the products for treatment of wood that is intended for use classes 3 and 4 is not recommended.

All other calculated risk ratios were <1 indicating an acceptable risk for the soil compartment.

For copper no groundwater assessment was performed. The calculated PEC values for the different European scenarios for Cu-HDO are below the trigger for biocides of 0.1 µg/L. This leads to the assumption that there is acceptable risk for groundwater. Although the calculated risks for boric acid exceed the trigger value of 0.1µg/L all values are below the trigger value for drinking water of 1 mg/L according to Directive 98/83/EC Annex I, part B.

<u>Field tests:</u>

The results of the field monitoring studies were in a similar range as the results from the calculated scenarios calculated. However, the application rate used in the field tests was lower than the application rate used for the predicted environmental concentrations. Therefore, the study results were not used for the further assessment

<u>Substances of concern:</u>

2-Aminoethanol:

Risk ratios <1, indicating acceptable risks, were calculated for the STP, surface water and sediment compartment for scenarios [2c] bridge over pond and [4a] Jetty in Lake.

In addition, identified risks for the soil compartment are considered to be acceptable.

The calculated PEC values (approach 2) for the different European scenarios for the substance of concern 2-Aminoethanol are below the trigger for biocides of 0.1 µg/L. This leads to the assumption that there is acceptable risk for groundwater based on this approach.

In comparison the calculated PEC values (approach 1) for 2 European scenarios indicating unacceptable risk for the groundwater. All other calculated scenarios are below the trigger value of 0.1µg/L, indicating acceptable risk for the groundwater.

Risk ratios >1, indicating unacceptable risks, were calculated for the surface water and sediment compartment for scenario [4b] Sheet piling.

In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

Polyethylenimine:

A qualitative assessment to Polyethylenimine is provided in the confidential annex. Considering the set RMMs for the active substances, no unacceptable risks are expected for polyethyleneimine.

Mixture Toxicity:

According to the intended use and the applied RMMs a Tier 1 mixture toxicity assessment (PEC/PNEC summation) was performed for the three active substances and the SoC 2-Aminoethanol.

For the STP no cumulative risks were identified.

For the surface water and the sediment compartment cumulative risks were identified for scenario [4b] sheet piling for all time scales. In order to reduce the identified risks to an acceptable level for TIME 2 and 3 the following RMM is proposed:

"Treated timber must not be placed or used directly in water bodies".

For all other scenarios for the surface and sediment compartment acceptable risks were identified.

For the soil compartment for all calculated scenarios the cumulative risk ratios are >1 indicating unacceptable risk except for scenario 2a (house scenario total without copper background concentration TIME 1, total with copper pristine background concentration TIME 1) and scenario 2b (noise barrier total without copper background concentration. TIME 1, total with copper pristine background concentration TIME 1 and total with copper regional background concentration TIME 1).

For those identified risks no reliable RMM can be set in order to mitigate the risk to an acceptable level. Therefore, use of the products for treatment of wood that is intended for use classes 3 and 4 is not recommended.

Conclusion:

Use of the biocidal products contained in the biocidal product family (as outlined in the authorised use section), for treatment of wood which is intended for use class 1 and 2, results in an acceptable risk for the environment due to negligible emissions.

However, use of those products for treatment of wood which is intended for use class 3 and 4 is not recommended, as unacceptable risks for water and sediment (total copper, SoC 2-aminoethanol), soil compartment (boric acid) and the groundwater (SoC 2-aminoethanol) has been identified.

2.2.9 Measures to protect man, animals and the environment

RECOMMENDED METHODS AND PRECAUTIONS CONCERNING HANDLING, USE, STORAGE, TRANSPORT OR FIRE:

Please cf. to chapter 2.1.5. Sprayed water, foam, CO_2 extinguishing powder or sand are suitable extinguishing media. Fire fighters shall wear full protection including self-contained breathing apparatus.

IDENTITY OF RELEVANT COMBUSTION PRODUCTS IN CASES OF FIRE

In the case of combustion. CO_2/CO. H_2O and N_2/NOx will be generated.

SPECIFIC TREATMENT IN CASE OF AN ACCIDENT

Please cf. to chapter 2.1.5.

POSSIBILITY OF DESTRUCTION OR DECONTAMINATION FOLLOWING RELEASE

Please cf. to chapter 2.1.5.

PROCEDURES FOR WASTE MANAGEMENT OF THE BIOCIDAL PRODUCT AND ITS PACKAGING

Please cf. to chapter 2.1.5.

PROCEDURES FOR CLEANING APPLICATION EQUIPMENT WHERE RELEVANT

Not applicable. Although cleaning of the impregnation tank has been considered in the human health exposure assessment in practice this does not occur for vacuum pressure / oscillating pressure treatment tanks. The timber used for vacuum pressure / oscillating pressure has been planned before treatment and is free of sawdust. Accumulation of deposit does therefore not occur and cleaning is not required.

SPECIFY ANY REPELLENTS OR POISON CONTROL MEASURES INCLUDED IN THE PRODUCT

No repellents or poison control measures are included in the Wolmanit CX-products to prevent action against non-target organisms.

2.2.10 Assessment of a combination of biocidal products

Not applicable. The Wolmanit CX-10 products are not intended to be authorised for the use with other biocidal products.

2.2.11 Comparative assessment

Note:

Following comparative assessment was performed on base of the intended uses as applied by the applicant – including UC 3 and UC 4.

Background:

The biocidal product family „Wolmanit CX-10_family" contains the active substance boric acid, which meets the criteria for exclusion pursuant to Article 5(1) of the Biocides Regulation (EU) No 528/2012 (BPR). Boric acid is classified as toxic for reproduction category 1B according to Annex VI of Regulation (EU) No 1272/2008 (CLP). In addition it meets two of the three criteria for being PBT (vP and T) in accordance with Annex XIII to Regulation (EC) No 1907/2006, and thus fulfils a substitution criterion according to Article 10(1)(d) of BPR.

Consequently, in line with Article 23(1) of the Biocides Regulation the Austrian Competent Authority has performed a comparative assessment for the biocidal product family „Wolmanit CX-10_family", based on the *„Technical Guidance Note on comparative assessment of biocidal products*" (CA-May15-Doc.4.3.a-Final).

For this comparative assessment the Austrian Competent Authority used the list of biocidal products authorised in Austria for PT 8 (in the version of 13.10.2022), accessible on http://www.biozide.at/, which is maintained by the Environment Agency Austria („Umweltbundesamt") on behalf of the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology („BMK"). This was done due to the lack of a tool in the current version of R4BP3 to search SPCs, pursuant to the *„Technical Guidance Note on comparative assessment of biocidal products*"(abbreviated "TGN" in the following).

Intended uses for the relevant biocidal product family (as applied for)

The members of the biocidal product family „Wolmanit CX-10_family" are wood preservatives (PT 8) which contain the active substances boric acid, Cu-HDO, and basic copper carbonate. The product is a liquid concentrate for dilution in water to be used exclusively by industrial users for preservation of structural timber.

PRODUCT TYPE(S)	8
WHERE RELEVANT, AN EXACT DESCRIPTION OF THE AUTHORISED USE	---
TARGET ORGANISM (INCLUDING DEVELOPMENTAL STAGE)	Wood destroying fungi (no data): White rot, brown rot, Soft rot fungi Wood boring beetles: (larvae) *Wood destroying beetles*

	Termites (subterranean termites): (no data) *Reticulitermes spp., Mastotermes darwiniensis, Coptotermes acinaciformis*
FIELD OF USE	Application: indoor use in dedicated treatment plants Preservation of structural timber for indoor and outdoor use, in particular for timber used in use class 1 - 4.
CATEGORY(IES) OF USER(S)	Industrial user
APPLICATION METHOD(S)	Vacuum pressure treatment / oscillating pressure process

As stated in TGN, elements 1 to 5 in the table above should be considered as the critical ones. But the AT CA mentions, that in (33) of TGN it is stated that, if an *„eCA considers that an application method makes that the BP is used in practice for very different purposes or under very different circumstances […],* ***some application methods*** *could be considered* ***as separate uses*** *to be covered under the comparative assessment.” Furthermore, according to (57) „at least three different and independent active substances/mode of action combinations should remain available through authorised BPs for a given use […] in order to consider that the chemical diversity is adequate.”*

Therefore the application method might be taken into consideration.

Mapping of existing alternatives to the relevant biocidal product family in Austria

Identified eligible alternative biocidal products:

As mentioned above the Austrian Competent Authority used the list of biocidal products authorised in Austria for PT 8 (in the version of 13.10.2022). Biocidal products with following active substances are presently authorised in Austria for PT 8: Cypermethrin, propiconazole, tebuconazole, IPBC, Cu-HDO, K-HDO, permethrin, boric acid, penflufen, DDA-carbonate, basic copper carbonate, copper hydroxide, creosote, C 12-16-ADBAC/BKC, sulfuryl fluoride and hydrogen cyanide (the latter two for fumigation applications). Candidates for substitution (CFS) of these active substances are propiconazole, permethrin, boric acid, and creosote. Boric acid, propiconazole and creosote furthermore meet exclusion criteria according to Article 5.

According to the information available, there are currently 74 biocidal products/biocidal product families (with various trade names) for industrial use obtainable, but nearly all of them are just authorised to be used for use class 1 (UC1) up to use class 3 (UC3). Only two biocidal products and two biocidal product families are authorised for industrial use **in** UC4. So the suitability of „Wolmanit CX-10_family‟ for UC4 clearly sets the product apart from others and is also its main application according to the applicant.

One the abovementioned biocidal products is ‟Tanalith E 3462”, which is authorised for UC 1 to UC4 (+U4 special application) and is based on the active substances basic copper carbonate, propiconazole, and tebuconazole, with propiconazole fulfilling the exclusion criteria.

The other biocidal product is "Tanasote S40", which is authorised for use class 3 and 4 and being based on the active substances copper hydroxide, penflufen and DDACarbonate. For use class 4, the product is limited to application to softwood only.

The first biocidal product family is "Creosote EN 13991 BPF", authorised for UC3 and UC4, and is based on the active substance creosote, which meets the exclusion criteria.

The second biocidal product family is "Wolmanit CX-8WB_family", which contains the active substances Cu-HDO and basic copper carbonate.

Taking a closer look on the target organisms, all mentioned BP(F)s are able to control the same fungi as „Wolmanit CX-10_family". Concerning wood boring beetles and termites only "Creosote EN 13991 BPF" is not authorised for its control. Additionally it is mentioned, that only „Wolmanit CX-10_family" is authorised for the control of the Australian termites *Mastotermes darwiniensis* and *Coptotermes acinaciformis.*

Concerning the application methods it is noted that all possible alternative products are authorised for vacuum (pressure) impregnation as well, but only „Wolmanit CX-10_family" and "Wolmanit CX-8WB_family" are authorised for "oscillating pressure process treatment", a process specially developed for the impregnation of wet timbers in general, especially for European grown spruce and fir with moisture levels of over 80%.

It is important to mention, that "Tanasote S40" and "Creosote EN 13991" are oil-based and <u>cannot be used</u> as alternatives in current industrial plants for water-soluble impregnation products, what results in a practical disadvantage. Nevertheless, even if they are no suitable alternatives due to aforementioned reason, they will not fully be excluded from this assessment, but their disadvantages we be reflected in the assessment's outcome.

2.2.11.1 Screening phase

<u>Description of the assessment of the adequate chemical diversity in authorised biocidal products to minimise the occurrence of resistance and conclusion</u>

<u>Chemical diversity</u>

Article 23(3)(b) BPR refers to the adequate chemical diversity of the available active substances within a given product type/use/target organism combination as one of the two sine qua non conditions to be met in order to allow a restriction or prohibition of a biocidal product subject to comparative assessment. During the screening phase, it shall be checked whether the diversity of the active substance, product type and mode of action combination in authorised biocidal products is adequate to minimise the occurrence of resistance in the target organisms. The screening phase shall allow through a simple assessment to judge whether it is required or not to perform a comprehensive comparative assessment. As proposed as general rule in TGN at least three different and independent active substance/mode of action - combinations should be available through authorised biocidal products for a given use to provide adequate chemical diversity as stipulated by Article 23(3)(b) BPR.

Mode of action

Boric acid acts fungicidal as well as insecticidal. Up to current level of knowledge boric acid has a unique mode of action. The primary mode of action is the interaction of the borate anion $B(OH)_4^-$ with polyols of biological significance e.g. oxidized co-enzymes (NAD^+, NMN^+ and $NADP^+$). It complexes them and inhibits their ability to support the necessary metabolic functions without time delay.

Further active substances present in the biocidal product family "Wolmanit CX-10_family" and the four alternative biocidal product (families) have the following modes of action:

Active substance	**Mode of action**
Boric acid	Fungicide: Interaction with polyols of biological significance Insecticide: Interaction with polyols of biological significance; disruption of metabolic pathways
Tebuconazole	Fungicide: Inhibits the C 14 demethylation step in the ergosterolbiosynthesis of fungi (Synthesis of membranes of fungi).
Propiconazole	Fungicide: Inhibits the C 14 demethylation step in the ergosterolbiosynthesis of fungi (Synthesis of membranes of fungi).
Basic Cu (II) Carbonate/ Copper Hydroxide/ Cu(HDO)	Insecticide: copper acts as a feeding and cell poison in insects. Fungicide: multi-site contact activity (inhibition of enzymatic activity, systemic mode of action, prevention of infestation).
Creosote	Due to the complexity of creosote composition, the mechanism of action of creosote has not been well defined/is not known.
Penflufen	Fungicide: succinate dehydrogenase (complex II) inhibitor within the fungal mitochondrial respiration.
DDACarbonate	Microbicide: reaction with cell walls of microorganisms (phospholipid-bilayer); disturbing membrane-bound ion-translocation mechanisms. Fungicidal: against fungi, there exists a selective activity spectrum. Insecticidal: mode of action is not fully understood, probably disruption of the digestive process.

As shown above, boric acid and its unique mode of action expands the limited variety of the mode of action of currently authorised biocidal products for the given PT/target organism/use/(application method) combination. The formation of resistance against biocidal products based on the active substance is considered very unlikely.

Furthermore, it is to mention that two of the alternatives contain active substances fulfilling exclusion criteria ("Tanalith E 3462") or even totally consist of an active substance fulfilling exclusion criteria ("Creosote EN 13991 BPF").

The AT CA is concludes that if boric acid was substituted in the given biocidal product that chemical diversity for fungicidal activity might remain adequate. Nevertheless, a restriction of boric acid in use classes 3 and 4 would result in a significant loss of "available" fungicidal mode of biocidal actions remaining to be used for applications in UC3 and UC4.

For insecticidal activity it expands the chemical variety as only DDACarbonate and copper-based active substances are authorised for the given use.

Additionally boric acid is distinguished by its high diffusion capability - according to the applicant. Due to this property zones within the wood, normally not being reached by pressure impregnation, are penetrated by subsequent migration of boric acid after the application process and therefore prolonging the life span of the treated timber.

Consideration on whether the CFS meet at least one of the exclusion criteria listed in Article 5(1) but can benefit from derogation in accordance with Article 5(2) of the BPR.

Classified with Repr. 1B (H360FD), boric acid meets an exclusion criterion according to Article 5(1)(c) of the BPR.

According to Article 5(2)(a) of the BPR, active substance referred to in Article 5(1) may be approved if

"the risk to humans, animals or the environment from exposure to the active substance in a biocidal product, under realistic worst case conditions of use, is negligible, in particular where the product is used in closed systems or under other conditions which aim at excluding contact with humans and release into the environment;

it is shown by evidence that the active substance is essential to prevent or control a serious danger to human health, animal health or the environment; or

not approving the active substance would have a disproportionate negative impact on society when compared with the risk to human health, animal health or the environment arising from the use of the substance."

Conclusion of the screening phase: Go to Tier I-B.

Taking into account the available information summarised here, just two biocidal products and two biocidal product families for the given product type, target organism in use class 4 for industrial users are currently available. However, two of these 4 have major practical disadvantages as these are oil-based and cannot be used as alternatives in current industrial plants for water-soluble impregnation products.

Reflecting the application method only „Wolmanit CX-10_family" and "Wolmanit CX-8WB_family" are authorised for "oscillating pressure process treatment", a process specifically developed for the impregnation of wet timbers in general, especially for European grown spruce and fir with moisture levels of over 80%.

The first biocidal product "Tanalith E 3462" contains - amongst others - propiconazole, which which fulfills exclusion criteria for being Repr. 1B (as well as tebuconazole, for which classification of Repr. 1B is proposed).

The biocidal product family "Creosote EN 13991 BPF" is based on creosote, which also meets the exclusion criteria according to Article 5 of BPR and is oil-based.

"Wolmanit CX-8WB_family" and "Tanasote S40" do not contain active substances fulfilling exclusion criteria nor candidates for substitution. However, "Tanasote S40" is oil-based.

The AT CA considers the (insecticidal) chemical diversity of the available active substances as inadequate to minimise the occurrence of resistance in the target harmful organisms.

Additionally the AT CA sees difficulties of restricting a biocidal product containing an active substance fulfilling exclusion criteria for the benefit of another biocidal product also containing an active substance fulfilling exclusion criteria.

However, according to TNG, the "Wolmanit CX-10_family" nevertheless should be subject to a detailed quantitative comparative assessment, since boric acid fullfills the exclusion criteria.

2.2.11.2 Tier I-A

Not relevant as the active substances meet the exclusion criteria in article 5 of Regulation 528/2012. Therefore the comparative assessment is advanced to Tier IB.

2.2.11.3 Tier I-B Detailed comparison to other authorised biocidal products

After the screening phase of the comparative assessment, for biocidal products containing an active substance which meets the exclusion criteria in article 5 of Regulation 528/2012 the AT CA has carried out a detailed comparison of the risk for the biocidal product to other authorised biocidal products (Tier I-B). Therein it has to be cleared

- Is the overall risk of the alternative authorised BP significantly lower for human health, animal health and the environment?
- Does the alternative authorised BP present other significant economic or practical disadvantages?

Identification of alternative biocidal products

As outlined above the Austrian CA used the list of biocidal products authorised in Austria for PT 8 (in the version of 13.10.2022). The Austrian CA has identified two biocidal products and two biocidal product families that could act as alternatives (please see also "Identified eligible alternative biocidal products"), but with two having major practical disadvantages (for being oil-based).

Comparison of „Wolmanit CX-10 family" to other authorised biocidal product (families) – Risks for human health, animal health and the environment

Risks for human health

According to TGN (par. 82) only the data associated with the following criteria have to be compared with respect to human health:

- CMR properties (exclusion criterion)
- ED properties (exclusion criterion)

- Respiratory sensitiser (substitution criterion)

	CMR	ED properties	Respiratory sensitzer
Tanalith E 3462*****	---	No suspected endocrine disruptor	---
Creosote EN 13991 BPF	Carc. 1B Repr. 1B Repr. 2	Contains potential endocrine disruptor (p-cresol)	---
Wolmanit CX-10_family	Repr. 1B	No suspected endocrine disruptor	---
Wolmanit CX-8WB_family	Repr. 2	Contains potential endocrine disruptor (“*endocrine activity of 2-aminoethanol cannot be excluded*”)	---
Tanasote S40	---	No suspected endocrine disruptor	---

*****product’s classification is based on the old classification of propiconazole and is therefore supposed to be changed as propiconazole now is classified repr. 1B, meets HH and ENV ED criteris and is vP and T. For tebuconazole classification of Repr. 1B is proposed and its potential to cause endocrine disruption is under consideration.

Comparison with “Tanalith E 3462”:

Biocidal products of the “Wolmanit CX-10_family” all contain boric acid within the range of 4.0 – 5.0% in the liquid concentrate, resulting in a maximum of 0.24% in the application solution.

“Tanalith E 3462” but contains propiconazole at concentration of 0.18% in the soluble concentrate resulting in a maximum of 0.0023% in the application solution.

Propiconazole and boric acid both have a harmonized classification as Repr. 1B, therefore both fulfil exclusion criteria and being a candidate for substitution. Propiconazole was classified for reproductive toxicity (ATP 13) what is not refelected in the classification of “Tanalith E 3462”. Additionally propiconazole now meets HH and ENV ED criteria and is vP and T.

“Tanalith E 3462” also contains tebuconazole, for which a classification of Repr. 1B is proposed and will be discussed within RAC. Tebuconazole is present at a concentration of 0.18 % in the soluble concentrate (maximum of 0.0023% in application solution).

Summed up, currently “Tanalith E 3462” does have a slightly better profile with regard to human health due to the very low content of propiconazole and tebuconazole compared to the content of boric acid at low level in “Wolmanit CX-10_family” products. This is reflected in the current classification of the products but is highly expected to be changed in near future due to above-mentioned updated classifications of propiconazole and tebuconazole.

"Tanalith E 3462" has a valid authorisation until 30/10/2025.

Comparison with "Creosote EN 13991 BPF"

The biocidal product family is classified Carc. 1B, Repr. 1B, and Repr. 2. „Wolmanit CX-10_family" is classified Repr. 1B.

None of the representational biocidal product family members contains a known or suspected carcinogen, mutagen or endocrine disruptor. Creosote is not classified as mutagenic but meets intermediate ED criteria. Please see following quote of the respective SE-PARs of the creosote family:

"Creosote contains p-cresol which is identified as a substance with potential evidence of endocrine disrupting effects (…). The content of p-cresol has been determined in composite Grade B creosote to be approximately 0.12% while in creosote oils Grade B and C, p-cresol has not been detected. Since the contents of the creosote oils Grade B and C are not determined to more than approximately 63 and 57% respectively, we cannot eliminate the possibility that they may, in very low concentrations, contain other substances exhibiting potential endocrine disrupting effects."

"Creosote EN 13991" has a valid authorisation until 29/03/2024. Active substance renewal of creosote is ongoing in Poland.

Comparison with "Wolmanit CX-8WB_family"

All meta-SPC levels of the biocidal product family "Wolmanit CX-8WB" is classified Repr. 2. None of the representational biocidal product family members contains a known or suspected carcinogen, mutagen or endocrine disruptor nor "Wolmanit CX-8WB_family". Although is should be mentioned, that in the PAR of does "Wolmanit CX-8WB_family" it is stated that "*endocrine activity of 2-aminoethanol cannot be excluded*".

Comparison with "Tanasote S40"

"Tanasote S40" has no classification in concern to CMR properties, ED properties, or respiratory sensitiser.

Summary

Only the alternative product "Tanasote S40" clearly has a better profile and "Wolmanit CX-8WB_family" also has a better profile with regard to human health.

"Tanalith E 3462" currently has a better profile but which is highly expected to be changed within renewal process in light of the new/ongoing classifications of its active substances.

The creosote family contains development toxicants, cancerogens and potential endocrine disruptors.

This, however, makes "Tanasote S40", "Wolmanit CX-8WB_family" and "Tanalith E 3462" preferable to products of „Wolmanit CX-10_family" from the perspective of human health at present. This – as already mentioned – is highly expected to change within the renewal of "Tanalith E 3642" in the light of the recently adopted new classification of propiconazole and the ongoing process of tebuconazole.

Risks for the environment

According to TGN (par. 82), only the data associated with the following criteria have to be compared with respect to the environment:

- PBT properties (exclusion criterion)
- Two out of the three P/B/T properties (substitution criterion)

	PBT properties	P/B/T (two out of three)
Tanalith E 3462*****	---	Propiconazole (vP, T)
Creosote EN 13991 BPF	"substance containing PBT constituents"	vP, vB (metabolite)
Wolmanit CX-10_family	---	Boric acid (vP, T)
Wolmanit CX-8WB_family	---	---
Tanasote S40	---	---

*product's classification is based on the obsolete classification of propiconazole and is therefore supposed to be changed as propiconazole now is classified repr. 1B, meets HH and ENV ED criteris and is vP and T. Tebuconazole's potential to cause endocrine disruption is under consideration.

None of the products contains an active substance considered as PBT except creosote that is a multi-constituent substance and can be described as "substance containing PBT constituents".

As shown in the table above „Wolmanit CX-10_family" has – among others - boric acid as active substance and "Tanalith E 3462" contains propiconazole. Both active substances are very persistent and toxic (vP, T).

Summary

Biocidal product "Tanalith E 3462" and the family members of the representational family contain an active substance possessing two of the P/B/T properties, whereby they meet a substitution criterion (both vP and T). The creosote based family can be described as a "substance containing PBT constituents".

Thus, two of the alternative products do not have a better profile with respect to the environment.

Does the alternative authorised BP present other significant economic or practical disadvantages?

Taking into account the definition of "significant economic or practical disadvantages" provided by paragraph 27 of the TNsG-CA (CA-May15-Doc.4.3.a-Final) and following the approach provided in section 6.2.1.2 the comparative assessment should reach a conclusion on whether or not the identified disadvantages lead eather:

- an inability to maintain sufficient control of the target organism, or
- the control of the target organism at very high efforts and/or disproportionate costs

Input assessment:

All alternative authorised BP are for industrial use only and are authorised for UC4, this has been a selection criteria for being seen as a relevant alternative. "Tanalith E 3462" and "Wolmanit CX-8WB_family" are authorised for use class 1 to 4. "Tanasote S40" and "Creosote EN 13991 BPF" are authorised for use class 3 and 4 only. "Tanasote S40" is limited to softwood only in UC4.

All possible alternative products are authorised for vacuum pressure impregnation as well, but only „Wolmanit CX-10_family" and "Wolmanit CX-8WB_family" are authorised for "oscillating pressure process treatment", a process specially developed for the impregnation of wet timbers in general, especially for European grown spruce and fir with moisture levels of over 80%. Usage of "Tanasote S40" in use class 4 is limited to softwood only.

Concerning the target organisms, all mentioned BP(F)s are able to control the same fungi, like „Wolmanit CX-10_family". Concerning wood boring beetles and termites only "Creosote EN 13991 BPF" is not authorised for its control. Additionally it is mentioned, that only „Wolmanit CX-10_family" is authorised for the control of the Australian termites *Mastotermes darwiniensis* and *Coptotermes acinaciformis*. "Tanasote S40" and „Wolmanit CX-10_family" are the only ones to contain 2 active substances against insects.

"Tanasote S40" and "Creosote EN 13991" are oil-based and cannot be used as alternatives in current industrial plants for water-soluble impregnation products, what results in a major practical disadvantage.

According to the applicant, "Wolmanit CX-10_family" is characterised by a high diffusion capability of boric acid in the wood. Due to this property zones within the wood, normally not being reached by pressure impregnation, are penetrated by subsequent migration of boric acid after the application process and therefore prolonging the life span of the treated timber.

Conclusion

Alternatives present practical disadvantages (different use classes and target organisms as well as specific application method) which prevents this products from being regarded as viable alternatives.

Additionally – concerning significant economic or practical disadvantages - the reduction of the market to a few remaining wood preservatives could result in a price increase for the wood treater and for the end consumer. Any cost increase of the final product might lead to a decreased usage of timber as construction material as it may lose its economic advantages against other materials – with a higher greenhouse impact compared to wood.

Conclusion of Tier I-B: Go to Tier II.

From the perspective of human health, "Tanasote S40" has a better profile as well as "Wolmanit CX-8WB_family" has.

"Tanalith E 3462" can currently be considered to be a better alternative as it does not represent a fertility hazard. But in the light of the new classification of propiconazole and the ongoing process of tebuconazole this is exptected to be changed within the renewal.

The family based on creosote has a worse profile.

Seen from an environmental view "Tanalith E 3462" and the relevant BPF both contain an active substance being vP and T. Additionally "Tanalith E 3462" contains propiconazole, which meets ENV ED criteris. "Creosote EN 13991 BPF" has worse profile.

"Wolmanit CX-8WB_family" has a better profile with regard to HH and ENV, but might bear a practical disadvantage compared to "Wolmanit CX-10_family". As it is lacking boric acid and its high diffusion capability this might result in a shortened lifetime.

Furthermore it is to mention, that "Tanasote S40" and "Creosote EN 13991" are oil-based and <u>cannot be used</u> as alternatives in current industrial plants for water-soluble impregnation products, what results in a major practical disadvantage.

So two alternative products ("Tanalith E 3462" and "Wolmanit CX-8WB_family") <u>currently</u> have lower risk for human health and the environment, but what is suspected not to reflect actual knowledge of propiconazole's (and maybe tebuconazole's) properties. At least one poses a major practical disadvantage (please see application methods), comparative assessment must move to Tier II (TGN, par. 91), as only one biocidal product ("Wolmanit CX-8WB_family") remains as an alternative.

2.2.11.4 Tier II Comparison to non-chemical alternatives

The Tier II assessment is intended to identify non-chemical alternatives to the relevant biocidal product and assess whether these potential alternatives:

(a) are sufficiently effective,

(b) pose any significant economic or practical disadvantages or,

(c) Have a significantly lower overall risk for human health, animal health and the environment than the relevant biocidal product.

So the main goal of Tier II is to conclude whether or not substitution of the relevant biocidal product by an eligible non-chemical alternative would be possible.

The AT CA has identified several non-chemical alternatives to biocidal timber treatment:

<u>Control of moisture:</u> Rot fungi need a certain amount of moisture content in order to decompose wood. Therefore keeping the moisture as low as possible is a natural opportunity to prevent microbial activity. However it does not prevent against wood boring insects and fungi in general as other parameters might influence. Furthermore this is no option for already existing wooden construction. This might be promoted indoors but overall it is regarded as not universally applicable and not sufficiently effective.

<u>Durable wood</u> Several wood species are known for their high weather resistance like oak and larch, others have high natural durability against wood-rotting fungi like oak and chestnut. But most common regional trees like spruce, fir, birch, and beech are highly prone to wood rotting fungi. However, most durable wood species are relatively expensive and are not grown in sufficient quantity. In some cases, naturally durable wood might pose a good opportunity but overall it is considered as an alternative posing significant economic and practical disadvantages. Apart from that, the lifespan does not reach those with biocide treatment.

<u>Wood modification</u> Different practises for wood treatment do exist. The most common one is thermal modification (thermally modified timber, TMT). This is a controlled process under which wood is being heated (> 180 °C) in absence of oxygen (prevention of

burning) in order to increase its durability. Since this treatment results in a reduction weight-bearing capacity TMT is currently not a construction product. Therefore, it may not be used for supporting and stiffening purposes. This is considered a critical practical disadvantage.

Alternative materials: In times of climate change the AT-CA is unaware of any suitable alternative material to the renewable resource wood that is qualified to replace it - even if wood is treated with biocides.

Summary
AT considers that alternative materials cannot be recommended as substitute due to the higher environmental impact.

Taking into account the reasons and options listed above the AT CA identifies no reasonable non-chemical alternative to replace wood preservatives.

2.2.11.5 Overall conclusion

Taking into account and reflecting all the arguments summarised above (please see conclusion of the screening phase, of Tier I-B and of Tier II):

- only one authorised biocidal product exists which presents a significantly lower overall risk, is sufficiently effective and presents no other significant economic or practical disadvantage;
- no non-chemical control prevention method exists which presents a significantly lower overall risk, is sufficiently effective and presents no other significant economic or practical disadvantage
- the chemical diversity of the active substances of the only remaining product is not fully adequate to minimise the occurrence of resistance and
- boric acid in "Wolmanit CX-10_family" product family can benefit from derogation in accordance with Article 5(2) of the BPR.

The AT CA concludes in accordance with Article 23(3) of the BPR that there are no reasons to prohibit or restrict the making available on the market of „Wolmanit CX-10_family".

The biocidal products contained in the biocidal product family „Wolmanit CX-10_family" will be authorised for a period not exceeding 5 years in accordance with Article 23(6) of Regulation (EU) No 528/2012.

2.2.12 ED assessment

Please see confidential annex.

3 ANNEXES

3.1 List of studies for the biocidal product (Family)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 3.1-1 B 3.2-1	Anonymous	2014a	Odour, physical state and pH - Wolmanit CX-10	BASF Wolman GmbH	14-WD-006	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
B 3.1-2 B 3.2-2	Anonymous	2014b	Odour, physical state and pH value of Wolmanit CX-8	BASF Wolman GmbH	14-WD-001	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
B 3.1-3 B 3.2-3	Anonymous	2014c	Odour, physical state and pH value of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-004	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
B 3.2-4	Anonymous	2016a	Determination of the pH value of a 1% (m/m) solution of Wolmanit CX-8 (9176)	BASF Wolman GmbH	16-WD-084	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (9176)
B 3.3-1	Anonymous	2014d	Density of Wolmanit CX-10	BASF Wolman GmbH	14-WD-024	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
B 3.3-2	Anonymous	2014e	Density of Wolmanit CX-8	BASF Wolman GmbH	14-WD-019	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
B 3.3-3	Anonymous	2014f	Density of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-022	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
B 3.3-4	Anonymous	2016b	Density of Wolmanit CX-8 (9176)	BASF Wolman GmbH	16-WD-083	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (9176)
B 3.2	Anonymous	2020a	Alkalinity of Wolmanit CX-10	BASF Wolman GmbH	20-WD-022	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (1000235775)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 3.2	Anonymous	2020b	Alkalinity of Wolmanit CX-8	BASF Wolman GmbH	20-WD-023	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (1000250966)
B 3.2	Anonymous	2020c	Alkalinity of Wolmanit CX-8N	BASF Wolman GmbH	20-WD-024	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (LP18695)
B 3.2	Anonymous	2020d	Alkalinity of Wolmanit CX-8 (9176)	BASF Wolman GmbH	20-WD-025	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (9176) (1000242063)
B 3.4.1.1-1	Anonymous	2014g	Accelerated storage test by heating of Wolmanit CX-8	BASF Wolman GmbH	14-WD-031	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
B 3.4.1.1-2	Anonymous	2015a	Accelerated storage test by heating of Wolmanit CX-8	BASF Wolman GmbH	14-WD-031 Revision 1	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
B 3.4.1.1-3	Anonymous	2014h	Accelerated storage test by heating of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-034	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
B 3.4.1.1-4	Anonymous	2015b	Accelerated storage test by heating of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-034 Revision 1	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
3.4.1.1-5	Anonymous	2003a	Accelerated Storage Test by Heating	BASF Wolman GmbH	UP 15467	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (UP 15467)
3.4.1.1-6	Anonymous	2014i	Accelerated storage test by heating of Wolmanit CX-10	BASF Wolman GmbH	14-WD-036	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
3.4.1.1-7	Anonymous	2015c	Accelerated storage test by heating of Wolmanit CX-10	BASF Wolman GmbH	14-WD-036 Revision 1	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
3.4.1.2-1	Anonymous	2014j	Stability of Wolmanit CX-10	BASF Wolman GmbH	14-WD-063	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH Ch 0532515)
3.4.1.2-2	Anonymous	2015d	Stability of Wolmanit CX-10	BASF Wolman GmbH	15-WD-101	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH Ch 0532515)
3.4.1.2-3	Anonymous	2002a	Stability - Wolmanit CX-10	BASF Wolman GmbH	U 8642	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (U 8642)
3.4.1.2-4	Anonymous	2014k	Stability of Wolmanit CX-8	BASF Wolman GmbH	14-WD-058	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.4.1.2-5	Anonymous	2015e	Stability of Wolmanit CX-8	BASF Wolman GmbH	15-WD-096	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.4.1.2-6	Anonymous	2014l	Stability of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-061	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
3.4.1.2-7	Anonymous	2015f	Stability of Wolmanit CX-SN	BASF Wolman GmbH	15-WD-099	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
3.5.7-1	Anonymous	2014m	Determination of the persistence of foaming of Wolmanit CX-10	BASF Wolman GmbH	14-WD-030-RO	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
3.5.7-2	Anonymous	2014n	Determination of the persistence of foaming of Wolmanit CX-8	BASF Wolman GmbH	14-WD-025-RO	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.5.7-3	Anonymous	2014o	Determination of the persistence of foaming of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-028RO	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
3.6.7-1	Anonymous	2014p	Dilution stability of Wolmanit CX-10	BASF Wolman GmbH	14-WD-075-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
3.6.7-2	Anonymous	2014q	Dilution stability of Wolmanit CX-8	BASF Wolman GmbH	14-WD-070-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.6.7-3	Anonymous	2014r	Dilution stability of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-073-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
3.8-1	Anonymous	2004a	Determination of the surface tension of Wolmanit CX-10	BioChem	03 50 40 274	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (“old”)
3.8-2	Anonymous	2015g	Determination of the surface tension of Wolmanit CX-10	BioChem	14 50 40 696F	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
3.8-3	Anonymous	2015h	Determination of the surface tension of Wolmanit CX-8	BioChem	14 50 40 696A	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.8-4	Anonymous	2015i	Determination of the surface tension of Wolmanit CX-8N	BioChem	14 50 40 696D	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
3.9-1	Anonymous	2014s	Viscosity of Wolmanit CX-10	BASF Wolman GmbH	14-WD-012	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
3.9-2	Anonymous	2014t	Viscosity of Wolmanit CX-8	BASF Wolman GmbH	14-WD-007	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
3.9-3	Anonymous	2014u	Viscosity of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-010	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
4.1 4.6 4.17.1	Anonymous	2003b	Safety characteristics according to directive 92/69/EC, annex A9-A17	BASF SE	SIK-Nr. 03/2303	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 ("old")
4.4	Anonymous	2023a	Wolmanit® CX-8: Determination of physico-chemical properties Oxidizing Properties of Liquids (UN Test O.2)	Consilab Gesellschaft für Anlagensicherheit mbH	CSL-23-0306.01	Yes	Yes	Wolman Wood and Fire Protection GmbH	Wolmanit CX-8
4.4	Anonymous	2023b	Wolmanit® CX-10: Determination of physico-chemical properties Oxidizing Properties of Liquids (UN Test O.2)	Consilab Gesellschaft für Anlagensicherheit mbH	CSL-23-0304.01	Yes	Yes	Wolman Wood and Fire Protection GmbH	Wolmanit CX-10
4.16-1	Anonymous	2014v	Corrosivity to metal of Wolmanit CX-10	BASF Wolman GmbH	14-WD-069-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (TH 3332)
4.16-1	Anonymous	2015j	Corrosive to metal of Wolmanit CX-10	BASF Wolman GmbH	15-WD-107-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-10
4.16-1	Anonymous	2022a	Corrosive to metal of Wolmanit CX-10	BASF Wolman GmbH	22-WR-002	No	Yes	BASF Wolman GmbH	Wolmanit CX-10
4.16-2	Anonymous	2014w	Corrosiveness of Wolmanit CX-8 against mild steel DC 01	BASF Wolman GmbH	14-WD-064-RO	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 (TH 3338)
4.16-2	Anonymous	2015k	Corrosive to metal of Wolmanit CX-8	BASF Wolman GmbH	15-WD-102-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-8
4.16-2	Anonymous	2022b	Corrosive to metal of Wolmanit CX-8	BASF Wolman GmbH	22-WR-001	No	Yes	BASF Wolman GmbH	Wolmanit CX-8

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
4.16-3	Anonymous	2014x	Corrosivity to metal of Wolmanit CX-8N	BASF Wolman GmbH	14-WD-067-RO	No	Yes	BASF Wolman GmbH	Wolmanit CX-8N (TH 3266)
4.16-3	Anonymous	2015l	Corrosive to metal of Wolmanit CX-8N	BASF Wolman GmbH	15-WD-105-R0	No	Yes	BASF Wolman GmbH	Wolmanit CX-8
4.16-2	Anonymous	2022c	Corrosive to metal of Wolmanit CX-8N	BASF Wolman GmbH	22-WR-024	No	Yes	BASF Wolman GmbH	Wolmanit CX-8
5.1-1	Anonymous	2014y	Validation of an Atom Absorption Spectrometer Method for the Determination of Copper in Wolmanit CX products	BASF Wolman GmbH	14-WD-015	No	Yes	BASF Wolman GmbH	Wolmanit CX-products (Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N, Wolmanit CX-8WB, Wolmanit CX-8F, Wolmanit CX-8FP)
5.1-2	Anonymous	2014z	Validation of a Photometer Method for the Determination of Bis- (N-cyclohexyldiazenium-dioxy) -copper in Wolmanit CX products.	BASF Wolman GmbH	14-WD-017	No	Yes	BASF Wolman GmbH	Wolmanit CX-products (Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N, Wolmanit CX-8WB, Wolmanit CX-8F, Wolmanit CX-8FP)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
5.1-3	Anonymous	2014aa	Validation of an Atom Absorption Spectrometer Method for the Determination of Boron in Wolmanit CX products	BASF Wolman GmbH	14-WD-016	No	Yes	BASF Wolman GmbH	Wolmanit CX-concentrates and –solutions (Wolmanit CX-10, Wolmanit CX-8, Wolmanit CX-8N)
5.1-4	Anonymous	2019a	Validation of a method for determination co-formulants in wood preservative-Wolmanit CX (product group)	MPA Eberswalde	31/19/3671/01	No	Yes	BASF Wolman GmbH	Wolmanit CX-8WB
5.2-1	Anonymous	2014ab	Validation of an UPLC method for the determination of Cu(HDO)2 in water	BASF Wolman GmbH	10-FEA-010	No	Yes	BASF Wolman GmbH	Cu-HDO in water
5.2-2	Anonymous	2015m	Validation of an UPLC method in combination with solid phase extraction for the determination of Cu(HDO)2 in tap water	BAM	BAM Reference No. 15031686	No	Yes	BASF Wolman GmbH	Cu-HDO in water
B 6.7-1	Anonymous	2010a	Bestimmung der vorbeugenden Wirksamkeit gegen holzzerstörende Basidiomyceten gemäß DIN EN 113: 1196/A1:2004 nach Auswaschbeanspruchung gemäß DIN EN 84:1997-05 oder Verdunstungsbeanspruchung gemäß DIN EN 73:1988	BASF Wolman GmbH	B 2344-09	No	Yes	BASF Wolman GmbH	Wolmanit CX-10

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 6.7-2	Anonymous	2011a	Biologische Prüfung von Wolmanit CX-LP 15687 gemäß ÖNORM EN 113 nach vorangegangener Auswaschbeanspruchung gemäß ÖNORM EN 84	Holzforschung Austria	2316/2010/1 - HH	No	Yes	BASF Wolman GmbH	Wolmanit CX-LP 15687 (Wolmanit CX-8N)
B 6.7-3	Anonymous	2010b	Biologische Prüfung von Wolmanit CX-LP 15687 gemäß ÖNORM EN 113 nach vorangegangener Verdunstungsbeanspruchung gemäß ÖNORM EN 73	Holzforschung Austria	2316/2010/2 - HH	No	Yes	BASF Wolman GmbH	Wolmanit CX-LP 15687 (Wolmanit CX-8N)
B 6.7-4	Anonymous	2015n	Bestimmung des Grenzwertes der Wirksamkeit gegen Moderfäule und andere erdbewohnende Mikroorganismen gemäß DIN V ENV 807: 2001-12	BASF Wolman GmbH	B 2615 a	No	Yes	BASF Wolman GmbH	Wolmanit CX-8
B 6.7-5	Anonymous	2015o	Bestimmung des Grenzwertes der Wirksamkeit gegen Moderfäule und andere erdbewohnende Mikroorganismen gemäß DIN V ENV 807: 2001-12	BASF Wolman GmbH	B 2615 g	No	Yes	BASF Wolman GmbH	Wolmanit CX-LP14781
B 6.7-6	Anonymous	2015p	Bestimmung des Grenzwertes der Wirksamkeit gegen Moderfäule und andere erdbewohnende Mikroorganismen gemäß DIN V ENV 807: 2001-12	BASF Wolman GmbH	B 2615 d	No	Yes	BASF Wolman GmbH	Wolmanit CX-8F

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 6.7-7	Anonymous	1993a	Giftwertbestimmung gegenüber Eilarven des Haus-bockkäfers gemäß DIN EN 47 nach vorausgegangener Auswaschbeanspruchung gemäß DIN EN 84.	BAM	8.1/6170 Hb 8	No	Yes	BASF Wolman GmbH	LP 11920
B 6.7-8	Anonymous	1993b	Giftwertbestimmung gegenüber Eilarven des Haus-bockkäfers gemäß DIN EN 47 nach Verdunstungsbeanspruchung gemäß DIN EN 73.	BAM	8.1/6170 HbC	No	Yes	BASF Wolman GmbH	LP 11920
B 6.7-9	Anonymous	2002b	RAPPORT D'ESSAI N°: 01-16-EN 117, Norme EN 117 (1990), Nom du produit: Wolmanit CX-10 (80%)	CIRAD – Foret; Laboratoire de Préservation	01-16-EN 117	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 (80%)
B 6.7-10	Anonymous	1993c	Compte rendu d'essai no. 1207 A	CIRAD – Foret; Laboratoire de Préservation	1207 A	No	Yes	BASF Wolman GmbH	LP 11920
B 6.7-11	Anonymous	2007a	Determination of toxic values against Reticulitermes santonensis De Feytaud according to EN 117 (06/2005) after evaporative ageing procedure according to EN 73 (04190)	MPA Eberswald	32/0719008/04	No	Yes	BASF Wolman GmbH	Wolmanit CX- LP 14781

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 6.7-12	Anonymous	1999a	Laboratory bioassay on the effectiveness of three copper based, chromium- and arsenic-free, wood preservative formulations (Wolm. CX-LP 13492, Wolm. CX-LP 13460 and Wolm. CX-LP 12484) to protect P. radiata sapwood from attack by subterr. termites.	CSIRO - Forestry and Forest Products	566	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 as Wolmanit CX-LP 13492
B 6.7-13	Anonymous	2002c	Above ground field trial to determine the termiticidal effectiveness of Wolmanit CX-LP 13460 and Wolmanit CX-LP 13632b	CSIRO - Forestry and Forest Products	1126	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 as Wolmanit CX-LP 13632b
B 6.7-14	Anonymous	2004b	TEST REPORT No. 2004-F7. Field test with wood preservative	The Swedish University of AgriculturaI Sciences - Department of Wood Science	2004-F7	No	Yes	BASF Wolman GmbH	Wolmanit CX-LP 13632b
B 8.1	Anonymous	1994a	Acute Dermal Irritation/Corrosion Study with "Wolmanit CX-10"	Austrian Research Centre Seibersdorf	OEFZS-A—2988 BASF	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (VM 546)
B 8.2	Anonymous	1994b	Acute eye irritation/Corrosion study with "Wolmanit CX-10"	Austrian Research Centre Seibersdorf	OEFZS-A—2989	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (VM 546)
B 8.3/01	Anonymous	2007b	"WOLMANIT LP16067B": Skin Sensitization Study (Buehler Test)	AUSTRIAN RESEARCH CENTERS Toxikologie	WOL104	Yes	Yes	BASF Wolman GmbH	Wolmanit LP 16067B
B 8.5.1	Anonymous	1994c	Acute oral toxicity of Wolmanit CX-10 in rats	Austrian Research Centre Seibersdorf	OEFZS-A—2986	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (VM 546)

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 8.5.2	Anonymous	2003c	"Wolmanit CX-LP 15172" Acute Inhalation Toxicity in Rats	ARC Seibersdorf research GmbH	Wol 66 BASF	Yes	Yes	Wolman GmbH	Wolmanit CX-LP 15172
B 8.5.3	Anonymous	1994d	Acute dermal toxicity of "Wolmanit CX-10" in rats	Research Centre Seibersdorf	OEFZS-A—2987	Yes	Yes	BASF Wolman GmbH	Wolmanit CX-10 (VM 546)
B 8.6/01	Anonymous	2006a	Study of penetration through human skin in vitro	BASF SE	52H0893/052242	Yes	Yes	BASF Wolman GmbH	LP 16013 (Wolmanit CX)
8.10	Anonymous	2002d	Raumluftmessungen an Holzern, die mit Wolmanit CX-S impragniert wurden	Dr. Wolman GmbH BASF Group	PM-8s02120/scht	No	Yes	Dr. Wolman GmbH BASF Group	Wolmanit CX-S
8.10	Anonymous	2002e	Surface Sampling and Analysis for Residues of Cu-HDO and Copper from Wolmanit CX-10 treated wood by the wipe test	BASF Wolman GmbH	02/1603	No	Yes	BASF Wolman GmbH	Wolmanit CX-10
8.10/01	Anonymous	2004c	Estimation of the dermal exposure when using Wolmanit CX-10 in a vacuum pressure treatment plant	BASF Wolman GmbH	2602/2004	No	Yes	BASF Wolman GmbH	Wolmanit CX-10 "old"

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
8.10	Anonymous	2015q	Estimation of the dermal hand exposure when using Wolmanit CX-formulations in vacuum pressure treatment plants	BASF Wolman GmbH	Wol-Te-151116	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 Wolmanit CX-8N Wolmanit CX-10 Wolmanit CX-10.2 Wolmanit CX-8M
8.10	Anonymous	2015r	Surface sampling and analysis for residues of active substances from Wolmanit CX- treated wood by the wipe test	BASF Wolman GmbH	UP 24508	No	Yes	BASF Wolman GmbH	Wolmanit CX-8 Wolmanit CX-8F Wolmanit CX-8 FP
8.10	Anonymous	2018a	Measurement report Workplace concentration measurements	BASF Wolman GmbH	---	No	Yes	BASF Wolman GmbH	Wolmanit CX-8
9.2.1.1	Anonymous	2003d	WOLMANIT CX-LP 15172": Acute Toxicity Study for Zebra fish	ARC Seibersdorf research GmbH	WOL67	Yes	Yes	Dr. Wolman GmbH	Wolmanit CX-LP 15172
9.2.1.2	Anonymous	2003e	WOLMANIT CX-LP 15172": Acute Toxicity Study for Daphnia magna	ARC Seibersdorf research GmbH	WOL68	Yes	Yes	Dr. Wolman GmbH	Wolmanit CX-LP 15172
9.2.1.3	Anonymous	2003f	WOLMANIT CX-LP 15172": Alga (Selenastrum capricornutum) Growth Inhibition Test	ARC Seibersdorf research GmbH	WOL69	Yes	Yes	Dr. Wolman GmbH	Wolmanit CX-LP 15172

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
9.2.1.5	Anonymous	2003g	WOLMANIT CX-LP 15172": Alga (Selenastrum capricornutum) Growth Inhibition Test	ARC Seibersdorf research GmbH	WOL70	Yes	Yes	Dr. Wolman GmbH	Wolmanit CX-LP 15172
9.2.2.3	Anonymous	2003h	WOLMANIT CX-LP 15172": Determination of the effect on the emergence, growth and the observation of morphological changes of rize (Oryza sativa L.)	Experimental Toxicolo!;1y and Ecology BASF Aktiengesiellschaft	No.: 03/0050/65/1	Yes	Yes	Dr. Wolman GmbH	Wolmanit CX-LP 15172
B 10.2-01	Anonymous	2013a	Field monitoring of a soil compartment after installation of Wolmanit CX-8 treated poles	BASF Wolman GmbH	3107/2012	No	Yes	BASF Wolman GmbH	Wolmanti CX-8 (LP 16404)
B 10.2-02	Anonymous	2013b	Field monitoring study of a quarry pond after installation of a Wolmanit CX-8 treated jetty	BASF Wolman GmbH	1405/2012	No	Yes	BASF Wolman GmbH	Wolmanti CX-8
B 10.3-01	Anonymous	2015s	NT Build 509 " Leaching of active ingredients from preservative-treated timber-Semi-field testing"	MPA Eberswalde - Materialprüfanstalt Brandenburg GmbH	No 31/13/2061/01A	No	Yes	BASF Wolman GmbH	LP17178
B 10.3-02	Anonymous	2014ac	OECD 313 "Estimation of Emissions from Preservative-treated wood to the environment: Laboratory Method for Wooden Commodities that are not Covered and are in Contact with Fresh Water or Seawater (2007)"	MPA Eberswalde - Materialprüfanstalt Brandenburg GmbH	No 31/13/2061/07	No	Yes	BASF Wolman GmbH	LP17179

Section No. in IUCLID	Author(s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Test formulation
B 10.3-03	Anonymous	2015t	Comparison of the leaching behavior of Wolmanit CX-10 family, Wolmanit CX-8WB family and Wolmanit CX-8FP	BASF Wolman GmbH	B2589/08/2015	No	Yes	BASF Wolman GmbH	
B 10.3-04	Anonymous	2019b	NT Build 509 " Leaching of active ingredients from preservative-treated timber-Semi-field testing"	MPA Eberswalde - Materialprüfanstalt Brandenburg GmbH	No 31/16/2844/08F	No	Yes	BASF Wolman GmbH	LP17680
Not included in IUCLID	Anonymous	2014ad	Expert opinion on the DT50 value of boron in soil	Arche – Assessing Risk of Chemicals	No number reported	No	Yes	Rio Tinto Minerals	n.a

3.2 Output tables from exposure assessment tools

3.2.1 Relevant calculations for human and livestock exposure

Exposure
calculations Wolmar

Primary Exposure:

Scenario 1, Handling Model 1 – worst case model formulation	**Cu-HDO**	**Cu-Carb.**	**Boric acid**	**2-EHA**	**2-Amino-ethanol:**	
Concentration of substance in product	3,5	16,3	5	8	42	%
Concentration of application solution	4,17	4,17	4,17	5,21	4,17	%
Indicative exposure value of hands(dermal exposure inside gloves, application solution)	1080	1080	1080	1080	1080	mg/cycle
Indicative exposure value rest of body (application solution)	8570	8570	8570	8570	8570	mg/cycle
Indicative inhalative exposure (application solution)	1,9	1,9	1,9	1,9	1,9	mg/m³
Number of cycles per working day	3	3	3	3	3	-
Penetration through clothing (body)	10	10	10	10	10	%
Dermal absorption rates of a.s (%)	25	5	12	50	50	%
Inhalation rate: (m³/min)	0,0208	0,0208	0,0208	0,0208	0,0208	m³/min
Cycle time (min)	180	180	180	180	180	min/day
Body weight	60	60	60	60	60	kg
Potential dermal hands exposure to substance, Tier II	4,7288	22,0226	6,7554	13,5043	56,7454	mg/day
Systemic dermal hands exposure	0,0197	0,0184	0,0135	0,1125	0,4729	mg/kg bw/day
Potential dermal body exposure to substance, Tier II	37,5237	174,7534	53,6054	107,1593	450,2849	mg/day
Systemic dermal body exposure	0,0156	0,0146	0,0107	0,0893	0,3752	mg/kg bw/day
Inhalative exposure	0,0104	0,0484	0,0149	0,0297	0,1246	mg/day
Systemic inhalative exposure	0,0002	0,0008	0,0002	0,0005	0,0021	mg/kg bw/day
Systemic total exposure (mg/kg bw/day)	**0,0355**	**0,0337**	**0,0245**	**0,2023**	**0,8502**	**mg/kg bw/day**

Scenario 1, Calculations with measured data (following handling model 1) – meta SPC 1:	**Cu-HDO**	**Cu-Carb.**	**Boric acid**	**2-EHA**	**2-Aminoethanol:**	
Concentration of substance in product	2,8	13,04	4	8	29,6	%
Concentration of application solution	5,21	5,21	5,21	5,21	5,21	%
Indicative exposure value of hands(dermal exposure inside gloves, application solution)	108,68	108,68	108,68	108,68	108,68	mg/cycle
Indicative exposure value rest of body (application solution)	8570	8570	8570	8570	8570	mg/cycle
Indicative inhalative exposure (application solution)	1,9	1,9	1,9	1,9	1,9	mg/m³
Number of cycles per working day	3	3	3	3	3	-
Penetration through clothing (body)	10	10	10	10	10	%
Dermal absorption rates of a.s (%)	25	5	12	50	50	%
Inhalation rate: (m³/min)	0,02083	0,02083	0,02083	0,02083	0,02083	m³/min
Cycle time (min)	180	180	180	180	180	min/day
Body weight	60	60	60	60	60	kg
Potential dermal hands exposure to substance, Tier II	0,476	2,215	0,679	1,359	5,028	mg/day
Systemic dermal hands exposure	0,002	0,002	0,001	0,011	0,042	mg/kg bw/day
Potential dermal body exposure to substance, Tier II	37,506	174,670	53,580	107,159	396,489	mg/day
Systemic dermal body exposure	0,0156	0,0146	0,0107	0,0893	0,3304	mg/kg bw/day
Inhalative exposure	0,0104	0,0484	0,0148	0,0297	0,1099	mg/day
Systemic inhalative exposure	0,0002	0,0008	0,0002	0,0005	0,0018	mg/kg bw/day
Systemic total exposure (mg/kg bw/day)	0,0178	0,0172	0,0123	0,1011	0,3741	**mg/kg bw/day**

Scenario 1, Calculations with measured data (following handling model 1) – meta SPC 2:	**Cu-HDO**	**Cu-Carb.**	**Boric acid**	**2-EHA**	**2-Amino-ethanol:**	
Concentration of substance in product	2,8	13,04	4	7,5	33,6	%
Concentration of application solution	5,21	5,21	5,21	5,21	5,21	%
Indicative exposure value of hands(dermal exposure inside gloves, application solution)	108,68	108,68	108,68	108,68	108,68	mg/cycle
Indicative exposure value rest of body (application solution)	8570	8570	8570	8570	8570	mg/cycle
Indicative inhalative exposure (application solution)	1,9	1,9	1,9	1,9	1,9	mg/m³

Number of cycles per working day	3	3	3	3	3	-
Penetration through clothing (body)	10	10	10	10	10	%
Dermal absorption rates of a.s (%)	25	5	12	50	50	%
Inhalation rate: (m^3/min)	0,02083	0,02083	0,02083	0,02083	0,02083	m^3/min
Cycle time (min)	180	180	180	180	180	min/day
Body weight	60	60	60	60	60	kg
Potential dermal hands exposure to substance, Tier II	0,476	2,215	0,679	1,274	5,708	mg/day
Systemic dermal hands exposure	0,002	0,002	0,001	0,011	0,048	mg/kg bw/day
Potential dermal body exposure to substance, Tier II	37,506	174,670	53,580	100,462	450,069	mg/day
Systemic dermal body exposure	0,0156	0,0146	0,0107	0,0837	0,3751	mg/kg bw/day
Inhalative exposure	0,0104	0,0484	0,0148	0,0278	0,1247	mg/day
Systemic inhalative exposure	0,0002	0,0008	0,0002	0,0005	0,0021	mg/kg bw/day
Systemic total exposure (mg/kg bw/day)	0,0178	0,0172	0,0123	0,0948	0,4247	**mg/kg bw/day**

Scenario 1, Calculations with measured data (following handling model 1) – meta SPC 3:	**Cu-HDO**	**Cu-Carb.**	**Boric acid**	**2-EHA**	**2-Aminoethanol:**	
Concentration of substance in product	3,5	16,3	5	0	42	%
Concentration of application solution	4,17	4,17	4,17	4,17	4,17	%
Indicative exposure value of hands(dermal exposure inside gloves, application solution)	108,68	108,68	108,68	108,68	108,68	mg/cycle
Indicative exposure value rest of body (application solution)	8570	8570	8570	8570	8570	mg/cycle
Indicative inhalative exposure (application solution)	1,9	1,9	1,9	1,9	1,9	mg/m^3
Number of cycles per working day	3	3	3	3	3	-
Penetration through clothing (body)	10	10	10	10	10	%
Dermal absorption rates of a.s (%)	25	5	12	50	50	%
Inhalation rate: (m^3/min)	0,02083	0,02083	0,02083	0,02083	0,02083	m^3/min
Cycle time (min)	180	180	180	180	180	min/day
Body weight	60	60	60	60	60	kg
Potential dermal hands exposure to substance, Tier II	0,476	2,216	0,680	0,000	5,710	mg/day
Systemic dermal hands exposure	0,002	0,002	0,001	0,000	0,048	mg/kg bw/day
Potential dermal body exposure to substance, Tier II	37,524	174,753	53,605	0,000	450,285	mg/day
Systemic dermal body exposure	0,0156	0,0146	0,0107	0,0000	0,3752	mg/kg

						bw/day
Inhalative exposure	0,0104	0,0484	0,0149	0,0000	0,1248	mg/day
Systemic inhalative exposure	0,0002	0,0008	0,0002	0,0000	0,0021	mg/kg bw/day
Systemic total exposure (mg/kg bw/day)	0,0178	0,0172	0,0123	0,0000	0,4249	**mg/kg bw/day**

Secondary Exposure:

	Cu-HDO	**Cu-Carb.**	**Boric acid**	**2-EHA**	**2-Aminoethanol:**	
Concentration of substance in product	2,8	13,04	4	8	33,6	%
Product Retention	31,25	31,25	31,25	31,25	31,25	kg/m³
Scenario 2						
SANDING, INHALATION						
Substance applied to wood UC 4 special	875	4075	1250	2500	10500	g/m3
Substance applied to wood UC4 normal	630	2934	900	1800	7560	g/m3
Volume of post	0,004	0,004	0,004	0,004	0,004	m³
Substance applied to wood UC 4 special	3,5	16,3	5	10	42	g
Substance applied to wood UC 4 normal	2,52	11,736	3,6	7,2	30,24	g
Volume of outer 1 cm layer of post	0,003008	0,003008	0,003008	0,003008	0,003008	m³
all substance in outer 1 cm layer of post UC 4 special	1,1635638	5,418883	1,662234	3,32446809	13,962766	mg/cm³
all substance in outer 1 cm layer of post UC 4 normal	0,837765957	3,901595745	1,196808511	2,393617021	10,05319149	mg/cm³
Exposure Time	6	6	6	6	6	h/day
Inhalation rate	1,25	1,25	1,25	1,25	1,25	m³/h
Dust concentration in air	5	5	5	5	5	mg/m³
Inhaled wood dust	37,5	37,5	37,5	37,5	37,5	mg/day
Wood density	400	400	400	400	400	mg/cm³
Inhaled wood dust	0,09375	0,09375	0,09375	0,09375	0,09375	cm³/day
Inhalative potential exposure to substance UC 4 special	0,1090841	0,5080203	0,155834	0,31166888	1,30900931	mg/day
Inhalative potential exposure to	0,078540	0,365774	0,112200	0,224401	0,942486	mg/day

substance UC 4 normal	559	601	798	596	702	
Inhalative absorption	100	100	100	100	100	%
Body weight of adult	60	60	60	60	60	kg
Inhalative systemic exposure, Tier 1 UC 4 special	**0,0018**	**0,0085**	**0,0026**	**0,0052**	**0,0218**	**mg/kg bw/day**
Inhalative systemic exposure, Tier 1 UC4 normal	**0,0013**	**0,0061**	**0,0019**	**0,0037**	**0,0157**	**mg/kg bw/day**
dermal exposure						
Product Retention Szenario 4	22,5	22,5	22,5	22,5	22,5	Product Retention Szenario 4
Product Retention Szenario 2	31,25	31,25	31,25	31,25	31,25	Product Retention Szenario 2
max. concentration of a.s. in b.p.	2,8	13,04	4	8	33,6	max. concentration of a.s. in b.p.
amount of a.s. per m³ wood	875	4075	1250	2500	10500	amount of a.s. per m³ wood
amount of a.s. in the outer 1cm layer, all on surface, UC 4 special	0,875	4,075	1,25	2,5	10,5	amount of a.s. in the outer 1cm layer, all on surface, UC 4 special
amount of a.s. in the outer 1cm layer, all on surface, UC 4 normal	0,63	2,934	0,9	1,8	7,56	amount of a.s. in the outer 1cm layer, all on surface,

						UC 4 normal
SANDING, DERMAL EXPOSURE						**SANDING, DERMAL EXPOSURE**
Hand surface area	410	410	410	410	410	Hand surface area
Contaminated hand surface area						
Dermal absorption [%]	25	5	12	50	50	Dermal absorption [%]
Body weight of adult	60	60	60	60	60	Body weight of adult
Frequence of use	1	1	1	1	1	Frequence of use
Dermal systemic exposure, Tier 1 UC 4 special	**0,5979**	**0,5569**	**0,4100**	**3,4167**	**14,3500**	**Dermal systemic exposure, Tier 1**
Transfer factor (dislodgeable residues)	**2**	**2**	**2**	**2**	**2**	**%**
Dermal systemic exposure, Tier 2 UC 4 special	**0,0120**	**0,0111**	**0,0082**	**0,0683**	**0,2870**	**mg/kg bw/day**
Total systemic exposure, Tier 1 UC 4 special	**0,5997**	**0,5654**	**0,4126**	**3,4219**	**14,3718**	**mg/kg bw/day**
Total systemic exposure, Tier 2 UC 4 special	**0,0138**	**0,0196**	**0,0108**	**0,0735**	**0,3088**	**mg/kg bw/day**
Dermal systemic exposure, Tier 1 UC 4 normal	**0,4305**	**0,4010**	**0,952**	**2,4600**	**10,3320**	**mg/kg bw/day**
Dermal systemic exposure, Tier 2 UC 4 normal	**0,0086**	**0,0080**	**0,0059**	**0,0492**	**0,2066**	**mg/kg bw/day**

Total systemic exposure, Tier 1 UC4 normal	**0,4318**	**0,4071**	**0,2971**	**2,4637**	**n.r.**	**mg/kg bw/day**
Total systemic exposure, Tier 2 UC 4 normal	**0,0099**	**0,0141**	**0,0078**	**0,0529**	**n.nr.**	**mg/kg bw/day**

	Cu-HDO	**Cu-Carb.**	**Boric acid**	**2-EHA**	
Concentration of substance in product	2,8	13,04	4	8	%
Product Retention	22,5	22,5	22,5	22,5	kg/m³
Scenario 3					
Mouthing of treated wood chips					
Size of wood chip (4x4x1cm)	16	16	16	16	cm³
Substance applied to wood	630	2934	900	1800	g/m³
Substance applied to wood	0,63	2,934	0,9	1,8	mg/cm³
Substance contained in wood chip	10,08	46,944	14,4	28,8	mg
Extraction of active substance by chewing	10	10	10	10	%
Body weight toddler	10	10	10	10	kg
Frequency	1	1	1	1	1/day
Oral systemic exposure, Tier 1	**0,1008**	**0,4694**	**0,1440**	**0,2880**	**mg/kg bw/day**
Water solubility of substance	6,1	1,237	---	---	mg/L
Salvia produced by toddler per day	0,2	0,2	---	---	L/day
Duration of chewing	5	5	---	---	h
Oral absorption	100	36	---	---	%
Body weight toddler	10	10	---	---	kg
Oral systemic exposure, Tier 2	**0,0254**	**0,0019**	**---**	**---**	**mg/kg bw/day**

Playing on treated wood structures

Hand surface area	115,2	115,2	115,2	115,2		cm²
Contaminated hand surface area	40	40	40	40		%
Oral absorption [%]	100	36	100	100		%
Body weight of infant	10	10	10	10		kg
Frequence of use	1	1	1	1		1/day
Oral systemic exposure, Tier 1	2,9030	4,8672	4,1472	8,2944		**mg/kg bw/day**
Transfer factor (dislodgeable residues)	2	2	2	2		%
Oral bzw. Dermal (2-MEA) systemic exposure, Tier 2	**0,0581**	**0,0973**	**0,0829**	**0,1659**		**mg/kg bw/day**

Tier 3	Cu-HDO	CuCarb.		
measured concentration	0,0000375	0,000794		mg/cm²
Hand surface area	115,2	115,2		cm²
contamination	40	40		%
oral absorption	100	36		%
frequency	1	1		1/day
number of contacts	10	10		
body weight	10	10		kg
Oral bzw. Dermal (2-MEA) systemic exposure, Tier 3	**0,0017**	**0,0132**		**mg/kg bw/day**

Scenario 5: Inhalation of volatilised residues:

Inhalation exposure		
Tier 1	**2-EHA**	**2-AE**
Vapour pressure (Pa)	4	50
Molecular weight (g/mol)	144,2	61,08
Gas constant (J/K mol)	8,31451	8,31451
Temperature (°K)	293	293
SVC (g/m³)	0,2367669	1,25361665
SVC (mg/m³)	236,76689	1253,61665
Inhalative absorption (%)	100	100
long-term inhalation rate (m³/day)	8	8
Bodyweight (toddler)	10	10
Inhalation exposure toddler (mg/kg bw/day)	189,4135	1002,8933

Tier 3		
Measured concentration in air (mg/m³)	0,037	0,018
long-term inhalation rate (m³/day) adult	16	16
long-term inhalation rate (m³/day)	8	8
Bodyweight (adult)	60	60
Bodyweight (toddler)	10	10
Inhalation exposure adult (mg/kg bw/day)	0,0099	0,0048
Inhalation exposure toddler (mg/kg bw/day)	0,0296	0,0144

Scenario 6 Livestock Exposure:

Oral Exposure Tier 1	**Cu-HDO**	**Cu-Carbonate**	**Boric acid**	**2-EHA**
Concentration of substance in product (%)	2,8	13,04	4	8
Maximum absorption of biocidal product into treated wood in hte outer 1 cm layer (L/m³)	50	50	50	50
Treatment solution UC 4 (protection against termites) (%)	3,75	3,75	3,75	3,75
Amount of active substance in the outer 1 cm layer of wood (g/m3)	52,5	244,5	75	150
Horse wood consumption (m³/day)	0,000019	1,9E-05	1,9E-05	0,000019
Extraction by chewing (%)	100	100	100	100
Oral absorption (%)	100	100	100	100
Tongue surface area calf (m2)	0,008	0,008	0,008	0,008
Licks per day (1/day)	10	10	10	10
Thickness of treated wood of which a. s./SoC is extracted by licking (m)	0,01	0,01	0,01	0,01
Body weight horse (kg)	400	400	400	400
Body weight lactating goat (kg)	70	70	70	70
Body weight slaughter goat (kg)	13	13	13	13
Body weight fattening pig (kg)	100	100	100	100
Body weight breeding pig (kg)	260	260	260	260
Body weight beef cattle (kg)	500	500	500	500
Body weight dairy cattle (kg)	650	650	650	650
Body weight calf	200	200	200	200
Oral systemic exposure horse, Tier 1 (mg/kg bw/day)	0,0025	0,0116	0,0036	0,0071
Oral systemic exposure lactating goat, Tier 1 (mg/kg bw/day)	0,0143	0,0664	0,0204	0,0407
Oral systemic exposure slaughter goat, Tier 1 (mg/kg bw/day)	0,0767	0,3573	0,1096	0,2192
Oral systemic exposure fattening pig, Tier 1 (mg/kg bw/day)				
Oral systemic exposure breeding pig, Tier 1 (mg/kg bw/day)	no stereotypic wood chewing - not calculated			
Oral systemic exposure beef cattle, Tier 1 (mg/kg bw/day)				
Oral systemic exposure dairy cattle, Tier 1 (mg/kg bw/day)				
Oral exposure calf Tier 1 (mg/kg bw/day) - LICKING	0,2100	0,9780	0,3000	0,6000

Oral exposure Tier 2

Extraction by chewing (%)	100	100	100	100
Oral absorption (%)	100	25	100	100
Oral systemic exposure horse, Tier 2 (mg/kg bw/day)	0,0025	0,0029	0,0036	0,0071
Oral systemic exposure lactating goat, Tier 2 (mg/kg bw/day)	0,0143	0,0166	0,0204	0,0407
Oral systemic exposure slaughter goat, Tier 2 (mg/kg bw/day)	0,0767	0,0893	0,1096	0,2192
Oral exposure calf Tier 2 (mg/kg bw/day) - LICKING	0,2100	0,2445	0,3000	0,6000

Dermal exposure Tier 1

Thickness of surface layer of the wooden wall representing the amount of substance per square meter (mm)	0,05	0,05	0,05	0,05	
Amount of a.s. / SoC per square meter (mg/m²)	2,625	12,225	3,75	7,5	
Body surface area in contact with surface, horse (m²)	1,62	1,62	1,62	1,62	
Body surface area in contact with surface, lactating goat (m²)	0,45	0,45	0,45	0,45	
Body surface area in contact with surface, slaughter goat (m²)	0,15	0,15	0,15	0,15	
Body surface area in contact with surface, fattening pig (m²)	0,45	0,45	0,45	0,45	
Body surface area in contact with surface, breeding pig (m²)	0,84	0,84	0,84	0,84	
Body surface area in contact with surface, beef cattle (m²)	1,44	1,44	1,44	1,44	
Body surface area in contact with surface, airy cattle (m²)	1,68	1,68	1,68	1,68	
Body surface area in contact with surface, calf (m²)	0,87	0,87	0,87	0,87	
Transfer coefficient from a treated surface (%)	100	100	100	100	
Dermal exposure horse (mg/kg bw/day)	0,0106	0,0495	0,0152	0,0304	
Dermal exposure lactating goat (mg/kg bw/day)	0,0169	0,0786	0,0241	0,0482	
Dermal exposure slaughter goat (mg/kg bw/day)	0,0303	0,1411	0,0433	0,0865	

Dermal exposure fattening pig (mg/kg bw/day)	0,0118	0,0550	0,0169	0,0338	
Dermal exposure breeding pig (mg/kg bw/day)	0,0085	0,0395	0,0121	0,0242	
Dermal exposure beef cattle (mg/kg bw/day)	0,0076	0,0352	0,0108	0,0216	
Dermal exposure dairy cattle (mg/kg bw/day)	0,0068	0,0316	0,0097	0,0194	
Dermal exposure calf (mg/kg bw/day)	0,0114	0,0532	0,0163	0,0326	

Inhalation exposure Tier 1					
Vapour pressure (Pa)	0,0001	0,00001	0,00001	4	
Molecular weight (g/mol)	349,9	221,2	61,833	144,2	
Gas constant (J/K mol)	8,31451	8,31451	8,31451	8,31451	
Temperature (°K)	293	293	293	293	
SVC (g/m³)	1,44E-05	9,1E-07	2,5E-07	0,236767	
SVC (mg/m³)	0,014363	0,00091	0,00025	236,7669	
Inhalative absorption (%)	100	100	100	100	
Alveolar ventilation rate horse (m³/day)	43	43	43	43	
Alveolar ventilation rate lactating goat(m³/day)	11	11	11	11	
Alveolar ventilation rate slaughter goat (m³/day)	3	3	3	3	
Alveolar ventilation rate fattening pig (m³/day)	14	14	14	14	
Alveolar ventilation rate breeding pig(m³/day)	30	30	30	30	
Alveolar ventilation rate beef cattle (m³/day)	51	51	51	51	
Alveolar ventilation rate dairy cattle (m³/day)	62	62	62	62	
Alveolar ventilation rate calf (m³/day)	25	25	25	25	
Inhalation exposure horse (mg/kg bw/day)	0,0015	0,0001	0,0000	25,4524	
Inhalation exposure lactating goat (mg/kg bw/day)	0,0023	0,0001	0,0000	37,2062	
Inhalation exposure slaughter goat (mg/kg bw/day)	0,0033	0,0002	0,0001	54,6385	
Inhalation exposure fattening pig (mg/kg bw/day)	0,0020	0,0001	0,0000	33,1474	
Inhalation exposure breeding pig (mg/kg bw/day)	0,0017	0,0001	0,0000	27,3193	
Inhalation exposure beef cattle (mg/kg bw/day)	0,0015	0,0001	0,0000	24,1502	
Inhalation exposure dairy cattle (mg/kg bw/day)	0,0014	0,0001	0,0000	22,5839	
Inhalation exposure calf (mg/kg bw/day)	0,0018	0,0001	0,0000	29,5959	

Inhalation exposure Tier 2					
Reduction by ventilation (%)	100	100	100	100	
Inhalation exposure horse (mg/kg bw/day)	0,0015	0,0001	0,0000	25,4524	
Inhalation exposure lactating goat (mg/kg bw/day)	0,0023	0,0001	0,0000	37,2062	
Inhalation exposure slaughter goat (mg/kg bw/day)	0,0033	0,0002	0,0001	54,6385	
Inhalation exposure fattening pig (mg/kg bw/day)	0,0020	0,0001	0,0000	33,1474	
Inhalation exposure breeding pig (mg/kg bw/day)	0,0017	0,0001	0,0000	27,3193	
Inhalation exposure beef cattle (mg/kg bw/day)	0,0015	0,0001	0,0000	24,1502	
Inhalation exposure dairy cattle (mg/kg bw/day)	0,0014	0,0001	0,0000	22,5839	
Inhalation exposure calf (mg/kg bw/day)	0,0018	0,0001	0,0000	29,5959	
Inhalation exposure Tier 3					
Measured concentration in air (mg/m³)				0,037	
Alveolar ventilation rate horse (m³/day)				43	
Alveolar ventilation rate lactating goat(m³/day)				11	
Alveolar ventilation rate slaughter goat(m³/day)				3	
Alveolar ventilation rate fattening pig (m³/day)				14	
Alveolar ventilation rate breeding pig(m³/day)				30	
Alveolar ventilation rate beef cattle (m³/day)				51	
Alveolar ventilation rate dairy cattle (m³/day)				62	
Alveolar ventilation rate calf (m³/day)				25	
Inhalation exposure horse (mg/kg bw/day)				0,0040	
Inhalation exposure lactating goat (mg/kg bw/day)				0,0058	
Inhalation exposure slaughter goat (mg/kg bw/day)				0,0085	
Inhalation exposure fattening pig (mg/kg bw/day)				0,0052	
Inhalation exposure breeding pig (mg/kg bw/day)				0,0043	
Inhalation exposure beef cattle (mg/kg bw/day)				0,0038	
Inhalation exposure dairy cattle (mg/kg bw/day)				0,0035	

Inhalation exposure calf (mg/kg bw/day)	0,0046

Tier 1 total exposure

Total Exposure = Oral exposure 1 + Dermal exposure + Inhalative Exposure 1

horse	0,0147	0,0612	0,0188	25,4899	
lactating goat	0,0334	0,1451	0,0445	37,2952	
slaughter goat	0,1103	0,4986	0,1529	54,9443	
fattening pig	0,0138	0,0551	0,0169	33,1811	
breeding pig	0,0101	0,0396	0,0121	27,3435	
beef cattle	0,0090	0,0353	0,0108	24,1718	
dairy cattle	0,0082	0,0317	0,0097	22,6033	
calf	0,2232	1,0313	0,3163	30,2285	

Tier 2 total exposure

Total Exposure = Oral exposure 2 + Dermal exposure + Inhalative Exposure 2

horse	0,0147	0,0525	0,0188	25,4899	
lactating goat	0,0334	0,0953	0,0445	37,2952	
slaughter goat	0,1103	0,2306	0,1529	54,9443	
fattening pig	0,0138	0,0551	0,0169	33,1811	
breeding pig	0,0101	0,0396	0,0121	27,3435	
beef cattle	0,0090	0,0353	0,0108	24,1718	
dairy cattle	0,0082	0,0317	0,0097	22,6033	
calf	0,2232	0,2978	0,3163	30,2285	

Tier 3 total exposure

Total Exposure = Oral exposure 2 + Dermal exposure + Inhalative Exposure 3

horse	0,0147	0,0525	0,0188	0,0415	
lactating goat	0,0334	0,0953	0,0445	0,0947	
slaughter goat	0,1103	0,2306	0,1529	0,3143	
fattening pig	0,0138	0,0551	0,0169	0,0389	
breeding pig	0,0101	0,0396	0,0121	0,0285	
beef cattle	0,0090	0,0353	0,0108	0,0254	
dairy cattle	0,0082	0,0317	0,0097	0,0229	
calf	0,2232	0,2978	0,3163	0,6373	

Trigger value of mg/kg bw	0,004	0,004	0,004	0,004

3.2.2 Relevant environmental exposure calculations

3.2.2.1 Exposure estimate sheets from ECHA

3.2.2.1.1 Assessed substance: Copper

Scenario [1]: Emission estimation for industrial preventive processes - Vacuum pressure and double vacuum (ESD § 4.1.3, p.51)

A) Emission scenario for vacuum pressure and double vacuum - product application (ESD Table 4.8, p.57)

Input						
Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*
Volume of wood treated per day	**Vacuum - pressure**	$VOLUME_{wood\text{-}treated}$	**30**	$m^3.d^{-1}$	D/P	ESD Table 4.8
Quantity of a substance applied per m^3 of wood		Q_{ai}	2,5	$kg.m^{-3}$	S	
Fraction released to facility drain	**Water solubility 1 to <50 mg/l**	$F_{facilitydrain}$	**0,003**	[-]	P	ESD Table 4.8
Fraction released to air	**Vapour pressure at 20 °C: <0.005 Pa**	F_{air}	**0,001**	[-]	P	EUSES 2.1 background document, Table III-60 (page III-76)

Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*
Local emission rate to air - quantity locally emitted per day to air	$Elocal_{air}$	**7,50E-02**	$kg.d^{-1}$	O	$\mathbf{Elocal_{air}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{air}$
Local emission rate to facility drain - quantity of a substance locally emitted per day to the facility drain	$Elocal_{facilitydrain}$	**2,25E-01**	$kg.d^{-1}$	O	$\mathbf{Elocal_{facilitydrain}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{facilitydrain}$

1) S: data set; D: default; O: output; P: pick list

B) Emission scenario for vacuum pressure and double vacuum - storage of treated wood prior to shipping (including removal processes in the receiving environmental compartment - soil) (ESD Table 4.9, p.58, Table 3.4, p.27)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*

Effective surface area of treated wood, considered to be exposed to rain, per 1 m^2 storage area (i.e. soil)	$AREA_{wood-expo}$	11	$m^2.m^{-2}$	D	
Surface area of the storage place **Vacuum-pressure**	$AREA_{storage}$	**525**	m^2	D/P	ESD Table 4.9
Duration of the initial assessment period	TIME1	30	d	D	
Duration of a longer assessment period	TIME2	7300	d	D	Value agreed at the WG IV 2015 (Tolyfluanid discussion) (20 years)
Average daily flux i.e. the average quantity of a substance that is daily leached out of 1 m^2 of treated wood during 14 day storage period	$FLUX_{storage,vac-pres}$	0,00000339	$kg.m^{-2}.d^{-1}$	S	
Bulk density of wet soil	RHO_{soil}	1700	$kg.m^{-3}$	D	
Soil depth	$DEPTH_{soil}$	0,5	m	D	
Fraction of rainwater running off the storage site	F_{runoff}	0,5	[-]	D	
Flow rate of surface water (creek/river)	$FLOW_{surfacewater}$	25920	$m^3.d^{-1}$	D	This value corresponds to 0.3 $m^3.s^{-1}$ which is the default value for a small creek.
Intermediate calculations					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Volume of wet soil	V_{soil}	**262,5**	m^3	O	$\mathbf{V_{soil}} = AREA_{storage} * DEPTH_{soil}$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over the initial assessment period	$Q_{leach,storage,TIME1}$	**5,87E-01**	kg	O	$\mathbf{Q_{leach,storage,TIME1}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME1$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over a longer assessment period	$Q_{leach,storage,TIME2}$	**1,43E+02**	kg	O	$\mathbf{Q_{leach,storage,TIME2}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME2$
Average daily release onto soil of substance due to leaching over the storage duration per m^2 of storage area	$Elocal_{soil}$	**3,72E-05**	$kg.m^{-2}.d^{-1}$	O	$\mathbf{Elocal_{soil}} = FLUX_{storage} * AREA_{wood-expo}$
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes in the soil					
Local concentration in soil at storage place at the end of the initial assessment period	$Clocal_{soil,time1}$	**6,57E-07**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = Q_{leach,storage,TIME1} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$

Local concentration in soil at storage place at the end of a longer assessment period	$Clocal_{soil,time2}$	**1,60E-04**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = Q_{leach,storage,TIME2} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$
Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over the initial assessment period	$Elocal_{surfacewater,TIME1}$	**9,78E-03**	$kg.d^{-1}$	O	$\mathbf{Elocal_{surfacewater,TIME1}} = Q_{leach,storage,TIME1} * F_{runoff} / TIME1$
Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over a longer assessment period	$Elocal_{surfacewater,TIME2}$	**9,78E-03**	$kg.d^{-1}$	O	$\mathbf{Elocal_{surfacewater,TIME2}} = Q_{leach,storage,TIME2} * F_{runoff} / TIME2$
Local concentration in surface water over the initial assessment period	$Clocal_{surfacewater,TIME1}$	**3,77E-04**	$mg.L^{-1}$	O	$\mathbf{Clocal_{surfacewater,TIME1}} = Elocal_{surfacewater,TIME1} * 1000 / FLOW_{surfacewater}$
Local concentration in surface water over a longer assessment period	$Clocal_{surfacewater,TIME2}$	**3,77E-04**	$mg.L^{-1}$	O	$\mathbf{Clocal_{surfacewater,TIME2}} = Elocal_{surfacewater,TIME2} * 1000 / FLOW_{surfacewater}$

1) S: data set; D: default; O: output; P: pick list

Scenario [2]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC3 - Wood not covered, not in contact with ground, exposed to weather or subject to frequent wetting (ESD § 4.3.3, p.68)

A) House scenario including removal processes (ESD Table 4.15, p.70, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{house}$	125	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	22,1	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	228,29	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	228,82	$mg.m^{-2}$	S	

Soil volume (wet)	V_{soil}	13	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,76E+03**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{house} * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,85E+04**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,86E+04**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**1,25E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**1,29E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**1,29E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**9,21E+01**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME1}} = AREA_{house} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**7,82E+01**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**3,92E+00**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

B) Noise barrier scenario including removal processes (ESD Table 4.17, p.74, Table 3.5, p.28 and Table 3.6, p.29)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{noise-barrier}$	3000	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	

Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^{*}_{leach,TIME1}$	22,1	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^{*}_{leach,TIME2}$	228,29	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^{*}_{leach,TIME3}$	228,82	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	250	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Fraction released to soil	F_{soil}	0,3	[-]	D	
Fraction released to the STP	F_{STP}	0,7	[-]	D	
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*
Without considering removal processes					
Emissions to soil					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**1,99E+04**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{noise-barrier} * F_{Soil} * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,05E+05**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{noise-barrier} * F_{Soil} * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,06E+05**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{noise-barrier} * F_{Soil} * Q^{*}_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**4,68E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**4,83E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**4,85E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$

Emissions to STP					
Local daily emission rate to the STP following leaching from treated wood during the initial assessment period	$E_{STP,TIME1}$	**1,547E+03**	mg.d^{-1}	O	$\mathbf{E_{STP,TIME1}} = AREA_{noise\text{-}barrier} * F_{STP} * Q^*_{leach,TIME1}/TIME1$
Local daily emission rate to the STP following leaching from treated wood during the intermediate assessment period	$E_{STP,TIME2}$	**1,313E+03**	mg.d^{-1}	O	$\mathbf{E_{STP,TIME2}} = AREA_{noise\text{-}barrier} * F_{STP} * Q^*_{leach,TIME2}/TIME2$
Local daily emission rate to the STP following leaching from treated wood during the longer assessment period	$E_{STP,TIME3}$	**6,58E+01**	mg.d^{-1}	O	$\mathbf{E_{STP,TIME3}} = AREA_{noise\text{-}barrier} * F_{STP} * Q^*_{leach,TIME3}/TIME3$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**6,63E+02**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME1}} = AREA_{noise\text{-}barrier} * F_{soil} * Q^*_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**5,63E+02**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME2}} = AREA_{noise\text{-}barrier} * F_{soil} * Q^*_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**2,82E+01**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME3}} = AREA_{noise\text{-}barrier} * F_{soil} * Q^*_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

C) Bridge over pond scenario including removal processes (ESD Table 4.18, p.76 and Table 3.8, p.31/32)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{bridge}$	10	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	22,1	mg.m^{-2}	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	228,29	mg.m^{-2}	S	

Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^{*}_{leach,TIME3}$	228,82	$mg.m^{-2}$	S	
Water volume under bridge	V_{water}	1000	m^3	D	
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,21E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,28E+03**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,29E+03**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**2,21E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**2,28E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**2,29E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
For wood which was treated *in situ* emissions to water can occur during the application itself and from leaching from treated wood in service. The total local concentration in water is calculated below.					
TOTAL concentration in local water at the end of the initial assessment period	$Clocal_{water,total,TIME1}$	**2,21E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME1}} = Clocal_{water,brush} + Clocal_{water,leach,TIME1}$
TOTAL concentration in local water at the end of the intermediate assessment period	$Clocal_{water,total,TIME2}$	**2,28E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME2}} = Clocal_{water,brush} + Clocal_{water,leach,TIME2}$
TOTAL concentration in local water at the end of a longer assessment period	$Clocal_{water,total,TIME3}$	**2,29E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME3}} = Clocal_{water,brush} + Clocal_{water,leach,TIME3}$
Considering removal processes in the water body (Table 3.8, p.31/32)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**7,37E+00**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**6,25E+00**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**3,13E-01**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

Scenario [3]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC4a - Wood in contact with the ground (ESD § 4.3.4, p.76)

A) Transmission pole (ESD Table 4.19 p.78, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/ P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area above soil	$AREA_{pole,above}$	5,5	m^2	D	
Leachable wood area below soil	$AREA_{pole,below}$	1,6	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	176,0717115	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	969,165488	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	1018,47454	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m2 of treated wood over an increased assessment period	$Q^*_{leach,TIME3\ special\ application}$	1024,7	$mg.m^{-2}$		
Soil volume (wet)	V_{soil}	2,97	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/ P* [1]	*References / Calculation formulas / Explanations*

Without considering removal processes in the receiving environmental compartments

Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**1,25E+03**	mg	O	**$Q_{leach,TIME1}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**6,88E+03**	mg	O	**$Q_{leach,TIME2}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**7,23E+03**	mg	O	**$Q_{leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3}$
Cumulative quantity of substance, leached over an increased assessment period	$Q_{leach,TIME3\ neache\ application}$	**7,28E+03**	mg	O	$Q_{leach,TIME3} = (AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3\ special\ application}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**2,48E-01**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME1}$** = $Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**1,36E+00**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME2}$** = $Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**1,43E+00**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME3}$** = $Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of an increased assessment period	$Clocal_{soil,leach,TIME3\ special\ application}$	**1,44E+00**	$mg.kg_{wwt}^{-1}$	O	$Clocal_{soil,leach,TIME3} = Q_{leach,TIME3\ special\ application} / (V_{soil} * RHO_{soil})$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**4,17E+01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME1}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**1,89E+01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME2}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**9,91E-01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3} / TIME3$
Average daily emission of substance due to leaching over an increased duration	$E_{soil,leach,TIME3\ special\ application}$	**9,91E-01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

Scenario [4]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC4b - Wood in contact with fresh water (ESD § 4.3.5, p.80)

A) Jetty in a lake (ESD Table 4.21 p.82 and Table 3.8, p.31/32)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P[1]*	*References / Calculation formulas / Explanations*
Leachable wood area planks	$AREA_{planks}$	16,2	m^2	D	
Leachable wood area poles	$AREA_{poles}$	10	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^{*}_{leach,TIME1}$	142,7203053	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^{*}_{leach,TIME2}$	422,8846565	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^{*}_{leach,TIME3}$	499,6037405	$mg.m^{-2}$	S	
Water volume	V_{water}	1,60E+04	m^3	D	

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P[1]*	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**3,74E+03**	mg	O	$\mathbf{Q_{leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,11E+04**	mg	O	$\mathbf{Q_{leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**1,31E+04**	mg	O	$\mathbf{Q_{leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**2,34E-04**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$

Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**6,92E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**8,18E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.31/32)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**1,25E+02**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**3,04E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**1,79E+00**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

B) Sheet piling in a waterway (ESD Table 4.22 p.83 and Table 3.8, p.33/34)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P 1*	*References / Calculation formulas / Explanations*
Wood area per m waterway length	$AREA_{poles}$	4,71	m^{2}	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^{2} of treated wood over the initial assessment period	$Q^{*}_{leach,TIME1}$	314,7	mg.m^{-2}	S	
Cumulative quantity of substance leached out of 1 m^{2} of treated wood over the intermediate assessment period	$Q^{*}_{leach,TIME2}$	496,1	mg.m^{-2}	S	
Cumulative quantity of substance leached out of 1 m^{2} of treated wood over a longer assessment period	$Q^{*}_{leach,TIME3}$	649,8	mg.m^{-2}	S	

Water volume per m waterway length	V_{water}	7,5	m^3	D	
Residence time of water in waterway	TAU_{wway}	20	d	D	
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**9,88E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{poles} * Q^{*}_{leach,TIME1}/TIME1 * TAU_{wway}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,28E+02**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{poles} * Q^{*}_{leach,TIME2}/TIME2 * TAU_{wway}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**8,39E+00**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{poles} * Q^{*}_{leach,TIME3}/TIME3 * TAU_{wway}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**1,32E-01**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**1,71E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**1,12E-03**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.33/34)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**4,94E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{poles} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**6,40E+00**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{poles} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**4,19E-01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{poles} * Q^{*}_{leach,TIME3} / TIME3$

1) S: data set; D: default; O: output; P: pick list

3.2.2.1.2 *Assessed substance: Cu-HDO*

Scenario [1]: Emission estimation for industrial preventive processes - Vacuum pressure and double vacuum (ESD § 4.1.3, p.51)

A) Emission scenario for vacuum pressure and double vacuum - product application (ESD Table 4.8, p.57)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Volume of wood treated per day	**Vacuum-pressure**	$VOLUME_{wood\text{-}treated}$	**30**	$m^3.d^{-1}$	D/P	ESD Table 4.8
Quantity of a substance applied per m^3 of wood		Q_{ai}	1,09375	$kg.m^{-3}$	S	
Fraction released to facility drain	**Water solubilty 1 to <50 mg/l**	$F_{facilitydrain}$	**0,003**	[-]	P	ESD Table 4.8
Fraction released to air	**Vapour pressure at 20 °C: <0.005 Pa**	F_{air}	**0,001**	[-]	P	EUSES 2.1 background document, Table III-60 (page III-76)

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Local emission rate to air - quantity locally emitted per day to air	$Elocal_{air}$	**3,28E-02**	$kg.d^{-1}$	O	$\mathbf{Elocal_{air}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{air}$
Local emission rate to facility drain - quantity of a substance locally emitted per day to the facility drain	$Elocal_{facilitydrain}$	**9,84E-02**	$kg.d^{-1}$	O	$\mathbf{Elocal_{facilitydrain}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{facilitydrain}$

1) S: data set; D: default; O: output; P: pick list

B) Emission scenario for vacuum pressure and double vacuum - storage of treated wood prior to shipping (including removal processes in the receiving environmental compartment - soil) (ESD Table 4.9, p.58, Table 3.4, p.27)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Effective surface area of treated wood, considered to be exposed to rain, per 1 m^2 storage area (i.e. soil)		$AREA_{wood\text{-}expo}$	11	$m^2.m^{-2}$	D	
Surface area of the storage place	**Vacuum-pressure**	$AREA_{storage}$	**525**	m^2	D/P	ESD Table 4.9
Duration of the initial assessment period		TIME1	30	d	D	

Duration of a longer assessment period	TIME2	7300	d	D	Value agreed at the WG IV 2015 (Tolyfluanid discussion) (20 years)
Average daily flux i.e. the average quantity of a substance that is daily leached out of 1 m^2 of treated wood during 14 day storage period	$FLUX_{storage,vac-pres}$	0,00000040	$kg.m^{-2}.d^{-1}$	S	
Bulk density of wet soil	RHO_{soil}	1700	$kg.m^{-3}$	D	
Soil depth	$DEPTH_{soil}$	0,5	m	D	
Fraction of rainwater running off the storage site	F_{runoff}	0,5	[-]	D	
Flow rate of surface water (creek/river)	$FLOW_{surfacewater}$	25920	$m^3.d^{-1}$	D	This value corresponds to 0.3 $m^3.s^{-1}$ which is the default value for a small creek.
Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.4, p.27)					
First order rate constant for removal from soil	k	0,12	d^{-1}	S	
Soil-water partitioning coefficient	$K_{soil-water}$	908,52	$m^3.m^{-3}$	S	
Intermediate calculations					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Volume of wet soil	V_{soil}	**262,5**	m^3	O	$\mathbf{V_{soil}} = AREA_{storage} * DEPTH_{soil}$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over the initial assessment period	$Q_{leach,storage,TIME1}$	**6,90E-02**	kg	O	$\mathbf{Q_{leach,storage,TIME1}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME1$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over a longer assessment period	$Q_{leach,storage,TIME2}$	**1,68E+01**	kg	O	$\mathbf{Q_{leach,storage,TIME2}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME2$
Average daily release onto soil of substance due to leaching over the storage duration per m^2 of storage area	$Elocal_{soil}$	**4,38E-06**	$kg.m^{-2}.d^{-1}$	O	$\mathbf{Elocal_{soil}} = FLUX_{storage} * AREA_{wood-expo}$
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes in the soil					
Local concentration in soil at storage place at the end of the initial assessment period	$Clocal_{soil,time1}$	**7,73E-08**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = Q_{leach,storage,TIME1} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$
Local concentration in soil at storage place at the end of a longer assessment period	$Clocal_{soil,time2}$	**1,88E-05**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = Q_{leach,storage,TIME2} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$

Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over the initial assessment period	$Elocal_{surfacewater,TIME1}$	**1,149E-03**	$kg.d^{-1}$	O	**$Elocal_{surfacewater,TIME1}$** = $Q_{leach,storage,TIME1}$ * F_{runoff} / TIME1
Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over a longer assessment period	$Elocal_{surfacewater,TIME2}$	**1,149E-03**	$kg.d^{-1}$	O	**$Elocal_{surfacewater,TIME2}$** = $Q_{leach,storage,TIME2}$ * F_{runoff} / TIME2
Local concentration in surface water over the initial assessment period	$Clocal_{surfacewater,TIME1}$	**4,43E-05**	$mg.L^{-1}$	O	**$Clocal_{surfacewater,TIME1}$** = $Elocal_{surfacewater,TIME1}$ * 1000 / $FLOW_{surfacewater}$
Local concentration in surface water over a longer assessment period	$Clocal_{surfacewater,TIME2}$	**4,43E-05**	$mg.L^{-1}$	O	**$Clocal_{surfacewater,TIME2}$** = $Elocal_{surfacewater,TIME2}$ * 1000 / $FLOW_{surfacewater}$
Considering removal processes in the soil (ESD Table 3.4, p.27)					
Steady-state concentration in local soil	$Clocal_{soil,steady\_state}$	**2,15E-08**	$kg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,ss}$** = $Elocal_{soil}$ * (1 - F_{runoff})/($DEPTH_{soil}$ * RHO_{soil} * k_{soil})
Steady-state concentration in soil pore water	$Clocal_{pore,steady\_state}$	**4,02E-08**	$kg.m^{-3}$	O	**$Clocal_{pore,ss}$** = $Clocal_{soil,ss}$ * RHO_{soil} / K_{soil_water}

1) S: data set; D: default; O: output; P: pick list

Scenario [2]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC3 - Wood not covered, not in contact with ground, exposed to weather or subject to frequent wetting (ESD § 4.3.3, p.68)

A) House scenario including removal processes (ESD Table 4.15, p.70, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{house}$	125	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^{*}_{leach,TIME1}$	2,6	$mg.m^{-2}$	S	

Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	27,69	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	34,16	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	13	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	

Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Soil-water partitioning coefficient	$K_{soil-water}$	908,52	$m^3.m^{-3}$	S	
First order rate constant for removal from soil	k	0,12	d^{-1}	S	

Output

Without considering removal processes

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**3,25E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{house} * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**3,46E+03**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{house} * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**4,27E+03**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{house} * Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**1,47E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**1,57E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**1,93E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$

For wood which was treated *in situ* emissions to soil can occur during the application itself and from leaching from treated wood in service. The total local concentration in soil is calculated below.

TOTAL concentration in local soil at the end of the initial assessment period	$Clocal_{soil,total,TIME1}$	**1,47E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME1}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME1}$
TOTAL concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,total,TIME2}$	**1,57E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME2}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME2}$
TOTAL concentration in local soil at the end of a longer assessment period	$Clocal_{soil,total,TIME3}$	**1,93E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME3}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME3}$

Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**1,08E+01**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME1}} = AREA_{house} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**9,48E+00**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**5,85E-01**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3} / TIME3$

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	**2,98E-03**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME1)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**3,49E-03**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME2)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**2,20E-04**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME3}} = [E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME3)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	**5,58E-06**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME1}} = Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**5,58E-06**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME2}} = Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**4,12E-07**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME3}} = Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**3,97E-03**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME1*k}$
Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**3,58E-03**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME2*k}$

ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**2,21E-04**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME3*k}$
Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	**7,43E-06**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME1}$** = $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water after the intermediate assessment period	$Clocal_{pore,TIME2}$	**6,69E-06**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME2}$** = $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**4,13E-07**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME3}$** = $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

1) S: data set; D: default; O: output; P: pick list

B) Noise barrier scenario including removal processes (ESD Table 4.17, p.74, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O/P[1]*	*References / Calculation formulas / Explanations*
Leachable wood area		$AREA_{noise-barrier}$	3000	m^2	D	
Duration of the initial assessment period		TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life		TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	**Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period		$Q^*_{leach,TIME1}$	2,6	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period		$Q^*_{leach,TIME2}$	27,69	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period		$Q^*_{leach,TIME3}$	34,16	$mg.m^{-2}$	S	
Soil volume (wet)		V_{soil}	250	m^3	D	
Bulk density of wet soil		RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Fraction released to soil		F_{soil}	0,3	[-]	D	
Fraction released to the STP		F_{STP}	0,7	[-]	D	

Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Soil-water partitioning coefficient	$K_{soil-water}$	908,52	$m^3.m^{-3}$	S	Value set in table A above. Editable in table A only.
First order rate constant for removal from soil	k	0,12	d^{-1}	S	Value set in table A above. Editable in table A only.
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/ P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Emissions to soil					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,34E+03**	mg	O	**$Q_{leach,TIME1}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,49E+04**	mg	O	**$Q_{leach,TIME2}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**3,07E+04**	mg	O	**$Q_{leach,TIME3}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**5,51E-03**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME1}$** = $Q_{leach,TIME1}$ / (V_{soil} * RHO_{soil})
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**5,86E-02**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME2}$** = $Q_{leach,TIME2}$ / (V_{soil} * RHO_{soil})
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**7,23E-02**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME3}$** = $Q_{leach,TIME3}$ / (V_{soil} * RHO_{soil})
Emissions to STP					
Local daily emission rate to the STP following leaching from treated wood during the initial assessment period	$E_{STP,TIME1}$	**1,82E+02**	$mg.d^{-1}$	O	**$E_{STP,TIME1}$** = $AREA_{noise-barrier}$ * F_{STP} * $Q^*_{leach,TIME1}$/TIME1
Local daily emission rate to the STP following leaching from treated wood during the intermediate assessment period	$E_{STP,TIME2}$	**1,59E+02**	$mg.d^{-1}$	O	**$E_{STP,TIME2}$** = $AREA_{noise-barrier}$ * F_{STP} * $Q^*_{leach,TIME2}$/TIME2
Local daily emission rate to the STP following leaching from treated wood during the longer assessment period	$E_{STP,TIME3}$	**9,83E+00**	$mg.d^{-1}$	O	**$E_{STP,TIME3}$** = $AREA_{noise-barrier}$ * F_{STP} * $Q^*_{leach,TIME3}$/TIME3
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**7,80E+01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME1}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME1}$ / TIME1
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**6,83E+01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME2}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME2}$ / TIME2
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**4,21E+00**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME3}$** = $AREA_{noise-barrier}$ * F_{soil} * $Q^*_{leach,TIME3}$ / TIME3

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

Note also that for the noise barrier scenario Clocalsoil=0.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	**1,12E-03**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME1)] * [-E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**1,31E-03**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME2)] * [-E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**8,25E-05**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME3)] * [-E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	**2,09E-06**	mg.l^{-1}	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**2,45E-06**	mg.l^{-1}	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**1,54E-07**	mg.l^{-1}	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**1,49E-03**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME1*k}$
Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**1,34E-03**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**8,26E-05**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME3*k}$
Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	**2,78E-06**	mg.l^{-1}	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**2,51E-06**	mg.l^{-1}	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**1,55E-07**	mg.l^{-1}	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-}$

					water

1) S: data set; D: default; O: output; P: pick list

C) Bridge over pond scenario including removal processes (ESD Table 4.18, p.76 and Table 3.8, p.31/32)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/ P ^{1}*	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{bridge}$	10	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	2,6	mg.m^{-2}	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	27,69	mg.m^{-2}	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	34,16	mg.m^{-2}	S	
Water volume under bridge	V_{water}	1000	m^3	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.31/32)					
First order rate constant for removal from water	k	0,1019	d^{-1}	S	

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/ P ^{1}*	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,60E+01**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{bridge} * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,77E+02**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{bridge} * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**3,42E+02**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{bridge} * Q^*_{leach,TIME3}$

Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**2,60E-02**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{soil,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**2,77E-01**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{soil,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**3,42E-01**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{soil,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$

For wood which was treated *in situ* emissions to water can occur during the application itself and from leaching from treated wood in service. The total local concentration in water is calculated below.

TOTAL concentration in local water at the end of the initial assessment period	$Clocal_{water,total,TIME1}$	**2,60E-02**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,total,TIME1}} = Clocal_{water,brush} + Clocal_{water,leach,TIME1}$
TOTAL concentration in local water at the end of the intermediate assessment period	$Clocal_{water,total,TIME2}$	**2,77E-01**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,total,TIME2}} = Clocal_{water,brush} + Clocal_{water,leach,TIME2}$
TOTAL concentration in local water at the end of a longer assessment period	$Clocal_{water,total,TIME3}$	**3,42E-01**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,total,TIME3}} = Clocal_{water,brush} + Clocal_{water,leach,TIME3}$

Considering removal processes in the water body (Table 3.8, p.31/32)

Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**8,67E-01**	mg.d^{-1}	O	$\mathbf{E}_{\mathbf{water,leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**7,59E-01**	mg.d^{-1}	O	$\mathbf{E}_{\mathbf{water,leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**4,68E-02**	mg.d^{-1}	O	$\mathbf{E}_{\mathbf{water,leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3} / TIME3$
Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	**5,85E-03**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,TIME1}} = [E_{water,leach,TIME1}/(V_{water}*k*1000)] * [1-(1-e^{-TIME1*k})/(k*TIME1)]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	**7,24E-03**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,TIME2}} = [E_{water,leach,TIME2}/(V_{water}*k*1000)] * [1-(1-e^{-TIME2*k})/(k*TIME2)]$
Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	**4,59E-04**	mg.l^{-1}	O	$\mathbf{Clocal}_{\mathbf{water,TIME3}} = [E_{water,leach,TIME3}/(V_{water}*k*1000)] * [1-(1-e^{-TIME3*k})/(k*TIME3)]$

1) S: data set; D: default; O: output; P: pick list

Scenario [3]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC4a - Wood in contact with the ground (ESD § 4.3.4, p.76)

A) Transmission pole (ESD Table 4.19 p.78, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* *1*	*References / Calculation formulas / Explanations*

Leachable wood area above soil	$AREA_{pole,above}$	5,5	m^2	D	
Leachable wood area below soil	$AREA_{pole,below}$	1,6	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	78,93	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	219,43	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	321,38	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	2,97	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Soil-water partioning coefficient	$K_{soil\text{-}water}$	908,522	$m^3.m^{-3}$	D	
First order rate constant for removal from soil	k	0,12	d^{-1}	D	
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes in the receiving environmental compartments					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**5,60E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = (AREA_{pole,above} + AREA_{pole,below}) * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,56E+03**	mg	O	$\mathbf{Q_{leach,TIME2}} = (AREA_{pole,above} + AREA_{pole,below}) * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,28E+03**	mg	O	$\mathbf{Q_{leach,TIME3}} = (AREA_{pole,above} + AREA_{pole,below}) * Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial	$Clocal_{soil,leach,TIME1}$	**1,11E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$

assessment period					
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**3,09E-01**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME2}$** = $Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**4,52E-01**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,leach,TIME3}$** = $Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$

Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**1,87E+01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME1}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**4,27E+00**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME2}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**3,13E-01**	$mg.d^{-1}$	O	**$E_{soil,leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3} / TIME3$

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

Note also that for this scenario Clocalsoil=0.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	**2,25E-02**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME1)] * [-E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**6,88E-03**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME2)] * [-E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**5,15E-04**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME3)] * [-E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	**4,21E-05**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1} * RHO_{soil} * 0.001 / K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**1,29E-05**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2} * RHO_{soil} * 0.001 / K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**9,64E-07**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3} * RHO_{soil} * 0.001 / K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**3,00E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME1*k}$
Concentration in local soil after the intermediate assessment period	$Clocal_{soil,TIME2}$	**7,04E-03**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**5,16E-04**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME3}} = [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME3*k}$
Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	**5,61E-05**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME1}} = Clocal_{soil,TIME1} * RHO_{soil} * 0.001 / K_{soil-water}$
Concentration in soil pore water after the intermediate assessment period	$Clocal_{pore,TIME2}$	**1,32E-05**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME2}} = Clocal_{soil,TIME2} * RHO_{soil} * 0.001 / K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**9,65E-07**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME3}} = Clocal_{soil,TIME3} * RHO_{soil} * 0.001 / K_{soil-water}$

1) S: data set; D: default; O: output; P: pick list

Scenario [4]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC4b - Wood in contact with fresh water (ESD § 4.3.5, p.80)

A) Jetty in a lake (ESD Table 4.21 p.82 and Table 3.8, p.31/32)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P 1*	*References / Calculation formulas / Explanations*
Leachable wood area planks	$AREA_{planks}$	16,2	m^2	D	
Leachable wood area poles	$AREA_{poles}$	10	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	88,84198473	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	177,4092366	$mg.m^{-2}$	S	

Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^{*}_{leach,TIME3}$	281,5505344	mg.m^{-2}	S	
Water volume	V_{water}	1,60E+04	m^3	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.31/32)					
First order rate constant for removal from water	k	0,1019	d^{-1}	S	
Output					

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,33E+03**	mg	O	$\mathbf{Q_{leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**4,65E+03**	mg	O	$\mathbf{Q_{leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**7,38E+03**	mg	O	$\mathbf{Q_{leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**1,45E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**2,91E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**4,61E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.31/32)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**7,76E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**1,27E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**1,01E+00**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3} / TIME3$
Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	**3,28E-05**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME1}} = [E_{water,leach,TIME1}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME1*k})/(k*TIME1)]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	**7,60E-06**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME2}} = [E_{water,leach,TIME2}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME2*k})/(k*TIME2)]$
Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	**6,19E-07**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME3}} = [E_{water,leach,TIME3}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME3*k})/(k*TIME3)]$

1) S: data set; D: default; O: output; P: pick list

B) Sheet piling in a waterway (ESD Table 4.22 p.83 and Table 3.8, p.33/34)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P 1*	*References / Calculation formulas / Explanations*
Wood area per m waterway length	$AREA_{poles}$	4,71	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	225,8	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	390,6	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	646,1	$mg.m^{-2}$	S	
Water volume per m waterway length	V_{water}	7,5	m^3	D	
Residence time of water in waterway	TAU_{wway}	20	d	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.33/34)					
First order rate constant for removal from water	k	0,1019	d^{-1}	S	
Concentration of suspended matter in the surface water	$SUSP_{water}$	0,015	$kg.m^{-3}$	D	
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	3,02774	$m^3.kg^{-1}$	S	If needed calculate Kp_{susp} below and insert the value here
Calculation of solids-water partitioning coefficient for suspended matter					
Partition coefficient organic carbon-water	K_{oc}	30,2774	$m^3.kg^{-1}$	S	
Weight fraction of organic carbon in the suspended solids	$F_{oc,susp}$	0,1	$kg_{oc}.kg_{solid}^{-1}$	D	Guidance on the Biocidal Products Regulation, Vol IV Environment - Part B (v 1.0 April 2015) - Table 5, p.49

Solids-water partitioning coefficient for suspended matter	Kp_{susp}	**3,02774**	m^{3}.kg^{-1}	O	$\mathbf{Kp_{susp}} = K_{oc} * F_{oc,susp}$ (Vol IV Part B, p.52)

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* *1*	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**7,09E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{poles} * Q^{*}_{leach,TIME1}/TIME1 * TAU_{wway}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,01E+02**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{poles} * Q^{*}_{leach,TIME2}/TIME2 * TAU_{wway}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**8,34E+00**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{poles} * Q^{*}_{leach,TIME3}/TIME3 * TAU_{wway}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**9,45E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**1,34E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**1,11E-03**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.33/34)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**3,55E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{poles} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**5,04E+00**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{poles} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**4,17E-01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{poles} * Q^{*}_{leach,TIME3} / TIME3$
Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	**2,66E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME1}} = [E_{water,leach,TIME1}*0.001/(V_{water}*k)] * [1-(1-e^{-TAUwway*k})/(k*TAU_{wway})]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	**3,78E-03**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME2}} = [E_{water,leach,TIME2}*0.001/(V_{water}*k)] * [1-(1-e^{-TAUwway*k})/(k*TAU_{wway})]$
Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	**3,13E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME3}} = [E_{water,leach,TIME3}*0.001/(V_{water}*k)] * [1-(1-e^{-TAUwway*k})/(k*TAU_{wway})]$

1) S: data set; D: default; O: output; P: pick list

3.2.2.1.3 Assessed substance: Boron

Scenario [1]: Emission estimation for industrial preventive processes - Vacuum pressure and double vacuum (ESD § 4.1.3, p.51)

A) Emission scenario for vacuum pressure and double vacuum - product application (ESD Table 4.8, p.57)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
Volume of wood treated per day	Vacuum-pressure	$VOLUME_{wood\text{-}treated}$	**30**	$m^3.d^{-1}$	D/P	ESD Table 4.8
Quantity of a substance applied per m^3 of wood		Q_{ai}	0,273	$kg.m^{-3}$	S	
Fraction released to facility drain	Water solubilty >100 mg/l	$F_{facilitydrain}$	**0,03**	[-]	P	ESD Table 4.8
Fraction released to air	Vapour pressure at 20 °C: <0.005 Pa	F_{air}	**0,001**	[-]	P	EUSES 2.1 background document, Table III-60 (page III-76)

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
Local emission rate to air - quantity locally emitted per day to air	$Elocal_{air}$	**8,19E-03**	$kg.d^{-1}$	O	$\mathbf{Elocal_{air}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{air}$
Local emission rate to facility drain - quantity of a substance locally emitted per day to the facility drain	$Elocal_{facilitydrain}$	**2,46E-01**	$kg.d^{-1}$	O	$\mathbf{Elocal_{facilitydrain}} = Q_{ai} * VOLUME_{wood\text{-}treated} * F_{facilitydrain}$

1) S: data set; D: default; O: output; P: pick list

B) Emission scenario for vacuum pressure and double vacuum - storage of treated wood prior to shipping (including removal processes in the receiving environmental compartment - soil) (ESD Table 4.9, p.58, Table 3.4, p.27)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
Effective surface area of treated wood, considered to be exposed to rain, per 1 m^2 storage area (i.e. soil)		$AREA_{wood\text{-}expo}$	11	$m^2.m^{-2}$	D	
Surface area of the storage place	Vacuum-pressure	$AREA_{storage}$	**525**	m^2	D/P	ESD Table 4.9
Duration of the initial assessment period		TIME1	30	d	D	

Duration of a longer assessment period	TIME2	7300	d	D	Value agreed at the WG IV 2015 (Tolyfluanid discussion) (20 years)
Average daily flux i.e. the average quantity of a substance that is daily leached out of 1 m^2 of treated wood during 14 day storage period	$FLUX_{storage,vac-pres}$	0,000001852	$kg.m^{-2}.d^{-1}$	S	
Bulk density of wet soil	RHO_{soil}	1700	$kg.m^{-3}$	D	
Soil depth	$DEPTH_{soil}$	0,5	m	D	
Fraction of rainwater running off the storage site	F_{runoff}	0,5	[-]	D	
Flow rate of surface water (creek/river)	$FLOW_{surfacewater}$	25920	$m^3.d^{-1}$	D	This value corresponds to 0.3 $m^3.s^{-1}$ which is the default value for a small creek.
Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.4, p.27)					
First order rate constant for removal from soil	k	2,30E-04	d^{-1}	S	
Soil-water partitioning coefficient	$K_{soil-water}$	2,6	$m^3.m^{-3}$	S	
Intermediate calculations					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Volume of wet soil	V_{soil}	**262,5**	m^3	O	$\mathbf{V_{soil}} = AREA_{storage} * DEPTH_{soil}$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over the initial assessment period	$Q_{leach,storage,TIME1}$	**3,21E-01**	kg	O	$\mathbf{Q_{leach,storage,TIME1}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME1$
Cumulative quantity of a substance, leached due to rainfall from stored treated wood, over a longer assessment period	$Q_{leach,storage,TIME2}$	**7,81E+01**	kg	O	$\mathbf{Q_{leach,storage,TIME2}} = FLUX_{storage,vac-pres} * AREA_{wood-expo} * AREA_{storage} * TIME2$
Average daily release onto soil of substance due to leaching over the storage duration per m^2 of storage area	$Elocal_{soil}$	**2,04E-05**	$kg.m^{-2}.d^{-1}$	O	$\mathbf{Elocal_{soil}} = FLUX_{storage} * AREA_{wood-expo}$
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Without considering removal processes in the soil					
Local concentration in soil at storage place at the end of the initial assessment period	$Clocal_{soil,time1}$	**3,60E-07**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = Q_{leach,storage,TIME1} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$
Local concentration in soil at storage place at the end of a longer assessment period	$Clocal_{soil,time2}$	**8,75E-05**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = Q_{leach,storage,TIME2} * (1 - F_{runoff}) / (V_{soil} * RHO_{soil})$

Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over the initial assessment period	$Elocal_{surfacewater,TIME1}$	**5,35E-03**	$kg.d^{-1}$	O	$\mathbf{Elocal_{surfacewater,TIME1}} = Q_{leach,storage,TIME1} * F_{runoff} / TIME1$
Local emission rate in surface water resulting from leaching from stored treated wood due to rain run-off, over a longer assessment period	$Elocal_{surfacewater,TIME2}$	**5,35E-03**	$kg.d^{-1}$	O	$\mathbf{Elocal_{surfacewater,TIME2}} = Q_{leach,storage,TIME2} * F_{runoff} / TIME2$
Local concentration in surface water over the initial assessment period	$Clocal_{surfacewater,TIME1}$	**2,06E-04**	$mg.L^{-1}$	O	$\mathbf{Clocal_{surfacewater,TIME1}} = Elocal_{surfacewater,TIME1} * 1000 / FLOW_{surfacewater}$
Local concentration in surface water over a longer assessment period	$Clocal_{surfacewater,TIME2}$	**2,063E-04**	$mg.L^{-1}$	O	$\mathbf{Clocal_{surfacewater,TIME2}} = Elocal_{surfacewater,TIME2} * 1000 / FLOW_{surfacewater}$
Considering removal processes in the soil (ESD Table 3.4, p.27)					
Steady-state concentration in local soil	$Clocal_{soil,steady\_state}$	**5,21E-05**	$kg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,ss}} = Elocal_{soil} * (1 - F_{runoff})/(DEPTH_{soil} * RHO_{soil} * k_{soil})$
Steady-state concentration in soil pore water	$Clocal_{pore,steady\_state}$	**3,41E-02**	$kg.m^{-3}$	O	$\mathbf{Clocal_{pore,ss}} = Clocal_{soil,ss} * RHO_{soil} / K_{soil\_water}$

1) S: data set; D: default; O: output; P: pick list

Scenario [2]: Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC3 - Wood not covered, not in contact with ground, exposed to weather or subject to frequent wetting (ESD § 4.3.3, p.68)

A) House scenario including removal processes (ESD Table 4.15, p.70, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P [1]*	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{house}$	125	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^{*}_{leach,TIME1}$	12,1	$mg.m^{-2}$	S	

Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	159,87	$mg.m^{-2}$	S
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	182,77	$mg.m^{-2}$	S
Soil volume (wet)	V_{soil}	13	m^3	D
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D
Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)				
Soil-water partitioning coefficient	$K_{soil-water}$	2,6	$m^3.m^{-3}$	S
First order rate constant for removal from soil	k	2,30E-04	d^{-1}	S

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**1,51E+03**	mg	O	$\mathbf{Q_{leach,TIME1}}$ = $AREA_{house}$ * $Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**2,00E+04**	mg	O	$\mathbf{Q_{leach,TIME2}}$ = $AREA_{house}$ * $Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**3,43E+04**	mg	O	$\mathbf{Q_{leach,TIME3}}$= $AREA_{house}$ * $Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**6,84E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}}$ = $Q_{leach,TIME1}$ / (V_{soil} * RHO_{soil})
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**9,04E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}}$ = $Q_{leach,TIME2}$ / (V_{soil} * RHO_{soil})
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**1,55E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}}$ = $Q_{leach,TIME3}$ / (V_{soil} * RHO_{soil})
For wood which was treated *in situ* emissions to soil can occur during the application itself and from leaching from treated wood in service. The total local concentration in soil is calculated below.					
TOTAL concentration in local soil at the end of the initial assessment period	$Clocal_{soil,total,TIME1}$	**6,84E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME1}}$ = $Clocal_{soil,brush}$ + $Clocal_{soil,leach,TIME1}$
TOTAL concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,total,TIME2}$	**9,04E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME2}}$ = $Clocal_{soil,brush}$ + $Clocal_{soil,leach,TIME2}$
TOTAL concentration in local soil at the end of a longer assessment period	$Clocal_{soil,total,TIME3}$	**1,55E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME3}}$ = $Clocal_{soil,brush}$ + $Clocal_{soil,leach,TIME3}$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**5,04E+01**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME1}}$ = $AREA_{house}$ * $Q^*_{leach,TIME1}$ / TIME1

Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**5,48E+01**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**3.13E+00**	mg.d^{-1}	O	$\mathbf{E_{soil,leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3} / TIME3$

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	**3,41E-02**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME1)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**4,40E-01**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME2)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**4,77E-01**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME3}} = [E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil} * k)] + [1/(k*TIME3)] * [Clocal_{soil,brush\_house} - E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	**2,23E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME1}} = Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**2,23E-02**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME2}} = Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**3,12E-01**	mg.l^{-1}	O	$\mathbf{Clocal_{pore,TIME3}} = Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**6,82E-02**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME1*k}$
Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**8,67E-01**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**5,01E-01**	mg.kg$_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME3}} = [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME3*k}$

Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	**4,46E-02**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME1}} =$ $Clocal_{soil,TIME1} * RHO_{soil} * 0.001 / K_{soil-water}$
Concentration in soil pore water after the intermediate assessment period	$Clocal_{pore,TIME2}$	**5,67E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME2}} =$ $Clocal_{soil,TIME2} * RHO_{soil} * 0.001 / K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**4,92E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{pore,TIME3}} =$ $Clocal_{soil,TIME3} * RHO_{soil} * 0.001 / K_{soil-water}$

1) S: data set; D: default; O: output; P: pick list

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B) Fence scenario including removal processes (ESD Table 4.16, p.72, Table 3.5, p.28 and Table 3.6, p.29)

Instructions for using the table:

1. In the "Input" table indicate whether the estimations should cover application (in situ treatment) (select "Yes" or "No" from the drop-down list). $Clocal_{soil}$ will be automatically filled in: with "0", if the choice was "No" or with the value calculated in the spreadsheet "PT8-prof&amateur in situ treatm", if "Yes" was chosen.
2. Select the application method/process; TIME3 will be automatically filled in.
3. Insert $Q^*_{leach,TIME1}$, $Q^*_{leach,TIME2}$ and $Q^*_{leach,TIME3}$ values.
4. To consider the removal processes (in soil), the following additional information is needed: $K_{soil-water}$ and k_{soil}; these values need to be inserted in the "Input" table in section A.
5. The "Output" table will be automatically filled in with the calculated values.

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
For wood which is treated *in situ* emissions to soil can occur during the application itself and from leaching from the treated wood in service. Select below whether the scenario should cover *in situ* treatment or only leaching from wood in service. If *in situ* treatment is to be covered the emissions from application need to be calculated in advance (spreadsheet "PT8-prof&amateur in situ treatm"). Please note that *in situ* brushing is not possible for the noise barrier scenario.					
Cover *in situ* treatment ?	**No**				
Concentration in local soil at the end of the day of application	$Clocal_{soil,brush\_fence}$	**0,00E+00**	$mg.kg_{wwt}^{-1}$	O	If *in situ* treatment is covered, this value has to be calculated in advance in the spreadsheet "PT8-prof&amateur in situ treatm"; once calculated, the value is automatically copied here.
Leachable wood area	$AREA_{fence}$	2	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!

Duration of a longer assessment period (service life)	Vacuum pressure treatment	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period		$Q^*_{leach,TIME1}$		$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period		$Q^*_{leach,TIME2}$		$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period		$Q^*_{leach,TIME3}$		$mg.m^{-2}$	S	
Soil volume (wet)		V_{soil}	0,25	m^3	D	
Bulk density of wet soil		RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	

Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Soil-water partitioning coefficient	$K_{soil-water}$	2,6	$m^3.m^{-3}$	S	Value set in table A above. Editable in table A only.
First order rate constant for removal from soil	k	0,00023	d^{-1}	S	Value set in table A above. Editable in table A only.

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	??	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{fence} * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	??	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{fence} * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	??	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{fence} * Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	??	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	??	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	??	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$

For wood which was treated *in situ* emissions to soil can occur during the application itself and from leaching from treated wood in service. The total local concentration in soil is calculated below.

TOTAL concentration in local soil at the end of the initial assessment period	$Clocal_{soil,total,TIME1}$	??	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME1}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME1}$
TOTAL concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,total,TIME2}$	??	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME2}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME2}$

TOTAL concentration in local soil at the end of a longer assessment period	$Clocal_{soil,total,TIME3}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,total,TIME3}$** = $Clocal_{soil,brush} + Clocal_{soil,leach,TIME3}$

Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	??	$mg.d^{-1}$	O	**$E_{soil,leach,TIME1}$** = $AREA_{fence} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	??	$mg.d^{-1}$	O	**$E_{soil,leach,TIME2}$** = $AREA_{fence} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	??	$mg.d^{-1}$	O	**$E_{soil,leach,TIME3}$** = $AREA_{fence} * Q^{*}_{leach,TIME3} / TIME3$

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k)] + [1/(k*TIME1)]*[Clocal_{soil,brush\_fence} - E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil}*k)] + [1/(k*TIME2)]*[Clocal_{soil,brush\_fence} - E_{soil,leach,TIME2}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil}*k)] + [1/(k*TIME3)]*[Clocal_{soil,brush\_fence} - E_{soil,leach,TIME3}/(V_{soil}*RHO_{soil}*k)]*(1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k)] - [E_{soil,leach,TIME1}/(V_{soil}*RHO_{soil}*k) - Clocal_{soil,brush\_fence}]*e^{-TIME1*k}$

Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_fence}] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	??	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_fence}] * e^{-TIME3*k}$
Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	??	$mg.l^{-1}$	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

1) S: data set; D: default; O: output; P: pick list

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C) Noise barrier scenario including removal processes (ESD Table 4.17, p.74, Table 3.5, p.28 and Table 3.6, p.29)

Instructions for using the table:

1. In the "Input" table select the application method/process; TIME3 will be automatically filled in.
2. Insert $Q*_{leach,TIME1}$, $Q*_{leach,TIME2}$ and $Q*_{leach,TIME3}$ values.
3. To consider the removal processes (in soil), the following additional information is needed: $K_{soil-water}$ and k_{soil}; these values need to be inserted in the "Input" table in section A.
4. The "Output" table will be automatically filled in with the calculated values.

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area	$AREA_{noise-barrier}$	3000	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	12,9	$mg.m^{-2}$	S	

Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	159,87	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	182,77	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	250	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Fraction released to soil	F_{soil}	0,3	[-]	D	
Fraction released to the STP	F_{STP}	0,7	[-]	D	
Additional information needed to estimate emissions taking into account removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
Soil-water partitioning coefficient	$K_{soil-water}$	2,6	$m^3.m^{-3}$	S	Value set in table A above. Editable in table A only.
First order rate constant for removal from soil	k	0,00023	d^{-1}	S	Value set in table A above. Editable in table A only.
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Emissions to soil					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**1,16E+04**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,44E+05**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,47E+05**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME3}$
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**2,73E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**3,39E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**5,82E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
Emissions to STP					
Local daily emission rate to the STP following leaching from treated wood during the initial assessment period	$E_{STP,TIME1}$	**9,03E+02**	$mg.d^{-1}$	O	$\mathbf{E_{STP,TIME1}} = AREA_{noise-barrier} * F_{STP} * Q^*_{leach,TIME1}/TIME1$
Local daily emission rate to the STP following leaching from treated wood during the intermediate assessment period	$E_{STP,TIME2}$	**9,20E+02**	$mg.d^{-1}$	O	$\mathbf{E_{STP,TIME2}} = AREA_{noise-barrier} * F_{STP} * Q^*_{leach,TIME2}/TIME2$

Local daily emission rate to the STP following leaching from treated wood during the longer assessment period	$E_{STP,TIME3}$	**5,26E+01**	mg.d^{-1}	O	**$E_{STP,TIME3}$** = $AREA_{noise\text{-}barrier} * F_{STP} * Q^{*}_{leach,TIME3}/TIME3$

Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)

Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**3,87E+02**	mg.d^{-1}	O	**$E_{soil,leach,TIME1}$** = $AREA_{noise\text{-}barrier} * F_{soil} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**3,94E+02**	mg.d^{-1}	O	**$E_{soil,leach,TIME2}$** = $AREA_{noise\text{-}barrier} * F_{soil} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**2,25E+01**	mg.d^{-1}	O	**$E_{soil,leach,TIME3}$** = $AREA_{noise\text{-}barrier} * F_{soil} * Q^{*}_{leach,TIME3} / TIME3$

NOTE (from the ESD):
#64 (p.29) Equations 3.7, 3.8, 3.11 and 3.12 give the concentration in soil taking into account continuous releases to soil and a single emission during application which increases the steady state concentration due to continuous release depending on time. The underlying assumption being that the steady state is reached during the time period and that the releases are the same every day. However, equations 3.11 and 3.12 calculate the concentration in soil as a function of time. As represented they calculate Clocalsoil at the end of the assessment period, time1, and time2 respectively. Equations 3.7 and 3.8 are the time weighted average forms of Equations 3.11 and 3.12, respectively. They calculate the time weighted average Clocalsoil over a period time1 (eq. 3.7) and over time2 (eq. 3.8).

#65 (p.29) Thus, depending on the value of $Clocal_{soil,applic}$ and the degradation half life, either equations 3.7/3.8 or 3.11/3.12 represent a worst-case situation, e.g. for persistent substances, equations 3.7 and 3.8 are recommended for those cases where $Clocal_{soil,applic}$ is not zero.

Note also that for the noise barrier scenario Clocalsoil=0.

ESD Eq. 3.7) Time weighted concentration in local soil over the initial assessment period	$Clocal_{soil,TIME1}$	**1,36E-02**	mg.kg$_{wwt}^{-1}$	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME1)] * [-E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME1*k})$
Time weighted concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**1,65E-01**	mg.kg$_{wwt}^{-1}$	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME2)] * [-E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME2*k})$
ESD Eq. 3.8) Time weighted concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**1,79E-01**	mg.kg$_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] + [1/(k * TIME3)] * [-E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * (1-e^{-TIME3*k})$
Average concentration in soil pore water over the initial assessment period	$Clocal_{pore,TIME1}$	**8,91E-03**	mg.l^{-1}	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**1,08E-01**	mg.l^{-1}	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Average concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**1,17E-01**	mg.l^{-1}	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**2,72E-02**	mg.kg$_{wwt}^{-1}$	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME1*k}$

Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**3,25E-01**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**1,88E-01**	$mg.kg_{wwt}^{-1}$	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME3*k}$
Concentration in soil pore water after the initial assessment period	$Clocal_{pore,TIME1}$	**1,78E-02**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME1}$ =** $Clocal_{soil,TIME1}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over the intermediate assessment period	$Clocal_{pore,TIME2}$	**2,12E-01**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME2}$ =** $Clocal_{soil,TIME2}*RHO_{soil}*0.001/K_{soil-water}$
Concentration in soil pore water over a longer duration	$Clocal_{pore,TIME3}$	**1,84E-01**	$mg.l^{-1}$	O	**$Clocal_{pore,TIME3}$ =** $Clocal_{soil,TIME3}*RHO_{soil}*0.001/K_{soil-water}$

1) S: data set; D: default; O: output; P: pick list

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D) Bridge over pond scenario including removal processes (ESD Table 4.18, p.76 and Table 3.8, p.31/32)

Instructions for using the table:

1. In the "Input" table indicate whether the estimations should cover application (*in situ* treatment) (select "Yes" or "No" from the drop-down list). $Clocal_{soil}$ will be automatically filled in: with "0", if the choice was "No" or with the value calculated in the spreadsheet "PT8-prof&amateur in situ treatm", if "Yes" was chosen.

2. Select the application method/process; TIME3 will be automatically filled in.

3. Insert $Q*_{leach,TIME1}$, $Q*_{leach,TIME2}$ and $Q*_{leach,TIME3}$ values.

4. To consider the removal processes (in water), provide the following additional information in the "Input" table: k_{water}, V_{sed}, $K_{sed-water}$ and Kp_{susp}; if only the substance K_{oc}, calculate separately Kp_{susp} and insert the value in the "Input" table.

5. The "Output" table will be automatically filled in with the calculated values.

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
For wood which is treated *in situ* emissions to soil can occur during the application itself and from leaching from the treated wood in service. Select below whether the scenario should cover *in situ* treatment or only leaching from wood in service. If *in situ* treatment is to be covered the emissions from application need to be calculated in advance (spreadsheet "PT8-prof&amateur in situ treatm"). Please note that *in situ* brushing is not possible for the noise barrier scenario.					
Cover *in situ* treatment ?	**No**				
Concentration in local water at the end of the day of application	$Clocal_{water,brush\_bridge}$	**0,00E+00**	$mg.l^{-1}$	O	If *in situ* treatment is covered, this value has to be calculated in advance in the spreadsheet "PT8-prof&amateur in situ treatm"; once calculated, the value is automatically copied here.
Leachable wood area	$AREA_{bridge}$	10	m^2	D	

Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	12,09	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	159,87	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	182,77	$mg.m^{-2}$	S	
Water volume under bridge	V_{water}	1000	m^3	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.31/32)					
First order rate constant for removal from water	k		d^{-1}	S	
Volume of sediment compartment	V_{sed}	3	m^3	D	Agreed at WG-IV-2017
Total sediment - water partitioning coefficient	$K_{sed\text{-}water}$		$m^3.m^{-3}$	S	
Concentration of suspended matter in the surface water	$SUSP_{water}$	0,015	$kg.m^{-3}$	D	
Solids-water partitioning coefficient for suspended matter	Kp_{susp}		$m^3.kg^{-1}$	S	If needed calculate Kp_{susp} below and insert the value here
Calculation of solids-water partitioning coefficient for suspended matter					
Partition coefficient organic carbon-water	K_{oc}		$l.kg^{-1}$	S	
Weight fraction of organic carbon in the suspended solids	$F_{oc,susp}$	0,1	$kg_{oc}.kg_{solid}^{-1}$	D	Guidance on the Biocidal Products Regulation, Vol IV Environment - Part B (v 1.0 April 2015) - Table 5, p.49
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	**??**	$m^3.kg^{-1}$	O	$\mathbf{Kp_{susp}} = K_{oc} * F_{oc,susp} / 1000$ (Vol IV Part B, p.52)
Output					

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O /P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**1,21E+02**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,60E+03**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,75E+03**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**1,21E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**1,60E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**2,75E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
For wood which was treated *in situ* emissions to water can occur during the application itself and from leaching from treated wood in service. The total local concentration in water is calculated below.					
TOTAL concentration in local water at the end of the initial assessment period	$Clocal_{water,total,TIME1}$	**1,21E-01**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME1}} = Clocal_{water,brush}+Clocal_{water,leach,TIME1}$
TOTAL concentration in local water at the end of the intermediate assessment period	$Clocal_{water,total,TIME2}$	**1,60E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME2}} = Clocal_{water,brush}+Clocal_{water,leach,TIME2}$
TOTAL concentration in local water at the end of a longer assessment period	$Clocal_{water,total,TIME3}$	**1,83E+00**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME3}} = Clocal_{water,brush}+Clocal_{water,leach,TIME3}$
Considering removal processes in the water body (Table 3.8, p.31/32)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**4,03E+00**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**4,38E+00**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**2,55E-01**	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3} / TIME3$
Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME1}} = [E_{water,leach,TIME1}/(V_{water}*k*1000)] * [1-(1-e^{-TIME1*k})/(k*TIME1)]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME2}} = [E_{water,leach,TIME2}/(V_{water}*k*1000)] * [1-(1-e^{-TIME2*k})/(k*TIME2)]$
Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME3}} = [E_{water,leach,TIME3}/(V_{water}*k*1000)] * [1-(1-e^{-TIME3*k})/(k*TIME3)]$
Time weighted dissolved concentration in local water over the initial assessment period	$Clocal_{diss,TIME1}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{diss,TIME1}} = \{[E_{water,leach,TIME1}*0.001/(V_{water}+K_{sed-water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME1*k})/(k*TIME1)]\}$

Time weighted dissolved concentration in local water over the intermediate assessment period	$Clocal_{diss,TIME2}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{diss,TIME2}}$ = $\{[E_{water,leach,TIME2}*0.001/(V_{water}+K_{sed\text{-}water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME2*k})/(k*TIME2)]\}$
Time weighted dissolved concentration in local water over a longer duration	$Clocal_{diss,TIME3}$	**??**	$mg.l^{-1}$	O	$\mathbf{Clocal_{diss,TIME3}}$ = $\{[E_{water,leach,TIME3}*0.001/(V_{water}+K_{sed\text{-}water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME3*k})/(k*TIME3)]\}$

1) S: data set; D: default; O: output; P: pick list

Environmental Emission Scenarios for Product Type 8: Wood preservatives

Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC 4b - Wood in contact with fresh water (ESD § 4.3.5, p.80)

Spreadsheet index (click on the title to be directed to the sub-section of the table)

A) Jetty in a lake (ESD Table 4.21 p.82 and Table 3.8, p.31/32)
B) Sheet piling in a waterway (ESD Table 4.22 p.83 and Table 3.8, p.33/34)

Note:

-The default values can be overwritten. Once overwritten, in order to revert to the default values, these need to be manually introduced. Alternatively replace this worksheet by copying the one from the excel file in ECHA website.

-In a first tier assessment TIME1, TIME2 and TIME3 below correspond to the following periods:
TIME1: from day 1 until the end of TIME1;
TIME2: from day 1 until the end of TIME2;
TIME3: from day 1 until the end of TIME3.
A second tier is currently under discussion and will be implemented as soon as agreed (WG-IV-2017).

A) Jetty in a lake (ESD Table 4.21 p.82 and Table 3.8, p.31/32)

Instructions for using the table:

1. Insert $Q^*_{leach,TIME1}$, $Q^*_{leach,TIME2}$ and $Q^*_{leach,TIME3}$ values.

2. To consider the removal processes (in water), provide the following additional information in the "Input" table: k, V_{sed}, $K_{sed\text{-}water}$ and Kp_{susp}; if only the substance K_{oc} is known, calculate separately Kp_{susp} and insert the value in the "Input" table.

3. The "Output" table will be automatically filled in with the calculated values.

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P*[1]	*References / Calculation formulas / Explanations*
Leachable wood area planks	$AREA_{planks}$	16,2	m^2	D	
Leachable wood area poles	$AREA_{poles}$	10	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	364,6610687	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	515,7724427	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	539,2006107	$mg.m^{-2}$	S	
Water volume	V_{water}	1,60E+04	m^3	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.31/32)					
First order rate constant for removal from water	k		d^{-1}	S	
Volume of sediment compartment	V_{sed}	23,56	m^3	S	Agreed at WG-IV-2017
Total sediment - water partitioning coefficient	$K_{sed-water}$		$m^3.m^{-3}$	S	
Concentration of suspended matter in the surface water	$SUSP_{water}$	0,015	$kg.m^{-3}$	D	
Solids-water partitioning coefficient for suspended matter	Kp_{susp}		$m^3.kg^{-1}$	S	If needed calculate Kp_{susp} below and insert the value here
Calculation of solids-water partitioning coefficient for suspended matter					
Partition coefficient organic carbon-water	K_{oc}		$m^3.kg^{-1}$	S	
Weight fraction of organic carbon in the suspended solids	$F_{oc,susp}$	0,1	$kg_{oc}.kg_{solid}^{-1}$	D	Guidance on the Biocidal Products Regulation, Vol IV Environment - Part B (v 1.0 April 2015) - Table 5, p.49
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	??	$m^3.kg^{-1}$	O	**Kp_{susp}** = K_{oc} * $F_{oc,susp}$ (Vol IV Part B, p.52)

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**9,55E+03**	mg	O	$\mathbf{Q_{leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,35E+04**	mg	O	$\mathbf{Q_{leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**1,41E+04**	mg	O	$\mathbf{Q_{leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	**5,97E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	**8,45E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	**8,83E-04**	mg.l^{-1}	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.31/32)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	**3,18E+02**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME1}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	**3,70E+01**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME2}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	**1,94E+00**	mg.d^{-1}	O	$\mathbf{E_{water,leach,TIME3}} = (AREA_{planks} + AREA_{poles}) * Q^{*}_{leach,TIME3} / TIME3$
Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME1}} = [E_{water,leach,TIME1}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME1*k})/(k*TIME1)]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME2}} = [E_{water,leach,TIME2}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME2*k})/(k*TIME2)]$
Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{water,TIME3}} = [E_{water,leach,TIME3}*0.001/(V_{water}*k)] * [1-(1-e^{-TIME3*k})/(k*TIME3)]$
Time weighted dissolved concentration in local water over the initial assessment period	$Clocal_{diss,TIME1}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{diss,TIME1}} = \{[E_{water,leach,TIME1}*0.001/(V_{water}+K_{sed-water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME1*k})/(k*TIME1)]\}$
Time weighted dissolved concentration in local water over the intermediate assessment period	$Clocal_{diss,TIME2}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{diss,TIME2}} = \{[E_{water,leach,TIME2}*0.001/(V_{water}+K_{sed-water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME2*k})/(k*TIME2)]\}$
Time weighted dissolved concentration in local water over a longer duration	$Clocal_{diss,TIME3}$	**??**	mg.l^{-1}	O	$\mathbf{Clocal_{diss,TIME3}} = \{[E_{water,leach,TIME3}*0.001/(V_{water}+K_{sed-water}*V_{sed})] * (1/k) * [1/(1+Kp_{susp}*SUSP_{water})]\} * \{1-[(1-e^{-TIME3*k})/(k*TIME3)]\}$

1) S: data set; D: default; O: output; P: pick list

Go to the top of the page

B) Sheet piling in a waterway (ESD Table 4.22 p.83 and Table 3.8, p.33/34)

Instructions for using the table:

1. Insert $Q^*_{leach,TIME1}$, $Q^*_{leach,TIME2}$ and $Q^*_{leach,TIME3}$ values.

2. To consider the removal processes (in water), provide the following additional information in the "Input" table: k_{water} and Kp_{susp}; if only the substance K_{oc} is known, calculate separately Kp_{susp} and insert the value in the "Input" table.

3. The "Output" table will be automatically filled in with the calculated values.

Input

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/ O/P 1*	*References / Calculation formulas / Explanations*
Wood area per m waterway length	$AREA_{poles}$	4,71	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	922,85	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	922,85	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	922,85	$mg.m^{-2}$	S	
Water volume per m waterway length	V_{water}	7,5	m^3	D	
Residence time of water in waterway	TAU_{wway}	20	d	D	
Additional information needed to estimate emissions taking into account removal processes in the water body (Table 3.8, p.33/34)					
First order rate constant for removal from water	k		d^{-1}	S	
Concentration of suspended matter in the surface water	$SUSP_{water}$	0,015	$kg.m^{-3}$	D	

Solids-water partitioning coefficient for suspended matter	Kp_{susp}		$m^3.kg^{-1}$	S	If needed calculate Kp_{susp} below and insert the value here
Calculation of solids-water partitioning coefficient for suspended matter					
Partition coefficient organic carbon-water	K_{oc}		$m^3.kg^{-1}$	S	
Weight fraction of organic carbon in the suspended solids	$F_{oc,susp}$	0,1	$kg_{oc}.kg_{solid}^{-1}$	D	Guidance on the Biocidal Products Regulation, Vol IV Environment - Part B (v 1.0 April 2015) - Table 5, p.49
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	??	$m^3.kg^{-1}$	O	$\mathbf{Kp_{susp}} = K_{oc} * F_{oc,susp}$ (Vol IV Part B, p.52)

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Without considering removal processes					
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	2,90E+03	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{poles} * Q^*_{leach,TIME1}/TIME1 * TAU_{wway}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	2,38E+02	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{poles} * Q^*_{leach,TIME2}/TIME2 * TAU_{wway}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	1,19E+01	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{poles} * Q^*_{leach,TIME3}/TIME3 * TAU_{wway}$
Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	3,86E-01	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	3,18E-02	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	1,59E-03	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$
Considering removal processes in the water body (Table 3.8, p.33/34)					
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	1,45E+02	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{poles} * Q^*_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	1,19E+01	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{poles} * Q^*_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	5,95E-01	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{poles} * Q^*_{leach,TIME3} / TIME3$

3.2.2.2 Calculated PEC values (EUSES 2.1.2)

3.2.2.2.1 Assessed substance: Copper

3.2.2.2.1.1 SCENARIO [1]: INDUSTRIAL PROCESS, VACUUM PRESSURE: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
DEFAULTS				
DEFAULT IDENTIFICATION				
General name		Standard Euses 2.1		D
Description		According to TGDs		D
CHARACTERISTICS OF COMPARTMENTS				
GENERAL				
Density of solid phase		2,5	[kg.l-1]	D
Density of water phase		1	[kg.l-1]	D
Density of air phase		1,3E-03	[kg.l-1]	D
Environmental temperature		12	[oC]	D
Standard temperature for Vp and Sol		25	[oC]	D
Temperature correction method		Temperature correction for local distribution		D
Constant of Junge equation		0,01	[Pa.m]	D
Surface area of aerosol particles		0,01	[m2.m-3]	D
Gas constant (8.314)		8 314	[Pa.m3.mol-1.K-1]	D
SUSPENDED MATTER				
Volume fraction solids in suspended matter		0,1	[m3.m-3]	D
Volume fraction water in suspended matter		0,9	[m3.m-3]	D
Weight fraction of organic carbon in suspended matter		0,1	[kg.kg-1]	D
Bulk density of suspended matter		1,15E+03	[kgwwt.m-3]	O
Conversion factor wet-dry suspened matter		4,6	[kgwwt.kgdwt-1]	O

SEDIMENT				
Volume fraction solids in sediment		0,2	[m3.m-3]	D
Volume fraction water in sediment		0,8	[m3.m-3]	D
Weight fraction of organic carbon in sediment		0,05	[kg.kg-1]	D
SOIL				
Volume fraction solids in soil		0,6	[m3.m-3]	D
Volume fraction water in soil		0,2	[m3.m-3]	D
Volume fraction air in soil		0,2	[m3.m-3]	D
Weight fraction of organic carbon in soil		0,02	[kg.kg-1]	D
Weight fraction of organic matter in soil		0,034	[kg.kg-1]	O
Bulk density of soil		1,7E+03	[kgwwt.m-3]	O
Conversion factor wet-dry soil		1,13	[kgwwt.kgdwt-1]	O
STP SLUDGE				
Fraction of organic carbon in raw sewage sludge		0,3	[kg.kg-1]	D
Fraction of organic carbon in settled sewage sludge		0,3	[kg.kg-1]	D
Fraction of organic carbon in activated sewage sludge		0,37	[kg.kg-1]	D
Fraction of organic carbon in effluent sewage sludge		0,37	[kg.kg-1]	D
DEGRADATION AND TRANSFORMATION RATES				
Rate constant for abiotic degradation in STP		0	[d-1]	D
Rate constant for abiotic degradation in bulk sediment		0	[d-1] (12[oC])	D
Rate constant for anaerobic biodegradation in sediment		0	[d-1] (12[oC])	D
Fraction of sediment compartment that is aerated		0,1	[m3.m-3]	D
Concentration of OH-radicals in atmosphere		5,00E+05	[molec.cm-3]	D

Rate constant for abiotic degradation in bulk soil		0	[d-1] (12[oC])	D
RELEASE ESTIMATION				
Fraction of EU production volume for region		100	[%]	D
Fraction of EU tonnage for region (private use)		10	[%]	D
Fraction connected to sewer systems		80	[%]	D
SEWAGE TREATMENT				
GENERAL				
Number of inhabitants feeding one STP		1,00E+04	[eq]	D
Sewage flow		200	[l.eq-1.d-1]	D
Effluent discharge rate of local STP		2,00E+06	[l.d-1]	O
Temperature correction for STP degradation		No		D
Temperature of air above aeration tank		15	[oC]	D
Temperature of water in aeration tank		15	[oC]	D
Height of air column above STP		10	[m]	D
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants of continental system		3,5E+08	[eq]	O
Windspeed in the system		3	[m.s-1]	D
RAW SEWAGE				
Mass of O2 binding material per person per day		54	[g.eq-1.d-1]	D
Dry weight solids produced per person per day		0,09	[kg.eq-1.d-1]	D
Density solids in raw sewage		1,5	[kg.l-1]	D
Fraction of organic carbon in raw sewage sludge		0,3	[kg.kg-1]	D
PRIMARY SETTLER				
Depth of primary settler		4	[m]	D
Hydraulic retention time of primary settler		2	[hr]	D

Density suspended and settled solids in primary settler		1,5	[kg.l-1]	D
Fraction of organic carbon in settled sewage sludge		0,3	[kg.kg-1]	D
ACTIVATED SLUDGE TANK				
Depth of aeration tank		3	[m]	D
Density solids of activated sludge		1,3	[kg.l-1]	D
Concentration solids of activated sludge		4	[kg.m-3]	D
Steady state O2 concentration in activated sludge		2,00E-03	[kg.m-3]	D
Mode of aeration		Surface		D
Aeration rate of bubble aeration		1,31E-05	[m3.s-1.eq-1]	D
Fraction of organic carbon in activated sewage sludge		0,37	[kg.kg-1]	D
Sludge loading rate		0,15	[kg.kg-1.d-1]	D
Hydraulic retention time in aerator (9-box STP)		6,9	[hr]	O
Hydraulic retention time in aerator (6-box STP)		10,8	[hr]	O
Sludge retention time of aeration tank		9,2	[d]	O
SOLIDS-LIQUIDS SEPARATOR				
Depth of solids-liquid separator		3	[m]	D
Density suspended and settled solids in solids-liquid separator		1,3	[kg.l-1]	D
Concentration solids in effluent		30	[mg.l-1]	D
Hydraulic retention time of solids-liquid separator		6	[hr]	D
Fraction of organic carbon in effluent sewage sludge		0,37	[kg.kg-1]	D
LOCAL DISTRIBUTION				
AIR AND SURFACE WATER				
Concentration in air at source strength 1 [kg.d-1]		2,78E-04	[mg.m-3]	D
Standard deposition flux of aerosol-bound compounds		0,01	[mg.m-2.d-1]	D

Standard deposition flux of gaseous compounds		5,00E-04	[mg.m-2.d-1]	O
Suspended solids concentration in STP effluent water		15	[mg.l-1]	D
Dilution factor (rivers)		10	[-]	D
Flow rate of the river		1,8E+04	[m3.d-1]	D
Calculate dilution from river flow rate		No		D
Dilution factor (coastal areas)		100	[-]	D
SOIL				
Mixing depth of grassland soil		0,1	[m]	D
Dry sludge application rate on agricultural soil		5,00E+03	[kg.ha-1.yr-1]	D
Dry sludge application rate on grassland		1000	[kg.ha-1.yr-1]	D
Averaging time soil (for terrestrial ecosystem)		30	[d]	D
Averaging time agricultural soil		180	[d]	D
Averaging time grassland		180	[d]	D
PMTC, air side of air-soil interface		1,05E-03	[m.s-1]	O
Soil-air PMTC (air-soil interface)		5,56E-06	[m.s-1]	D
Soil-water film PMTC (air-soil interface)		5,56E-10	[m.s-1]	D
Mixing depth agricultural soil		0,2	[m]	D
Fraction of rain water infiltrating soil		0,25	[-]	D
Average annual precipitation		700	[mm.yr-1]	D
REGIONAL AND CONTINENTAL DISTRIBUTION				
CONFIGURATION				
Fraction of direct regional emissions to seawater		1	[%]	D
Fraction of direct continental emissions to seawater		0	[%]	D
Fraction of regional STP effluent to seawater		0	[%]	D
Fraction of continental STP effluent to seawater		0	[%]	D
Fraction of flow from continental rivers to regional rivers		0,034	[-]	D

Fraction of flow from continental rivers to regional sea		0	[-]	D
Fraction of flow from continental rivers to continental sea		0,966	[-]	O
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants in the EU		3,7E+08	[eq]	D
Number of inhabitants of continental system		3,5E+08	[eq]	O
AREAS				
REGIONAL				
Area (land+rivers) of regional system		4,00E+04	[km2]	D
Area fraction of freshwater, region (excl. sea)		0,03	[-]	D
Area fraction of natural soil, region (excl. sea)		0,27	[-]	D
Area fraction of agricultural soil, region (excl. sea)		0,6	[-]	D
Area fraction of industrial/urban soil, region (excl. sea)		0,1	[-]	D
Length of regional seawater		40	[km]	D
Width of regional seawater		10	[km]	D
Area of regional seawater		400	[km2]	O
Area (land+rivers+sea) of regional system		4,04E+04	[km2]	O
Area fraction of freshwater, region (total)		0,0297	[-]	O
Area fraction of seawater, region (total)		9,9E-03	[-]	O
Area fraction of natural soil, region (total)		0,267	[-]	O
Area fraction of agricultural soil, region (total)		0,594	[-]	O
Area fraction of industrial/urban soil, region (total)		0,099	[-]	O
CONTINENTAL				
Total area of EU (continent+region, incl. sea)		7,04E+06	[km2]	D
Area (land+rivers+sea) of continental system		7,00E+06	[km2]	O
Area (land+rivers) of continental system		3,5E+06	[km2]	O
Area fraction of freshwater, continent		0,03	[-]	D

(excl. sea)				
Area fraction of natural soil, continent (excl. sea)		0,27	[-]	D
Area fraction of agricultural soil, continent (excl. sea)		0,6	[-]	D
Area fraction of industrial/urban soil, continent (excl. sea)		0,1	[-]	D
Area fraction of freshwater, continent (total)		0,015	[-]	O
Area fraction of seawater, continent (total)		0,5	[-]	D
Area fraction of natural soil, continent (total)		0,135	[-]	O
Area fraction of agricultural soil, continent (total)		0,3	[-]	O
Area fraction of industrial/urban soil, continent (total)		0,05	[-]	O
MODERATE				
Area of moderate system (incl.continent,region)		8,5E+07	[km2]	D
Area of moderate system (excl.continent, region)		7,8E+07	[km2]	O
Area fraction of water, moderate system		0,5	[-]	D
ARCTIC				
Area of arctic system		4,25E+07	[km2]	D
Area fraction of water, arctic system		0,6	[-]	D
TROPIC				
Area of tropic system		1,28E+11	[km2]	D
Area fraction of water, tropic system		0,7	[-]	D
TEMPERATURE				
Environmental temperature, regional scale		12	[oC]	D
Environmental temperature, continental scale		12	[oC]	D
Environmental temperature, moderate scale		12	[oC]	D

Environmental temperature, arctic scale		-10	[oC]	D
Environmental temperature, tropic scale		25	[oC]	D
Enthalpy of vaporisation		50	[kJ.mol-1]	D
Enthalpy of solution		10	[kJ.mol-1]	D
MASS TRANSFER				
Air-film PMTC (air-water interface)		5,9E-03	[m.s-1]	O
Water-film PMTC (air-water interface)		6,4E-06	[m.s-1]	O
PMTC, air side of air-soil interface		1,05E-03	[m.s-1]	O
PMTC, soil side of air-soil interface		1,73E-11	[m.s-1]	O
Soil-air PMTC (air-soil interface)		5,56E-06	[m.s-1]	D
Soil-water film PMTC (air-soil interface)		5,56E-10	[m.s-1]	D
Water-film PMTC (sediment-water interface)		2,78E-06	[m.s-1]	D
Pore water PMTC (sediment-water interface)		2,78E-08	[m.s-1]	D
AIR				
GENERAL				
Atmospheric mixing height		1000	[m]	D
Windspeed in the system		3	[m.s-1]	D
Aerosol deposition velocity		1,00E-03	[m.s-1]	D
Aerosol collection efficiency		2,00E+05	[-]	D
RAIN				
Average precipitation, regional system		700	[mm.yr-1]	D
Average precipitation, continental system		700	[mm.yr-1]	D
Average precipitation, moderate system		700	[mm.yr-1]	D
Average precipitation, arctic system		250	[mm.yr-1]	D
Average precipitation, tropic system		1,3E+03	[mm.yr-1]	D
RESIDENCE TIMES				
Residence time of air, regional		0,687	[d]	O
Residence time of air, continental		9,05	[d]	O
Residence time of air, moderate		30,2	[d]	O
Residence time of air, arctic		22,3	[d]	O

Residence time of air, tropic		38,6	[d]	O
WATER				
DEPTH				
Water depth of freshwater, regional system		3	[m]	D
Water depth of seawater, regional system		10	[m]	D
Water depth of freshwater, continental system		3	[m]	D
Water depth of seawater, continental system		200	[m]	D
Water depth, moderate system		1000	[m]	D
Water depth, arctic system		1000	[m]	D
Water depth, tropic system		1000	[m]	D
SUSPENDED SOLIDS				
Suspended solids conc. freshwater, regional		15	[mg.l-1]	D
Suspended solids conc. seawater, regional		5	[mg.l-1]	D
Suspended solids conc. freshwater, continental		15	[mg.l-1]	D
Suspended solids conc. seawater, continental		5	[mg.l-1]	D
Suspended solids conc. seawater, moderate		5	[mg.l-1]	D
Suspended solids conc. seawater, arctic		5	[mg.l-1]	D
Suspended solids conc. seawater, tropic		5	[mg.l-1]	D
Concentration solids in effluent, regional		30	[mg.l-1]	D
Concentration solids in effluent, continental		30	[mg.l-1]	D
Concentration biota		1	[mgwwt.l-1]	D
RESIDENCE TIMES				
Residence time of freshwater, regional		43,3	[d]	O
Residence time of seawater, regional		4,64	[d]	O
Residence time of freshwater, continental		172	[d]	O
Residence time of seawater, continental		365	[d]	O

Residence time of water, moderate		2,69E+03	[d]	O
Residence time of water, arctic		5,84E+03	[d]	O
Residence time of water, tropic		1,09E+04	[d]	O
SEDIMENT				
DEPTH				
Sediment mixing depth		0,03	[m]	D
SUSPENDED SOLIDS				
(Biogenic) prod. susp. solids in freshwater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in freshwater, cont		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, cont		5	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, moderate		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, arctic		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, tropic		1	[g.m-2.yr-1]	D
SEDIMENTATION RATES				
Settling velocity of suspended solids		2,5	[m.d-1]	D
Net sedimentation rate, freshwater, regional		2,8	[mm.yr-1]	O
Net sedimentation rate, seawater, regional		1,53	[mm.yr-1]	O
Net sedimentation rate, freshwater, continental		2,75	[mm.yr-1]	O
Net sedimentation rate, seawater, continental		6,69E-03	[mm.yr-1]	O
Net sedimentation rate, moderate		2,8E-03	[mm.yr-1]	O
Net sedimentation rate, arctic		2,00E-03	[mm.yr-1]	O
Net sedimentation rate, tropic		2,00E-03	[mm.yr-1]	O
SOIL				
GENERAL				

Fraction of rain water infiltrating soil		0,25	[-]	D
Fraction of rain water running off soil		0,25	[-]	D
DEPTH				
Chemical-dependent soil depth		No		D
Mixing depth natural soil		0,05	[m]	D
Mixing depth agricultural soil		0,2	[m]	D
Mixing depth industrial/urban soil		0,05	[m]	D
Mixing depth of soil, moderate system		0,05	[m]	D
Mixing depth of soil, arctic system		0,05	[m]	D
Mixing depth of soil, tropic system		0,05	[m]	D
EROSION				
Soil erosion rate, regional system		0,03	[mm.yr-1]	D
Soil erosion rate, continental system		0,03	[mm.yr-1]	D
Soil erosion rate, moderate system		0,03	[mm.yr-1]	D
Soil erosion rate, arctic system		0,03	[mm.yr-1]	D
Soil erosion rate, tropic system		0,03	[mm.yr-1]	D
SUBSTANCE				
SUBSTANCE IDENTIFICATION				
General name		total Cu		S
Description		Wolmanit CX-10_family - VP		S
CAS-No				D
EC-notification no.				D
EINECS no.				D
PHYSICO-CHEMICAL PROPERTIES				
Molecular weight		63,5	[g.mol-1]	S
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O

Octanol-water partition coefficient		8,5E-07	[log10]	S
Water solubility at test temperature		1 237	[mg.l-1]	S
Temperature at which solubility was measured		20	[oC]	S
Water solubility at 25 [oC]		1,33	[mg.l-1]	O
PARTITION COEFFICIENTS AND BIOCONCENTRATION FACTORS				
SOLIDS-WATER				
Chemical class for Koc-QSAR		Non-hydrophobics (default QSAR)		D
Organic carbon-water partition coefficient		1,06E+05	[l.kg-1]	S
Solids-water partition coefficient in soil		2,12E+03	[l.kg-1]	O
Solids-water partition coefficient in sediment		5,3E+03	[l.kg-1]	O
Solids-water partition coefficient suspended matter		1,06E+04	[l.kg-1]	O
Solids-water partition coefficient in raw sewage sludge		3,18E+04	[l.kg-1]	O
Solids-water partition coefficient in settled sewage sludge		3,18E+04	[l.kg-1]	O
Solids-water partition coefficient in activated sewage sludge		3,92E+04	[l.kg-1]	O
Solids-water partition coefficient in effluent sewage sludge		3,92E+04	[l.kg-1]	O
Soil-water partition coefficient		3,18E+03	[m3.m-3]	O
Suspended matter-water partition coefficient		2,65E+03	[m3.m-3]	O
Sediment-water partition coefficient		2,65E+03	[m3.m-3]	O
AIR-WATER				
Environmental temperature		12	[oC]	D
Water solubility at environmental temperature		1,1	[mg.l-1]	O
Vapour pressure at environmental temperature		5,62E-07	[Pa]	O
Sub-cooled liquid vapour pressure		5,62E-07	[Pa]	O
Fraction of chemical associated with aerosol particles		0,994	[-]	O
Henry's law constant at test temparature		??	[Pa.m3.m	D

			ol-1]	
Temperature at which Henry's law constant was measured		25	[oC]	D
Henry's law constant at 25 [oC]		6,76E-05	[Pa.m3.mol-1]	O
Henry's law constant at enviromental temparature		3,24E-05	[Pa.m3.mol-1]	O
Air-water partitioning coefficient		1,37E-08	[m3.m-3]	O
BIOCONCENTRATION FACTORS				
PREDATOR EXPOSURE				
Bioconcentration factor for earthworms		0,852	[l.kgwwt-1]	O
HUMAN AND PREDATOR EXPOSURE				
Bioconcentration factor for fish		1,41	[l.kgwwt-1]	O
QSAR valid for calculation of BCF-Fish		Yes		O
Biomagnification factor in fish		1	[-]	O
Biomagnification factor in predator		1	[-]	O
HUMAN EXPOSURE				
Partition coefficient between leaves and air		4,83E+07	[m3.m-3]	O
Partition coefficient between plant tissue and water		0,66	[m3.m-3]	O
Transpiration-stream concentration factor		0,214	[-]	O
Bioaccumulation factor for meat		7,94E-07	[d.kg-1]	O
Bioaccumulation factor for milk		7,94E-06	[d.kg-1]	O
Purification factor for surface water		1	[-]	O
DEGRADATION AND TRANSFORMATION RATES				
CHARACTARIZATION				
Characterization of biodegradability		Not biodegradable		D
STP				
Degradation calculation method in STP		First order, standard OECD/EU tests		D

Rate constant for biodegradation in STP		0	[d-1]	O
Total rate constant for degradation in STP		0	[d-1]	O
Maximum growth rate of specific microorganisms		2	[d-1]	D
Half saturation concentration		0,5	[g.m-3]	D
WATER/SEDIMENT				
WATER				
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Total rate constant for degradation in bulk surface water		1,39E-06	[d-1] (12[oC])	O
Rate constant for biodegradation in saltwater		0	[d-1] (12[oC])	O
Total rate constant for degradation in bulk saltwater		1,39E-06	[d-1] (12[oC])	O
SEDIMENT				
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Total rate constant for degradation in bulk sediment		6,93E-08	[d-1] (12[oC])	O
AIR				
Specific degradation rate constant with OH-radicals		0	[cm3.molec-1.s-1]	D
Rate constant for degradation in air		0	[d-1]	O
SOIL				
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Total rate constant for degradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
REMOVAL RATE CONSTANTS SOIL				
Total rate constant for degradation in		6,93E-07	[d-1]	O

bulk soil			(12[oC])	
Rate constant for volatilisation from agricultural soil		1,94E-09	[d-1]	O
Rate constant for leaching from agricultural soil		7,54E-07	[d-1]	O
Total rate constant for removal from agricultural top soil		1,45E-06	[d-1]	O
Rate constant for volatilisation from grassland soil		3,89E-09	[d-1]	O
Rate constant for leaching from grassland soil		1,51E-06	[d-1]	O
Total rate constant for removal from grassland top soil		2,2E-06	[d-1]	O
Rate constant for volatilisation from industrial soil		7,78E-09	[d-1]	O
Rate constant for leaching from industrial soil		3,02E-06	[d-1]	O
Total rate constant for removal from industrial soil		3,72E-06	[d-1]	O
RELEASE ESTIMATION				
BIOCIDE SCENARIO INPUT DATA				
Usage/production title				D
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.1.3) Industrial process, Vacuum pressure		S
INDUSTRIAL USE				
Emission scenario		Local emissions and specific soil concentrations		S
INTERMEDIATE RESULTS				
RELEASE FRACTIONS AND EMISSION DAYS				
INDUSTRIAL USE				
INPUT				
Application rate		Solid		D
Solid application rate applied formulation		??	[kg.m-2]	D
Fluid application rate applied formulation		??	[m3.m-2]	D
Density of product		??	[kg.m-3]	D

Fraction of active ingredient		??	[-]	D
Vacuum pressure or double vacuum?		Vacuum pressure		D
Average daily flux of the active ingredient during storage period		??	[g.m-2.d-1]	D
Concentration in STP effluent, from processing		0,0156	[mg.l-1]	O
Effluent discharge rate of this STP		2,00E+06	[l.d-1]	O
PROCESSING				
Quantity of active ingredient applied per m3 of wood		??	[kg.m-3]	D
Local emission to air during episode		0,075	[kg.d-1]	S
Local emission to wastewater during episode		0,225	[kg.d-1]	S
Number of emission days per year		250	[-]	O
STORAGE				
Surface area of the storage place		525	[m2]	O
Wet soil mass		4,46E+05	[kgwwt]	O
Local emission to industrial soil		??	[kg.d-1]	O
Concentration of substance in soil, initial period		??	[mg.kgwwt-1]	O
Concentration of substance in soil, longer period		??	[mg.kgwwt-1]	O
Local emission to surface water		0	[kg.d-1]	D
Concentration in surface water during emission episode (dissolved)		1,35E-03	[mg.l-1]	O
Steady state concentration in soil		??	[mg.kgwwt-1]	O
Steady state concentration in soil pore water		??	[mg.l-1]	O
Concentration in industrial/application soil		??	[mg.kgwwt-1]	O
Number of emission days per year		250	[-]	O
DEFAULTS				
Effective surface area exposed to rain per unit of storage area		11	[m2.m-2]	D
Volume of wood treated per day		30	[m3.d-1]	O

Storage density of treated wood stacked on storage area		2	[m3.m-2]	D
Depth of receiving soil compartment		0,5	[m]	D
Fraction of rainwater running of storage site		0,5	[-]	D
DEFAULTS (CONTINUED)				
Duration of storage of treated wood prior to shipment		35	[d]	O
Number of emission days, initial period		30	[d]	D
Number of emission days, longer period		365	[d]	D
Volume flow rate of creek/river		2,59E+07	[m3.d-1]	D
Fraction of tonnage released to air		1,00E-03	[-]	O
Fraction of tonnage released to wastewater		0,03	[-]	O
Total rate constant for removal from industrial soil		3,72E-06	[d-1]	O
Soil-water partition coefficient		3,18E+03	[m3.m-3]	O
LOCAL				
[INDUSTRIAL USE]				
Local emission to air during episode		0,075	[kg.d-1]	S
Emission to air calculated by special scenario		Yes		O
Local emission to wastewater during episode		0,225	[kg.d-1]	S
Emission to water calculated by special scenario		Yes		O
Specific biocides scenario available		Yes		D
Show this step in further calculations		Yes		O
Intermittent release		No		D
DISTRIBUTION				
SEWAGE TREATMENT				
[INDUSTRIAL USE]				
INPUT AND CONFIGURATION [INDUSTRIAL USE]				
INPUT				
Use or bypass STP (local freshwater		Use STP		D

assessment)				
Use or bypass STP (local marine assessment)		Bypass STP		D
Local emission to wastewater during episode		0,225	[kg.d-1]	S
Concentration in untreated wastewater		0,112	[mg.l-1]	O
Local emission entering the STP		0,225	[kg.d-1]	O
CONFIGURATION				
Type of local STP		With primary settler (9-box)		D
Number of inhabitants feeding this STP		1,00E+04	[eq]	O
Effluent discharge rate of this STP		2,00E+06	[l.d-1]	O
Calculate dilution from river flow rate		No		O
Flow rate of the river		1,8E+04	[m3.d-1]	O
Dilution factor (rivers)		10	[-]	O
Dilution factor (coastal areas)		100	[-]	O
OUTPUT [INDUSTRIAL USE]				
Fraction of emission directed to air by STP		4,15E-06	[%]	O
Fraction of emission directed to water by STP		13,9	[%]	O
Fraction of emission directed to sludge by STP		86,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Total of fractions		100	[%]	O
Local indirect emission to air from STP during episode		9,34E-09	[kg.d-1]	O
Concentration in untreated wastewater		0,112	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		0,0156	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		245	[mg.kg-1]	O
PEC for micro-organisms in the STP		0,0156	[mg.l-1]	O
LIFE CYCLE STEPS				
[INDUSTRIAL USE]				

LOCAL CONCENTRATIONS AND DEPOSITIONS [INDUSTRIAL USE]				
AIR				
Concentration in air during emission episode		2,09E-05	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		1,43E-05	[mg.m-3]	O
Total deposition flux during emission episode		7,46E-04	[mg.m-2.d-1]	O
Annual average total deposition flux		5,11E-04	[mg.m-2.d-1]	O
WATER, SEDIMENT				
Concentration in surface water during emission episode (dissolved)		1,35E-03	[mg.l-1]	O
Concentration in surface water exceeds solubility		No		O
Annual average concentration in surface water (dissolved)		9,24E-04	[mg.l-1]	O
Concentration in seawater during emission episode (dissolved)		9,71E-04	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		6,65E-04	[mg.l-1]	O
SOIL, GROUNDWATER				
Concentration in agric. soil averaged over 30 days		3,6	[mg.kgwwt-1]	O
Concentration in agric. soil averaged over 180 days		3,6	[mg.kgwwt-1]	O
Concentration in grassland averaged over 180 days		1,45	[mg.kgwwt-1]	O
Fraction of steady-state (agricultural soil)		5,27E-03	[-]	O
Fraction of steady-state (grassland soil)		8,01E-03	[-]	O
LOCAL PECS [INDUSTRIAL USE]				
AIR				
Annual average local PEC in air (total)		1,43E-05	[mg.m-3]	O
WATER, SEDIMENT				
Local PEC in surface water during emission episode (dissolved)		1,35E-03	[mg.l-1]	O

Qualitative assessment might be needed (TGD Part II, 5.6)		No		O
Annual average local PEC in surface water (dissolved)		9,24E-04	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		3,11	[mg.kgwwt-1]	O
Local PEC in seawater during emission episode (dissolved)		9,71E-04	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)		No		O
Annual average local PEC in seawater (dissolved)		6,65E-04	[mg.l-1]	O
Local PEC in marine sediment during emission episode		2,24	[mg.kgwwt-1]	O
SOIL, GROUNDWATER				
Local PEC in agric. soil (total) averaged over 30 days		3,6	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		3,6	[mg.kgwwt-1]	O
Local PEC in grassland (total) averaged over 180 days		1,45	[mg.kgwwt-1]	O
Local PEC in pore water of agricultural soil		1,93E-03	[mg.l-1]	O
Local PEC in pore water of grassland		7,74E-04	[mg.l-1]	O
Local PEC in groundwater under agricultural soil		1,93E-03	[mg.l-1]	O

3.2.2.2.1.2 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 1: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S

Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		1 237	[mg.l-1]	S
Temperature at which solubility was measured		20	[oC]	S
Water solubility at 25 [oC]		1,33	[mg.l-1]	O
Octanol-water partition coefficient		8,5E-07	[log10]	S
Henry's law constant at 25 [oC]		6,76E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				
Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				
Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S
Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O
Fraction of tonnage released to		0	[-]	O

surface water				
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O
Number of emission days per year		30	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		1,55E-03	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O
Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				
PARTITION COEFFICIENTS				
Organic carbon-water partition coefficient		1,06E+05	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D

Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air by STP		4,15E-06	[%]	O
Fraction of emission directed to water by STP		13,9	[%]	O
Fraction of emission directed to sludge by STP		86,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated wastewater		7,73E-04	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		1,07E-04	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		1,68	[mg.kg-1]	O
PEC for micro-organisms in the STP		1,07E-04	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				

DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		1,78E-14	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		1,47E-15	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		9,27E-06	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		7,62E-07	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		9,27E-06	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		7,62E-07	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		0,0214	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		6,67E-06	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		5,48E-07	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)		6,67E-06	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		5,48E-07	[mg.l-1]	O
Local PEC in marine sediment during emission episode		0,0154	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		0,0247	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		0,0247	[mg.kg wwt-1]	O
Local PEC in grassland (total) averaged over 180 days		9,87E-03	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		1,32E-05	[mg.l-1]	O

3.2.2.2.1.3 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 2: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		1 237	[mg.l-1]	S
Temperature at which solubility was measured		20	[oC]	S
Water solubility at 25 [oC]		1,33	[mg.l-1]	O
Octanol-water partition coefficient		8,5E-07	[log10]	S
Henry's law constant at 25 [oC]		6,76E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				
Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				

Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S
Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O
Fraction of tonnage released to surface water		0	[-]	O
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O
Number of emission days per year		365	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		5,63E-04	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O
Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				

PARTITION COEFFICIENTS				
Organic carbon-water partition coefficient		1,06E+05	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air by STP		4,15E-06	[%]	O
Fraction of emission directed to water by STP		13,9	[%]	O
Fraction of emission directed to sludge by STP		86,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated		2,82E-04	[mg.l-	O

wastewater			1]	
Concentration of chemical (total) in the STP-effluent		3,91E-05	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		0,614	[mg.kg-1]	O
PEC for micro-organisms in the STP		3,91E-05	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				
DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		6,5E-15	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		6,5E-15	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		3,38E-06	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		3,38E-06	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		3,38E-06	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		3,38E-06	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		7,78E-03	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		2,43E-06	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		2,43E-06	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)		2,43E-06	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		2,43E-06	[mg.l-1]	O
Local PEC in marine sediment during emission episode		5,6E-03	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		9,00E-03	[mg.kg wwt-1]	O

Local PEC in agric. soil (total) averaged over 180 days		9,00E-03	[mg.kg wwt-1]	O
Local PEC in grassland (total) averaged over 180 days		3,6E-03	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		4,81E-06	[mg.l-1]	O

3.2.2.2.1.4 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 3: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		1 237	[mg.l-1]	S
Temperature at which solubility was measured		20	[oC]	S
Water solubility at 25 [oC]		1,33	[mg.l-1]	O
Octanol-water partition coefficient		8,5E-07	[log10]	S
Henry's law constant at 25 [oC]		6,76E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				

Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				
Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S
Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O
Fraction of tonnage released to surface water		0	[-]	O
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O
Number of emission days per year		30	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		6,58E-05	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O

Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				
PARTITION COEFFICIENTS				
Organic carbon-water partition coefficient		1,06E+05	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air		4,15E-06	[%]	O

by STP				
Fraction of emission directed to water by STP		13,9	[%]	O
Fraction of emission directed to sludge by STP		86,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated wastewater		3,29E-05	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		4,57E-06	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		0,0717	[mg.kg-1]	O
PEC for micro-organisms in the STP		4,57E-06	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				
DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		7,59E-16	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		6,24E-17	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		3,95E-07	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		3,24E-08	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		3,95E-07	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		3,24E-08	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		9,1E-04	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		2,84E-07	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		2,33E-08	[mg.l-1]	O

Local PEC in seawater during emission episode (dissolved)		2,84E-07	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		2,33E-08	[mg.l-1]	O
Local PEC in marine sediment during emission episode		6,54E-04	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		1,05E-03	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		1,05E-03	[mg.kg wwt-1]	O
Local PEC in grassland (total) averaged over 180 days		4,2E-04	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		5,62E-07	[mg.l-1]	O

3.2.2.2.2 Assessed substance: Cu-HDO

3.2.2.2.2.1 SCENARIO [1]: INDUSTRIAL PROCESS, VACUUM PRESSURE: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
DEFAULTS				
DEFAULT IDENTIFICATION				
General name		Standard Euses 2.1		D
Description		According to TGDs		D
CHARACTERISTICS OF COMPARTMENTS				
GENERAL				
Density of solid phase		2,5	[kg.l-1]	D
Density of water phase		1	[kg.l-1]	D
Density of air phase		1,3E-03	[kg.l-1]	D
Environmental temperature		12	[oC]	D
Standard temperature for Vp and Sol		25	[oC]	D
Temperature correction method		Temperature correction for local distribution		D
Constant of Junge equation		0,01	[Pa.m]	D
Surface area of aerosol particles		0,01	[m2.m-3]	D
Gas constant (8.314)		8 314	[Pa.m3.mol-1.K-1]	D
SUSPENDED MATTER				
Volume fraction solids in suspended matter		0,1	[m3.m-3]	D
Volume fraction water in suspended matter		0,9	[m3.m-3]	D
Weight fraction of organic carbon in suspended matter		0,1	[kg.kg-1]	D
Bulk density of suspended matter		1,15E+03	[kgwwt.m-3]	O
Conversion factor wet-dry suspened matter		4,6	[kgwwt.kgdwt-1]	O
SEDIMENT				

Volume fraction solids in sediment		0,2	[m3.m-3]	D
Volume fraction water in sediment		0,8	[m3.m-3]	D
Weight fraction of organic carbon in sediment		0,05	[kg.kg-1]	D
SOIL				
Volume fraction solids in soil		0,6	[m3.m-3]	D
Volume fraction water in soil		0,2	[m3.m-3]	D
Volume fraction air in soil		0,2	[m3.m-3]	D
Weight fraction of organic carbon in soil		0,02	[kg.kg-1]	D
Weight fraction of organic matter in soil		0,034	[kg.kg-1]	O
Bulk density of soil		1,7E+03	[kgwwt.m-3]	O
Conversion factor wet-dry soil		1,13	[kgwwt.kg dwt-1]	O
STP SLUDGE				
Fraction of organic carbon in raw sewage sludge		0,3	[kg.kg-1]	D
Fraction of organic carbon in settled sewage sludge		0,3	[kg.kg-1]	D
Fraction of organic carbon in activated sewage sludge		0,37	[kg.kg-1]	D
Fraction of organic carbon in effluent sewage sludge		0,37	[kg.kg-1]	D
DEGRADATION AND TRANSFORMATION RATES				
Rate constant for abiotic degradation in STP		0	[d-1]	D
Rate constant for abiotic degradation in bulk sediment		0	[d-1] (12[oC])	D
Rate constant for anaerobic biodegradation in sediment		0	[d-1] (12[oC])	D
Fraction of sediment compartment that is aerated		0,1	[m3.m-3]	D
Concentration of OH-radicals in atmosphere		5,00E+05	[molec.cm-3]	D
Rate constant for abiotic degradation in bulk soil		0	[d-1] (12[oC])	D

RELEASE ESTIMATION				
Fraction of EU production volume for region		100	[%]	D
Fraction of EU tonnage for region (private use)		10	[%]	D
Fraction connected to sewer systems		80	[%]	D
SEWAGE TREATMENT				
GENERAL				
Number of inhabitants feeding one STP		1,00E+04	[eq]	D
Sewage flow		200	[l.eq-1.d-1]	D
Effluent discharge rate of local STP		2,00E+06	[l.d-1]	O
Temperature correction for STP degradation		No		D
Temperature of air above aeration tank		15	[oC]	D
Temperature of water in aeration tank		15	[oC]	D
Height of air column above STP		10	[m]	D
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants of continental system		3,5E+08	[eq]	O
Windspeed in the system		3	[m.s-1]	D
RAW SEWAGE				
Mass of O2 binding material per person per day		54	[g.eq-1.d-1]	D
Dry weight solids produced per person per day		0,09	[kg.eq-1.d-1]	D
Density solids in raw sewage		1,5	[kg.l-1]	D
Fraction of organic carbon in raw sewage sludge		0,3	[kg.kg-1]	D
PRIMARY SETTLER				
Depth of primary settler		4	[m]	D
Hydraulic retention time of primary settler		2	[hr]	D
Density suspended and settled solids in primary settler		1,5	[kg.l-1]	D
Fraction of organic carbon in settled		0,3	[kg.kg-1]	D

sewage sludge				
ACTIVATED SLUDGE TANK				
Depth of aeration tank		3	[m]	D
Density solids of activated sludge		1,3	[kg.l-1]	D
Concentration solids of activated sludge		4	[kg.m-3]	D
Steady state O2 concentration in activated sludge		2,00E-03	[kg.m-3]	D
Mode of aeration		Surface		D
Aeration rate of bubble aeration		1,31E-05	[m3.s-1.eq-1]	D
Fraction of organic carbon in activated sewage sludge		0,37	[kg.kg-1]	D
Sludge loading rate		0,15	[kg.kg-1.d-1]	D
Hydraulic retention time in aerator (9-box STP)		6,9	[hr]	O
Hydraulic retention time in aerator (6-box STP)		10,8	[hr]	O
Sludge retention time of aeration tank		9,2	[d]	O
SOLIDS-LIQUIDS SEPARATOR				
Depth of solids-liquid separator		3	[m]	D
Density suspended and settled solids in solids-liquid separator		1,3	[kg.l-1]	D
Concentration solids in effluent		30	[mg.l-1]	D
Hydraulic retention time of solids-liquid separator		6	[hr]	D
Fraction of organic carbon in effluent sewage sludge		0,37	[kg.kg-1]	D
LOCAL DISTRIBUTION				
AIR AND SURFACE WATER				
Concentration in air at source strength 1 [kg.d-1]		2,78E-04	[mg.m-3]	D
Standard deposition flux of aerosol-bound compounds		0,01	[mg.m-2.d-1]	D
Standard deposition flux of gaseous compounds		5,00E-04	[mg.m-2.d-1]	O
Suspended solids concentration in STP		15	[mg.l-1]	D

effluent water				
Dilution factor (rivers)		10	[-]	D
Flow rate of the river		1,8E+04	[m3.d-1]	D
Calculate dilution from river flow rate		No		D
Dilution factor (coastal areas)		100	[-]	D
SOIL				
Mixing depth of grassland soil		0,1	[m]	D
Dry sludge application rate on agricultural soil		5,00E+03	[kg.ha-1.yr-1]	D
Dry sludge application rate on grassland		1000	[kg.ha-1.yr-1]	D
Averaging time soil (for terrestrial ecosystem)		30	[d]	D
Averaging time agricultural soil		180	[d]	D
Averaging time grassland		180	[d]	D
PMTC, air side of air-soil interface		1,05E-03	[m.s-1]	O
Soil-air PMTC (air-soil interface)		5,56E-06	[m.s-1]	D
Soil-water film PMTC (air-soil interface)		5,56E-10	[m.s-1]	D
Mixing depth agricultural soil		0,2	[m]	D
Fraction of rain water infiltrating soil		0,25	[-]	D
Average annual precipitation		700	[mm.yr-1]	D
REGIONAL AND CONTINENTAL DISTRIBUTION				
CONFIGURATION				
Fraction of direct regional emissions to seawater		1	[%]	D
Fraction of direct continental emissions to seawater		0	[%]	D
Fraction of regional STP effluent to seawater		0	[%]	D
Fraction of continental STP effluent to seawater		0	[%]	D
Fraction of flow from continental rivers to regional rivers		0,034	[-]	D
Fraction of flow from continental rivers to regional sea		0	[-]	D
Fraction of flow from continental rivers to		0,966	[-]	O

continental sea				
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants in the EU		3,7E+08	[eq]	D
Number of inhabitants of continental system		3,5E+08	[eq]	O
AREAS				
REGIONAL				
Area (land+rivers) of regional system		4,00E+04	[km2]	D
Area fraction of freshwater, region (excl. sea)		0,03	[-]	D
Area fraction of natural soil, region (excl. sea)		0,27	[-]	D
Area fraction of agricultural soil, region (excl. sea)		0,6	[-]	D
Area fraction of industrial/urban soil, region (excl. sea)		0,1	[-]	D
Length of regional seawater		40	[km]	D
Width of regional seawater		10	[km]	D
Area of regional seawater		400	[km2]	O
Area (land+rivers+sea) of regional system		4,04E+04	[km2]	O
Area fraction of freshwater, region (total)		0,0297	[-]	O
Area fraction of seawater, region (total)		9,9E-03	[-]	O
Area fraction of natural soil, region (total)		0,267	[-]	O
Area fraction of agricultural soil, region (total)		0,594	[-]	O
Area fraction of industrial/urban soil, region (total)		0,099	[-]	O
CONTINENTAL				
Total area of EU (continent+region, incl. sea)		7,04E+06	[km2]	D
Area (land+rivers+sea) of continental system		7,00E+06	[km2]	O
Area (land+rivers) of continental system		3,5E+06	[km2]	O
Area fraction of freshwater, continent (excl. sea)		0,03	[-]	D
Area fraction of natural soil, continent (excl. sea)		0,27	[-]	D

Area fraction of agricultural soil, continent (excl. sea)		0,6	[-]	D
Area fraction of industrial/urban soil, continent (excl. sea)		0,1	[-]	D
Area fraction of freshwater, continent (total)		0,015	[-]	O
Area fraction of seawater, continent (total)		0,5	[-]	D
Area fraction of natural soil, continent (total)		0,135	[-]	O
Area fraction of agricultural soil, continent (total)		0,3	[-]	O
Area fraction of industrial/urban soil, continent (total)		0,05	[-]	O
MODERATE				
Area of moderate system (incl.continent,region)		8,5E+07	[km2]	D
Area of moderate system (excl.continent, region)		7,8E+07	[km2]	O
Area fraction of water, moderate system		0,5	[-]	D
ARCTIC				
Area of arctic system		4,25E+07	[km2]	D
Area fraction of water, arctic system		0,6	[-]	D
TROPIC				
Area of tropic system		1,28E+11	[km2]	D
Area fraction of water, tropic system		0,7	[-]	D
TEMPERATURE				
Environmental temperature, regional scale		12	[oC]	D
Environmental temperature, continental scale		12	[oC]	D
Environmental temperature, moderate scale		12	[oC]	D
Environmental temperature, arctic scale		-10	[oC]	D
Environmental temperature, tropic scale		25	[oC]	D
Enthalpy of vaporisation		50	[kJ.mol-1]	D

Enthalpy of solution		10	[kJ.mol-1]	D
MASS TRANSFER				
Air-film PMTC (air-water interface)		3,33E-03	[m.s-1]	O
Water-film PMTC (air-water interface)		4,18E-06	[m.s-1]	O
PMTC, air side of air-soil interface		1,05E-03	[m.s-1]	O
PMTC, soil side of air-soil interface		3,88E-09	[m.s-1]	O
Soil-air PMTC (air-soil interface)		5,56E-06	[m.s-1]	D
Soil-water film PMTC (air-soil interface)		5,56E-10	[m.s-1]	D
Water-film PMTC (sediment-water interface)		2,78E-06	[m.s-1]	D
Pore water PMTC (sediment-water interface)		2,78E-08	[m.s-1]	D
AIR				
GENERAL				
Atmospheric mixing height		1000	[m]	D
Windspeed in the system		3	[m.s-1]	D
Aerosol deposition velocity		1,00E-03	[m.s-1]	D
Aerosol collection efficiency		2,00E+05	[-]	D
RAIN				
Average precipitation, regional system		700	[mm.yr-1]	D
Average precipitation, continental system		700	[mm.yr-1]	D
Average precipitation, moderate system		700	[mm.yr-1]	D
Average precipitation, arctic system		250	[mm.yr-1]	D
Average precipitation, tropic system		1,3E+03	[mm.yr-1]	D
RESIDENCE TIMES				
Residence time of air, regional		0,687	[d]	O
Residence time of air, continental		9,05	[d]	O
Residence time of air, moderate		30,2	[d]	O
Residence time of air, arctic		22,3	[d]	O
Residence time of air, tropic		38,6	[d]	O
WATER				
DEPTH				

Water depth of freshwater, regional system		3	[m]	D
Water depth of seawater, regional system		10	[m]	D
Water depth of freshwater, continental system		3	[m]	D
Water depth of seawater, continental system		200	[m]	D
Water depth, moderate system		1000	[m]	D
Water depth, arctic system		1000	[m]	D
Water depth, tropic system		1000	[m]	D
SUSPENDED SOLIDS				
Suspended solids conc. freshwater, regional		15	[mg.l-1]	D
Suspended solids conc. seawater, regional		5	[mg.l-1]	D
Suspended solids conc. freshwater, continental		15	[mg.l-1]	D
Suspended solids conc. seawater, continental		5	[mg.l-1]	D
Suspended solids conc. seawater, moderate		5	[mg.l-1]	D
Suspended solids conc. seawater, arctic		5	[mg.l-1]	D
Suspended solids conc. seawater, tropic		5	[mg.l-1]	D
Concentration solids in effluent, regional		30	[mg.l-1]	D
Concentration solids in effluent, continental		30	[mg.l-1]	D
Concentration biota		1	[mgwwt.l-1]	D
RESIDENCE TIMES				
Residence time of freshwater, regional		43,3	[d]	O
Residence time of seawater, regional		4,64	[d]	O
Residence time of freshwater, continental		172	[d]	O
Residence time of seawater, continental		365	[d]	O
Residence time of water, moderate		2,69E+03	[d]	O
Residence time of water, arctic		5,84E+03	[d]	O
Residence time of water, tropic		1,09E+04	[d]	O

SEDIMENT				
DEPTH				
Sediment mixing depth		0,03	[m]	D
SUSPENDED SOLIDS				
(Biogenic) prod. susp. solids in freshwater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in freshwater, cont		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, cont		5	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, moderate		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, arctic		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, tropic		1	[g.m-2.yr-1]	D
SEDIMENTATION RATES				
Settling velocity of suspended solids		2,5	[m.d-1]	D
Net sedimentation rate, freshwater, regional		2,8	[mm.yr-1]	O
Net sedimentation rate, seawater, regional		1,53	[mm.yr-1]	O
Net sedimentation rate, freshwater, continental		2,75	[mm.yr-1]	O
Net sedimentation rate, seawater, continental		6,69E-03	[mm.yr-1]	O
Net sedimentation rate, moderate		2,8E-03	[mm.yr-1]	O
Net sedimentation rate, arctic		2,00E-03	[mm.yr-1]	O
Net sedimentation rate, tropic		2,00E-03	[mm.yr-1]	O
SOIL				
GENERAL				
Fraction of rain water infiltrating soil		0,25	[-]	D
Fraction of rain water running off soil		0,25	[-]	D
DEPTH				

Chemical-dependent soil depth		No		D
Mixing depth natural soil		0,05	[m]	D
Mixing depth agricultural soil		0,2	[m]	D
Mixing depth industrial/urban soil		0,05	[m]	D
Mixing depth of soil, moderate system		0,05	[m]	D
Mixing depth of soil, arctic system		0,05	[m]	D
Mixing depth of soil, tropic system		0,05	[m]	D
EROSION				
Soil erosion rate, regional system		0,03	[mm.yr-1]	D
Soil erosion rate, continental system		0,03	[mm.yr-1]	D
Soil erosion rate, moderate system		0,03	[mm.yr-1]	D
Soil erosion rate, arctic system		0,03	[mm.yr-1]	D
Soil erosion rate, tropic system		0,03	[mm.yr-1]	D
SUBSTANCE				
SUBSTANCE IDENTIFICATION				
General name		Cu-HDO		S
Description		Wolmanit CX-10 - VP		S
CAS-No				D
EC-notification no.				D
EINECS no.				D
PHYSICO-CHEMICAL PROPERTIES				
Molecular weight		349,9	[g.mol-1]	S
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Octanol-water partition coefficient		2,6	[log10]	S
Water solubility at test temperature		6,1	[mg.l-1]	S
Temperature at which solubility was measured		23	[oC]	S
Water solubility at 25 [oC]		6,27	[mg.l-1]	O

PARTITION COEFFICIENTS AND BIOCONCENTRATION FACTORS				
SOLIDS-WATER				
Chemical class for Koc-QSAR		Non-hydrophobics (default QSAR)		D
Organic carbon-water partition coefficient		3,03E+09	[l.kg-1]	S
Solids-water partition coefficient in soil		606	[l.kg-1]	O
Solids-water partition coefficient in sediment		1,51E+03	[l.kg-1]	O
Solids-water partition coefficient suspended matter		3,03E+03	[l.kg-1]	O
Solids-water partition coefficient in raw sewage sludge		9,08E+03	[l.kg-1]	O
Solids-water partition coefficient in settled sewage sludge		9,08E+03	[l.kg-1]	O
Solids-water partition coefficient in activated sewage sludge		1,12E+04	[l.kg-1]	O
Solids-water partition coefficient in effluent sewage sludge		1,12E+04	[l.kg-1]	O
Soil-water partition coefficient		909	[m3.m-3]	O
Suspended matter-water partition coefficient		758	[m3.m-3]	O
Sediment-water partition coefficient		758	[m3.m-3]	O
AIR-WATER				
Environmental temperature		12	[oC]	D
Water solubility at environmental temperature		5,21	[mg.l-1]	O
Vapour pressure at environmental temperature		5,62E-07	[Pa]	O
Sub-cooled liquid vapour pressure		5,62E-07	[Pa]	O
Fraction of chemical associated with aerosol particles		0,994	[-]	O
Henry's law constant at test temparature		??	[Pa.m3.mol-1]	D
Temperature at which Henry's law constant was measured		25	[oC]	D
Henry's law constant at 25 [oC]		7,88E-05	[Pa.m3.mol-1]	O
Henry's law constant at enviromental		3,77E-05	[Pa.m3.m	O

temparature			ol-1]	
Air-water partitioning coefficient		1,59E-08	[m3.m-3]	O
BIOCONCENTRATION FACTORS				
PREDATOR EXPOSURE				
Bioconcentration factor for earthworms		5,62	[l.kgwwt-1]	O
HUMAN AND PREDATOR EXPOSURE				
Bioconcentration factor for fish		32,4	[l.kgwwt-1]	O
QSAR valid for calculation of BCF-Fish		Yes		O
Biomagnification factor in fish		1	[-]	O
Biomagnification factor in predator		1	[-]	O
HUMAN EXPOSURE				
Partition coefficient between leaves and air		2,26E+08	[m3.m-3]	O
Partition coefficient between plant tissue and water		3,6	[m3.m-3]	O
Transpiration-stream concentration factor		0,595	[-]	O
Bioaccumulation factor for meat		1,00E-05	[d.kg-1]	O
Bioaccumulation factor for milk		7,94E-06	[d.kg-1]	O
Purification factor for surface water		1	[-]	O
DEGRADATION AND TRANSFORMATION RATES				
CHARACTARIZATION				
Characterization of biodegradability		Not biodegradable		D
STP				
Degradation calculation method in STP		First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP		1,00E+40	[d] (DT50)	O
Total rate constant for degradation in STP		0	[d-1]	O
Maximum growth rate of specific microorganisms		2	[d-1]	D
Half saturation concentration		0,5	[g.m-3]	D

WATER/SEDIMENT				
WATER				
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Total rate constant for degradation in bulk surface water		1,39E-06	[d-1] (12[oC])	O
Rate constant for biodegradation in saltwater		0	[d-1] (12[oC])	O
Total rate constant for degradation in bulk saltwater		1,39E-06	[d-1] (12[oC])	O
SEDIMENT				
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Total rate constant for degradation in bulk sediment		6,93E-08	[d-1] (12[oC])	O
AIR				
Specific degradation rate constant with OH-radicals		0	[cm3.molec-1.s-1]	D
Rate constant for degradation in air		0	[d-1]	O
SOIL				
Rate constant for biodegradation in bulk soil		5,7	[d] (DT50,12[oC])	S
Total rate constant for degradation in bulk soil		0,122	[d-1] (12[oC])	O
REMOVAL RATE CONSTANTS SOIL				
Total rate constant for degradation in bulk soil		0,122	[d-1] (12[oC])	O
Rate constant for volatilisation from agricultural soil		7,93E-09	[d-1]	O
Rate constant for leaching from agricultural soil		2,64E-06	[d-1]	O

Total rate constant for removal from agricultural top soil		0,122	[d-1]	O
Rate constant for volatilisation from grassland soil		1,59E-08	[d-1]	O
Rate constant for leaching from grassland soil		5,28E-06	[d-1]	O
Total rate constant for removal from grassland top soil		0,122	[d-1]	O
Rate constant for volatilisation from industrial soil		3,17E-08	[d-1]	O
Rate constant for leaching from industrial soil		1,06E-05	[d-1]	O
Total rate constant for removal from industrial soil		0,122	[d-1]	O
RELEASE ESTIMATION				
BIOCIDE SCENARIO INPUT DATA				
Usage/production title				D
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.1.3) Industrial process, Vacuum pressure		S
INDUSTRIAL USE				
Emission scenario		Local emissions and specific soil concentrations		S
INTERMEDIATE RESULTS				
RELEASE FRACTIONS AND EMISSION DAYS				
INDUSTRIAL USE				
INPUT				
Application rate		Solid		S
Solid application rate applied formulation		??	[kg.m-2]	D
Fluid application rate applied formulation		??	[m3.m-2]	D
Density of product		??	[kg.m-3]	D
Fraction of active ingredient		??	[-]	D
Vacuum pressure or double vacuum?		Vacuum pressure		D
Average daily flux of the active ingredient during storage period		??	[mg.m-2.d-1]	D

Concentration in STP effluent, from processing		0,0102	[mg.l-1]	O
Effluent discharge rate of this STP		2,00E+06	[l.d-1]	O
PROCESSING				
Quantity of active ingredient applied per m3 of wood		??	[kg.m-3]	D
Local emission to air during episode		0,0263	[kg.d-1]	S
Local emission to wastewater during episode		0,0788	[kg.d-1]	S
Number of emission days per year		250	[-]	O
STORAGE				
Surface area of the storage place		525	[m2]	O
Wet soil mass		4,46E+05	[kgwwt]	O
Local emission to industrial soil		??	[kg.d-1]	O
Concentration of substance in soil, initial period		??	[mg.kgwwt-1]	O
Concentration of substance in soil, longer period		??	[mg.kgwwt-1]	O
Local emission to surface water		0	[kg.d-1]	D
Concentration in surface water during emission episode (dissolved)		9,74E-04	[mg.l-1]	O
Steady state concentration in soil		??	[mg.kgwwt-1]	O
Steady state concentration in soil pore water		??	[mg.l-1]	O
Concentration in industrial/application soil		??	[mg.kgwwt-1]	O
Number of emission days per year		250	[-]	O
DEFAULTS				
Effective surface area exposed to rain per unit of storage area		11	[m2.m-2]	D
Volume of wood treated per day		30	[m3.d-1]	O
Storage density of treated wood stacked on storage area		2	[m3.m-2]	D
Depth of receiving soil compartment		0,5	[m]	D
Fraction of rainwater running of storage site		0,5	[-]	D

DEFAULTS (CONTINUED)				
Duration of storage of treated wood prior to shipment		35	[d]	O
Number of emission days, initial period		30	[d]	D
Number of emission days, longer period		365	[d]	D
Volume flow rate of creek/river		2,59E+07	[m3.d-1]	D
Fraction of tonnage released to air		1,00E-03	[-]	O
Fraction of tonnage released to wastewater		0,03	[-]	O
Total rate constant for removal from industrial soil		0,122	[d-1]	O
Soil-water partition coefficient		909	[m3.m-3]	O
LOCAL				
[INDUSTRIAL USE]				
Local emission to air during episode		0,0263	[kg.d-1]	S
Emission to air calculated by special scenario		Yes		O
Local emission to wastewater during episode		0,0788	[kg.d-1]	S
Emission to water calculated by special scenario		Yes		O
Specific biocides scenario available		Yes		D
Show this step in further calculations		Yes		O
Intermittent release		No		D
DISTRIBUTION				
SEWAGE TREATMENT				
[INDUSTRIAL USE]				
INPUT AND CONFIGURATION [INDUSTRIAL USE]				
INPUT				
Use or bypass STP (local freshwater assessment)		Use STP		D
Use or bypass STP (local marine assessment)		Bypass STP		D
Local emission to wastewater during episode		0,0788	[kg.d-1]	S

Concentration in untreated wastewater		0,0394	[mg.l-1]	O
Local emission entering the STP		0,0788	[kg.d-1]	O
CONFIGURATION				
Type of local STP		With primary settler (9-box)		D
Number of inhabitants feeding this STP		1,00E+04	[eq]	O
Effluent discharge rate of this STP		2,00E+06	[l.d-1]	O
Calculate dilution from river flow rate		No		S
Flow rate of the river		1,8E+04	[m3.d-1]	O
Dilution factor (rivers)		10	[-]	O
Dilution factor (coastal areas)		100	[-]	O
OUTPUT [INDUSTRIAL USE]				
Fraction of emission directed to air by STP		1,46E-05	[%]	O
Fraction of emission directed to water by STP		25,9	[%]	O
Fraction of emission directed to sludge by STP		74,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Total of fractions		100	[%]	O
Local indirect emission to air from STP during episode		1,15E-08	[kg.d-1]	O
Concentration in untreated wastewater		0,0394	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		0,0102	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		74	[mg.kg-1]	O
PEC for micro-organisms in the STP		0,0102	[mg.l-1]	O
LIFE CYCLE STEPS				
[INDUSTRIAL USE]				
LOCAL CONCENTRATIONS AND DEPOSITIONS [INDUSTRIAL USE]				
AIR				
Concentration in air during emission episode		7,31E-06	[mg.m-3]	O

Annual average concentration in air, 100 m from point source		5,01E-06	[mg.m-3]	O
Total deposition flux during emission episode		2,62E-04	[mg.m-2.d-1]	O
Annual average total deposition flux		1,79E-04	[mg.m-2.d-1]	O
WATER, SEDIMENT				
Concentration in surface water during emission episode (dissolved)		9,74E-04	[mg.l-1]	O
Concentration in surface water exceeds solubility		No		O
Annual average concentration in surface water (dissolved)		6,67E-04	[mg.l-1]	O
Concentration in seawater during emission episode (dissolved)		3,77E-04	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		2,58E-04	[mg.l-1]	O
SOIL, GROUNDWATER				
Concentration in agric. soil averaged over 30 days		0,029	[mg.kgwwt-1]	O
Concentration in agric. soil averaged over 180 days		4,97E-03	[mg.kgwwt-1]	O
Concentration in grassland averaged over 180 days		2,00E-03	[mg.kgwwt-1]	O
Fraction of steady-state (agricultural soil)		1	[-]	O
Fraction of steady-state (grassland soil)		1	[-]	O
LOCAL PECS [INDUSTRIAL USE]				
AIR				
Annual average local PEC in air (total)		5,01E-06	[mg.m-3]	O
WATER, SEDIMENT				
Local PEC in surface water during emission episode (dissolved)		9,74E-04	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)		No		O
Annual average local PEC in surface water (dissolved)		6,67E-04	[mg.l-1]	O
Local PEC in fresh-water sediment during		0,642	[mg.kgww	O

emission episode			t-1]	
Local PEC in seawater during emission episode (dissolved)		3,77E-04	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)		No		O
Annual average local PEC in seawater (dissolved)		2,58E-04	[mg.l-1]	O
Local PEC in marine sediment during emission episode		0,248	[mg.kgwwt-1]	O
SOIL, GROUNDWATER				
Local PEC in agric. soil (total) averaged over 30 days		0,029	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		4,97E-03	[mg.kgwwt-1]	O
Local PEC in grassland (total) averaged over 180 days		2,00E-03	[mg.kgwwt-1]	O
Local PEC in pore water of agricultural soil		9,31E-06	[mg.l-1]	O
Local PEC in pore water of grassland		3,74E-06	[mg.l-1]	O
Local PEC in groundwater under agricultural soil		9,31E-06	[mg.l-1]	O

3.2.2.2.2.2 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 1: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		6,1	[mg.l-1]	S
Temperature at which solubility was measured		23	[oC]	S
Water solubility at 25 [oC]		6,27	[mg.l-	O

			1]	
Octanol-water partition coefficient		2,6	[log10]	S
Henry's law constant at 25 [oC]		7,88E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				
Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				
Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S
Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O
Fraction of tonnage released to surface water		0	[-]	O
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O

Number of emission days per year		30	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		1,81E-04	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O
Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				
PARTITION COEFFICIENTS				
Organic carbon-water partition coefficient		3,03E+09	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC]	O

			)	
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air by STP		1,46E-05	[%]	O
Fraction of emission directed to water by STP		25,9	[%]	O
Fraction of emission directed to sludge by STP		74,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated wastewater		9,03E-05	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		2,33E-05	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		0,17	[mg.kg-1]	O
PEC for micro-organisms in the STP		2,33E-05	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				
DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		7,35E-15	[mg.m-3]	O

Annual average concentration in air, 100 m from point source		6,04E-16	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		2,23E-06	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		1,84E-07	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		2,23E-06	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		1,84E-07	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		1,47E-03	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		8,64E-07	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		7,1E-08	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)		8,64E-07	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		7,1E-08	[mg.l-1]	O
Local PEC in marine sediment during emission episode		5,69E-04	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		2,48E-03	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		2,48E-03	[mg.kg wwt-1]	O
Local PEC in grassland (total) averaged over 180 days		9,87E-04	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		4,64E-06	[mg.l-1]	O

3.2.2.2.2.3 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 2: EUSES 2.1.2 OUTPUT FILE

Section/parameter		**Actual value**	**Unit**	**Stat**
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour		20	[oC]	S

pressure was measured				
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		6,1	[mg.l-1]	S
Temperature at which solubility was measured		23	[oC]	S
Water solubility at 25 [oC]		6,27	[mg.l-1]	O
Octanol-water partition coefficient		2,6	[log10]	S
Henry's law constant at 25 [oC]		7,88E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				
Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				
Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S
Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O

Fraction of tonnage released to surface water		0	[-]	O
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O
Number of emission days per year		30	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		1,59E-04	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O
Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				
PARTITION COEFFICIENTS				
Organic carbon-water partition coefficient		3,03E+09	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D

Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air by STP		1,46E-05	[%]	O
Fraction of emission directed to water by STP		25,9	[%]	O
Fraction of emission directed to sludge by STP		74,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated wastewater		7,94E-05	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent		2,05E-05	[mg.l-1]	O
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		0,149	[mg.kg-1]	O
PEC for micro-organisms in the STP		2,05E-05	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				

DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		6,46E-15	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		5,31E-16	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		1,96E-06	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		1,61E-07	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		1,96E-06	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		1,61E-07	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		1,29E-03	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		7,6E-07	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		6,24E-08	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)		7,6E-07	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		6,24E-08	[mg.l-1]	O
Local PEC in marine sediment during emission episode		5,01E-04	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		2,18E-03	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		2,18E-03	[mg.kg wwt-1]	O
Local PEC in grassland (total) averaged over 180 days		8,68E-04	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		4,08E-06	[mg.l-1]	O

3.2.2.2.2.4 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 3: EUSES 2.1.2 OUTPUT FILE

Section/parameter		Actual value	Unit	St

				at
PHYSICO-CHEMICAL PROPERTIES				
Melting point		??	[oC]	D
Boiling point		??	[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]		1,41E-06	[Pa]	O
Water solubility at test temperature		6,1	[mg.l-1]	S
Temperature at which solubility was measured		23	[oC]	S
Water solubility at 25 [oC]		6,27	[mg.l-1]	O
Octanol-water partition coefficient		2,6	[log10]	S
Henry's law constant at 25 [oC]		7,88E-05	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
Tonnage of substance in Europe		0	[tonnes.yr-1]	O
Regional production volume of substance		0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[1 "", IC=15/UC=39]				
Industry category		15/0 Others		D
Use category		39 Biocides, non-agricultural		D
Fraction of tonnage for application		1	[-]	D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
[SERVICE LIFE]				
Use specific emission scenario		Yes		D
Emission tables		No applicable emission tables		S

Emission scenario		Local wastewater emission and application soil concentration		S
Scenario choice for biocides		(8) Wood preservatives		S
Additional scenario information		(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air		0	[-]	O
Fraction of tonnage released to wastewater		0,7	[-]	O
Fraction of tonnage released to surface water		0	[-]	O
Fraction of tonnage released to industrial soil		0,3	[-]	O
Fraction of tonnage released to agricultural soil		0	[-]	O
Fraction of the main local source		0	[-]	O
Number of emission days per year		30	[-]	O
Local emission to air during episode		0	[kg.d-1]	O
Local emission to wastewater during episode		9,83E-06	[kg.d-1]	O
Intermittent release		No		D
ENVIRONMENT-EXPOSURE				
RELEASE ESTIMATION				
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS				
Total regional emission to air		0	[kg.d-1]	O
Total regional emission to wastewater		0	[kg.d-1]	O
Total regional emission to surface water		0	[kg.d-1]	O
Total regional emission to industrial soil		0	[kg.d-1]	O
Total regional emission to agricultural soil		0	[kg.d-1]	O
ENVIRONMENT-EXPOSURE				
PARTITION COEFFICIENTS				

Organic carbon-water partition coefficient		3,03E+09	[l.kg-1]	S
ENVIRONMENT-EXPOSURE				
DEGRADATION AND TRANSFORMATION				
Characterization of biodegradability		Not biodegradable		D
Degradation calculation method in STP		First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP		0	[d-1]	O
Rate constant for biodegradation in surface water		0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil		6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment		6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water		6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water		6,93E-07	[d-1]	O
ENVIRONMENT-EXPOSURE				
SEWAGE TREATMENT				
LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]				
OUTPUT				
Fraction of emission directed to air by STP		1,46E-05	[%]	O
Fraction of emission directed to water by STP		25,9	[%]	O
Fraction of emission directed to sludge by STP		74,1	[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Concentration in untreated wastewater		4,91E-06	[mg.l-1]	O
Concentration of chemical (total) in		1,27E-06	[mg.l-	O

the STP-effluent			1]	
Concentration in effluent exceeds solubility		No		O
Concentration in dry sewage sludge		9,22E-03	[mg.kg-1]	O
PEC for micro-organisms in the STP		1,27E-06	[mg.l-1]	O
ENVIRONMENT-EXPOSURE				
DISTRIBUTION				
LOCAL SCALE				
[1 "", IC=15/UC=39][SERVICE LIFE]				
Concentration in air during emission episode		4,00E-16	[mg.m-3]	O
Annual average concentration in air, 100 m from point source		3,29E-17	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)		1,22E-07	[mg.l-1]	O
Annual average concentration in surface water (dissolved)		9,99E-09	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)		1,22E-07	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)		9,99E-09	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode		8,01E-05	[mg.kg wwt-1]	O
Concentration in seawater during emission episode (dissolved)		4,7E-08	[mg.l-1]	O
Annual average concentration in seawater (dissolved)		3,86E-09	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)		4,7E-08	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)		3,86E-09	[mg.l-1]	O
Local PEC in marine sediment during emission episode		3,1E-05	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days		1,35E-04	[mg.kg wwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days		1,35E-04	[mg.kg wwt-1]	O

Local PEC in grassland (total) averaged over 180 days		5,37E-05	[mg.kg wwt-1]	O
Local PEC in groundwater under agricultural soil		2,52E-07	[mg.l-1]	O

3.2.2.2.3 Assessed substance: Boron

3.2.2.2.3.1 SCENARIO [1]: INDUSTRIAL PROCESS, VACUUM PRESSURE: EUSES 2.1.2 OUTPUT FILE

Section/parameter	**Actual value**	**Unit**	**St at**
STUDY			
STUDY IDENTIFICATION			
Study name	total Cu noise 30		S
Study description			D
Author			D
Institute			D
Address			D
Zip code			D
City			D
Country			D
Telephone			D
Telefax			D
Email			D
Calculations checksum	2A340868		S
DEFAULTS			
DEFAULT IDENTIFICATION			
General name	Standard Euses 2.1		D
Description	According to TGDs		D
CHARACTERISTICS OF COMPARTMENTS			
GENERAL			
Density of solid phase	2,5	[kg.l-1]	D
Density of water phase	1	[kg.l-1]	D
Density of air phase	1,3E-03	[kg.l-1]	D
Environmental temperature	12	[oC]	D
Standard temperature for Vp and Sol	25	[oC]	D
Constant of Junge equation	0,01	[Pa.m]	D
Surface area of aerosol particles	0,01	[m2.m-3]	D
Gas constant (8.314)	8 314	[Pa.m3.mol-1.K-1]	D
SUSPENDED MATTER			
Volume fraction solids in suspended matter	0,1	[m3.m-3]	D

Volume fraction water in suspended matter	0,9	[m3.m-3]	D
Weight fraction of organic carbon in suspended matter	0,1	[kg.kg-1]	D
Bulk density of suspended matter	1,15E+03	[kgwwt.m-3]	O
Conversion factor wet-dry suspened matter	4,6	[kgwwt.kgdwt-1]	O

SEDIMENT

Volume fraction solids in sediment	0,2	[m3.m-3]	D
Volume fraction water in sediment	0,8	[m3.m-3]	D
Weight fraction of organic carbon in sediment	0,05	[kg.kg-1]	D

SOIL

Volume fraction solids in soil	0,6	[m3.m-3]	D
Volume fraction water in soil	0,2	[m3.m-3]	D
Volume fraction air in soil	0,2	[m3.m-3]	D
Weight fraction of organic carbon in soil	0,02	[kg.kg-1]	D
Weight fraction of organic matter in soil	0,034	[kg.kg-1]	O
Bulk density of soil	1,7E+03	[kgwwt.m-3]	O
Conversion factor wet-dry soil	1,13	[kgwwt.kgdwt-1]	O

STP SLUDGE

Fraction of organic carbon in raw sewage sludge	0,3	[kg.kg-1]	D
Fraction of organic carbon in settled sewage sludge	0,3	[kg.kg-1]	D
Fraction of organic carbon in activated sewage sludge	0,37	[kg.kg-1]	D
Fraction of organic carbon in effluent sewage sludge	0,37	[kg.kg-1]	D

DEGRADATION AND TRANSFORMATION RATES

Rate constant for abiotic degradation in STP	0	[d-1]	D
Rate constant for abiotic degradation in bulk sediment	0	[d-1] (12[oC])	D
Rate constant for anaerobic biodegradation in sediment	0	[d-1] (12[oC])	D
Fraction of sediment compartment that is aerated	0,1	[m3.m-3]	D
Concentration of OH-radicals in atmosphere	5,00E+05	[molec.cm-3]	D
Rate constant for abiotic degradation in bulk soil	0	[d-1] (12[oC])	D

RELEASE ESTIMATION

Fraction of EU production volume for region	100	[%]	D
Fraction of EU tonnage for region (private use)	10	[%]	D

Fraction connected to sewer systems		80	[%]	D
SEWAGE TREATMENT				
GENERAL				
Number of inhabitants feeding one STP		1,00E+04	[eq]	D
Sewage flow		200	[l.eq-1.d-1]	D
Effluent discharge rate of local STP		2,00E+06	[l.d-1]	O
Temperature correction for STP degradation	No			D
Temperature of air above aeration tank		15	[oC]	D
Temperature of water in aeration tank		15	[oC]	D
Height of air column above STP		10	[m]	D
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants of continental system	3,5E+08		[eq]	O
Windspeed in the system		3	[m.s-1]	D
RAW SEWAGE				
Mass of O2 binding material per person per day		54	[g.eq-1.d-1]	D
Dry weight solids produced per person per day	0,09		[kg.eq-1.d-1]	D
Density solids in raw sewage	1,5		[kg.l-1]	D
Fraction of organic carbon in raw sewage sludge	0,3		[kg.kg-1]	D
PRIMARY SETTLER				
Depth of primary settler		4	[m]	D
Hydraulic retention time of primary settler		2	[hr]	D
Density suspended and settled solids in primary settler	1,5		[kg.l-1]	D
Fraction of organic carbon in settled sewage sludge	0,3		[kg.kg-1]	D
ACTIVATED SLUDGE TANK				
Depth of aeration tank		3	[m]	D
Density solids of activated sludge	1,3		[kg.l-1]	D
Concentration solids of activated sludge		4	[kg.m-3]	D
Steady state O2 concentration in activated sludge		2,00E-03	[kg.m-3]	D
Mode of aeration	Surface			D
Aeration rate of bubble aeration	1,31E-05		[m3.s-1.eq-1]	D
Fraction of organic carbon in activated sewage sludge	0,37		[kg.kg-1]	D
Sludge loading rate	0,15		[kg.kg-1.d-1]	D
Hydraulic retention time in aerator (9-box STP)	6,9		[hr]	O
Hydraulic retention time in aerator (6-box STP)	10,8		[hr]	O
Sludge retention time of aeration tank	9,2		[d]	O

SOLIDS-LIQUIDS SEPARATOR				
Depth of solids-liquid separator		3	[m]	D
Density suspended and settled solids in solids-liquid separator	1,3		[kg.l-1]	D
Concentration solids in effluent		30	[mg.l-1]	D
Hydraulic retention time of solids-liquid separator		6	[hr]	D
Fraction of organic carbon in effluent sewage sludge	0,37		[kg.kg-1]	D
LOCAL DISTRIBUTION				
AIR AND SURFACE WATER				
Concentration in air at source strength 1 [kg.d-1]	2,78E-04		[mg.m-3]	D
Standard deposition flux of aerosol-bound compounds	0,01		[mg.m-2.d-1]	D
Standard deposition flux of gaseous compounds		5,00E-04	[mg.m-2.d-1]	O
Suspended solids concentration in STP effluent water		15	[mg.l-1]	D
Dilution factor (rivers)		10	[-]	D
Flow rate of the river	1,8E+04		[m3.d-1]	D
Calculate dilution from river flow rate	No			D
Dilution factor (coastal areas)		100	[-]	D
SOIL				
Mixing depth of grassland soil	0,1		[m]	D
Dry sludge application rate on agricultural soil		5,00E+03	[kg.ha-1.yr-1]	D
Dry sludge application rate on grassland		1000	[kg.ha-1.yr-1]	D
Averaging time soil (for terrestrial ecosystem)		30	[d]	D
Averaging time agricultural soil		180	[d]	D
Averaging time grassland		180	[d]	D
PMTC, air side of air-soil interface	1,05E-03		[m.s-1]	O
Soil-air PMTC (air-soil interface)	5,56E-06		[m.s-1]	D
Soil-water film PMTC (air-soil interface)	5,56E-10		[m.s-1]	D
Mixing depth agricultural soil	0,2		[m]	D
Fraction of rain water infiltrating soil	0,25		[-]	D
Average annual precipitation		700	[mm.yr-1]	D
REGIONAL AND CONTINENTAL DISTRIBUTION				
CONFIGURATION				
Fraction of direct regional emissions to seawater		1	[%]	D
Fraction of direct continental emissions to seawater		0	[%]	D
Fraction of regional STP effluent to seawater		0	[%]	D

Fraction of continental STP effluent to seawater		0	[%]	D
Fraction of flow from continental rivers to regional rivers	0,034		[-]	D
Fraction of flow from continental rivers to regional sea		0	[-]	D
Fraction of flow from continental rivers to continental sea	0,966		[-]	O
Number of inhabitants of region		2,00E+07	[eq]	D
Number of inhabitants in the EU	3,7E+08		[eq]	D
Number of inhabitants of continental system	3,5E+08		[eq]	O

AREAS

REGIONAL

Area (land+rivers) of regional system		4,00E+04	[km2]	D
Area fraction of freshwater, region (excl. sea)	0,03		[-]	D
Area fraction of natural soil, region (excl. sea)	0,27		[-]	D
Area fraction of agricultural soil, region (excl. sea)	0,6		[-]	D
Area fraction of industrial/urban soil, region (excl. sea)	0,1		[-]	D
Length of regional seawater		40	[km]	D
Width of regional seawater		10	[km]	D
Area of regional seawater		400	[km2]	O
Area (land+rivers+sea) of regional system	4,04E+04		[km2]	O
Area fraction of freshwater, region (total)	0,0297		[-]	O
Area fraction of seawater, region (total)	9,9E-03		[-]	O
Area fraction of natural soil, region (total)	0,267		[-]	O
Area fraction of agricultural soil, region (total)	0,594		[-]	O
Area fraction of industrial/urban soil, region (total)	0,099		[-]	O

CONTINENTAL

Total area of EU (continent+region, incl. sea)	7,04E+06		[km2]	D
Area (land+rivers+sea) of continental system		7,00E+06	[km2]	O
Area (land+rivers) of continental system	3,5E+06		[km2]	O
Area fraction of freshwater, continent (excl. sea)	0,03		[-]	D
Area fraction of natural soil, continent (excl. sea)	0,27		[-]	D
Area fraction of agricultural soil, continent (excl. sea)	0,6		[-]	D
Area fraction of industrial/urban soil, continent (excl. sea)	0,1		[-]	D
Area fraction of freshwater, continent (total)	0,015		[-]	O
Area fraction of seawater, continent (total)	0,5		[-]	D
Area fraction of natural soil, continent (total)	0,135		[-]	O
Area fraction of agricultural soil, continent (total)	0,3		[-]	O

Area fraction of industrial/urban soil, continent (total)	0,05		[-]	O
MODERATE				
Area of moderate system (incl.continent,region)	8,5E+07		[km2]	D
Area of moderate system (excl.continent, region)	7,8E+07		[km2]	O
Area fraction of water, moderate system	0,5		[-]	D
ARCTIC				
Area of arctic system	4,25E+07		[km2]	D
Area fraction of water, arctic system	0,6		[-]	D
TROPIC				
Area of tropic system		1,28E+11	[km2]	D
Area fraction of water, tropic system	0,7		[-]	D
TEMPERATURE				
Environmental temperature, regional scale		12	[oC]	D
Environmental temperature, continental scale		12	[oC]	D
Environmental temperature, moderate scale		12	[oC]	D
Environmental temperature, arctic scale		-10	[oC]	D
Environmental temperature, tropic scale		25	[oC]	D
Enthalpy of vaporisation		50	[kJ.mol-1]	D
Enthalpy of solution		10	[kJ.mol-1]	D
MASS TRANSFER				
Air-film PMTC (air-water interface)	5,95E-03		[m.s-1]	O
Water-film PMTC (air-water interface)	6,45E-06		[m.s-1]	O
PMTC, air side of air-soil interface	1,05E-03		[m.s-1]	O
PMTC, soil side of air-soil interface		2,00E-08	[m.s-1]	O
Soil-air PMTC (air-soil interface)	5,56E-06		[m.s-1]	D
Soil-water film PMTC (air-soil interface)	5,56E-10		[m.s-1]	D
Water-film PMTC (sediment-water interface)	2,78E-06		[m.s-1]	D
Pore water PMTC (sediment-water interface)	2,78E-08		[m.s-1]	D
AIR				
GENERAL				
Atmospheric mixing height		1000	[m]	D
Windspeed in the system		3	[m.s-1]	D
Aerosol deposition velocity		1,00E-03	[m.s-1]	D
Aerosol collection efficiency		2,00E+05	[-]	D
RAIN				

Average precipitation, regional system		700	[mm.yr-1]	D
Average precipitation, continental system		700	[mm.yr-1]	D
Average precipitation, moderate system		700	[mm.yr-1]	D
Average precipitation, arctic system		250	[mm.yr-1]	D
Average precipitation, tropic system	1,3E+03		[mm.yr-1]	D

RESIDENCE TIMES

Residence time of air, regional	0,687		[d]	O
Residence time of air, continental	9,05		[d]	O
Residence time of air, moderate	30,2		[d]	O
Residence time of air, arctic	22,3		[d]	O
Residence time of air, tropic	38,6		[d]	O

WATER

DEPTH

Water depth of freshwater, regional system		3	[m]	D
Water depth of seawater, regional system		10	[m]	D
Water depth of freshwater, continental system		3	[m]	D
Water depth of seawater, continental system		200	[m]	D
Water depth, moderate system		1000	[m]	D
Water depth, arctic system		1000	[m]	D
Water depth, tropic system		1000	[m]	D

SUSPENDED SOLIDS

Suspended solids conc. freshwater, regional		15	[mg.l-1]	D
Suspended solids conc. seawater, regional		5	[mg.l-1]	D
Suspended solids conc. freshwater, continental		15	[mg.l-1]	D
Suspended solids conc. seawater, continental		5	[mg.l-1]	D
Suspended solids conc. seawater, moderate		5	[mg.l-1]	D
Suspended solids conc. seawater, arctic		5	[mg.l-1]	D
Suspended solids conc. seawater, tropic		5	[mg.l-1]	D
Concentration solids in effluent, regional		30	[mg.l-1]	D
Concentration solids in effluent, continental		30	[mg.l-1]	D
Concentration biota		1	[mgwwt.l-1]	D

RESIDENCE TIMES

Residence time of freshwater, regional	43,3		[d]	O
Residence time of seawater, regional	4,64		[d]	O
Residence time of freshwater, continental		172	[d]	O
Residence time of seawater, continental	2,1E+03		[d]	O
Residence time of water, moderate	3,03E+03		[d]	O
Residence time of water, arctic	5,84E+03		[d]	O
Residence time of water, tropic	1,09E+04		[d]	O

SEDIMENT

DEPTH

Sediment mixing depth	0,03		[m]	D

SUSPENDED SOLIDS

(Biogenic) prod. susp. solids in freshwater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, reg		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in freshwater, cont		10	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in seawater, cont		5	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, moderate		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, arctic		1	[g.m-2.yr-1]	D
(Biogenic) prod. susp. solids in water, tropic		1	[g.m-2.yr-1]	D

SEDIMENTATION RATES

Settling velocity of suspended solids	2,5		[m.d-1]	D
Net sedimentation rate, freshwater, regional	2,8		[mm.yr-1]	O
Net sedimentation rate, seawater, regional	1,53		[mm.yr-1]	O
Net sedimentation rate, freshwater, continental	2,75		[mm.yr-1]	O
Net sedimentation rate, seawater, continental	6,69E-03		[mm.yr-1]	O
Net sedimentation rate, moderate	2,8E-03		[mm.yr-1]	O
Net sedimentation rate, arctic		2,00E-03	[mm.yr-1]	O
Net sedimentation rate, tropic		2,00E-03	[mm.yr-1]	O

SOIL

GENERAL

Fraction of rain water infiltrating soil	0,25		[-]	D
Fraction of rain water running off soil	0,25		[-]	D

DEPTH

Chemical-dependent soil depth	No			D
Mixing depth natural soil	0,05		[m]	D
Mixing depth agricultural soil	0,2		[m]	D
Mixing depth industrial/urban soil	0,05		[m]	D
Mixing depth of soil, moderate system	0,05		[m]	D
Mixing depth of soil, arctic system	0,05		[m]	D
Mixing depth of soil, tropic system	0,05		[m]	D

EROSION

Soil erosion rate, regional system	0,03		[mm.yr-1]	D
Soil erosion rate, continental system	0,03		[mm.yr-1]	D
Soil erosion rate, moderate system	0,03		[mm.yr-1]	D
Soil erosion rate, arctic system	0,03		[mm.yr-1]	D
Soil erosion rate, tropic system	0,03		[mm.yr-1]	D

SUBSTANCE

SUBSTANCE IDENTIFICATION

General name	Boron		S
Description	Wolmanit CX-10_family - VP		S
CAS-No			D
EC-notification no.			D
EINECS no.			D

PHYSICO-CHEMICAL PROPERTIES

Molecular weight	61,83	[g.mol-1]	S
Melting point	??	[oC]	D
Boiling point	??	[oC]	D
Vapour pressure at test temperature	1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured	20	[oC]	S
Vapour pressure at 25 [oC]	1,41E-06	[Pa]	O
Octanol-water partition coefficient	-1	[log10]	S
Water solubility at test temperature	5,41E+07	[mg.l-1]	S
Temperature at which solubility was measured	20	[oC]	S
Water solubility at 25 [oC]	5,8E+04	[mg.l-1]	O

PARTITION COEFFICIENTS AND BIOCONCENTRATION FACTORS

SOLIDS-WATER

Chemical class for Koc-QSAR	Non-hydrophobics (default QSAR)		D
Organic carbon-water partition coefficient	2,6	[l.kg-1]	S
Solids-water partition coefficient in soil	0,052	[l.kg-1]	O
Solids-water partition coefficient in sediment	0,13	[l.kg-1]	O
Solids-water partition coefficient suspended matter	0,26	[l.kg-1]	O
Solids-water partition coefficient in raw sewage sludge	0,78	[l.kg-1]	O
Solids-water partition coefficient in settled sewage sludge	0,78	[l.kg-1]	O
Solids-water partition coefficient in activated sewage sludge	0,962	[l.kg-1]	O
Solids-water partition coefficient in effluent sewage sludge	0,962	[l.kg-1]	O
Soil-water partition coefficient	0,278	[m3.m-3]	O
Suspended matter-water partition coefficient	0,965	[m3.m-3]	O
Sediment-water partition coefficient	0,865	[m3.m-3]	O

AIR-WATER

Sub-cooled liquid vapour pressure	1,41E-06	[Pa]	O

Fraction of chemical associated with aerosol particles	0,986	[-]	O
Henry's law constant at 25 [oC]	1,5E-09	[Pa.m3.mol-1]	O
Air-water partitioning coefficient	6,35E-13	[m3.m-3]	O

BIOCONCENTRATION FACTORS

PREDATOR EXPOSURE

Bioconcentration factor for earthworms	0,841	[l.kgwwt-1]	O

HUMAN AND PREDATOR EXPOSURE

Bioconcentration factor for fish	1,41	[l.kgwwt-1]	O
QSAR valid for calculation of BCF-Fish	Yes		O
Biomagnification factor in fish	1	[-]	O
Biomagnification factor in predator	1	[-]	O

HUMAN EXPOSURE

Partition coefficient between leaves and air	1,03E+12	[m3.m-3]	O
Partition coefficient between plant tissue and water	0,651	[m3.m-3]	O
Transpiration-stream concentration factor	0,033	[-]	O
Bioaccumulation factor for meat	7,94E-07	[d.kg-1]	O
Bioaccumulation factor for milk	7,94E-06	[d.kg-1]	O
Purification factor for surface water	1	[-]	O

DEGRADATION AND TRANSFORMATION RATES

CHARACTARIZATION

Characterization of biodegradability	Not biodegradable		D

STP

Degradation calculation method in STP	First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP	0	[d-1]	O
Total rate constant for degradation in STP	0	[d-1]	O
Maximum growth rate of specific microorganisms	2	[d-1]	D
Half saturation concentration	0,5	[g.m-3]	D

WATER/SEDIMENT

WATER

Rate constant for hydrolysis in surface water	6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water	6,93E-07	[d-1]	O
Rate constant for biodegradation in surface water	0	[d-1] (12[oC])	O

Total rate constant for degradation in bulk surface water	1,39E-06	[d-1] (12[oC])	O
SEDIMENT			
Rate constant for biodegradation in aerated sediment	6,93E-07	[d-1] (12[oC])	O
Total rate constant for degradation in bulk sediment	6,93E-08	[d-1] (12[oC])	O
AIR			
Specific degradation rate constant with OH-radicals	0	[cm3.molec-1.s-1]	D
Rate constant for degradation in air	0	[d-1]	O
SOIL			
Rate constant for biodegradation in bulk soil	6,93E-07	[d-1] (12[oC])	O
Total rate constant for degradation in bulk soil	6,93E-07	[d-1] (12[oC])	O
REMOVAL RATE CONSTANTS SOIL			
Total rate constant for degradation in bulk soil	6,93E-07	[d-1] (12[oC])	O
Rate constant for volatilisation from agricultural soil	1,03E-09	[d-1]	O
Rate constant for leaching from agricultural soil	8,62E-03	[d-1]	O
Total rate constant for removal from agricultural top soil	8,62E-03	[d-1]	O
Rate constant for volatilisation from grassland soil	2,07E-09	[d-1]	O
Rate constant for leaching from grassland soil	0,0172	[d-1]	O
Total rate constant for removal from grassland top soil	0,0172	[d-1]	O
Rate constant for volatilisation from industrial soil	4,14E-09	[d-1]	O
Rate constant for leaching from industrial soil	0,0345	[d-1]	O
Total rate constant for removal from industrial soil	0,0345	[d-1]	O
RELEASE ESTIMATION			
BIOCIDE SCENARIO INPUT DATA			
Usage/production title			D
Scenario choice for biocides	(8) Wood preservatives		S
Additional scenario information	(8.1.3) Industrial process, Vacuum pressure		S
INDUSTRIAL USE			

Emission scenario	Local emissions and soil concentration		S

INTERMEDIATE RESULTS

RELEASE FRACTIONS AND EMISSION DAYS

INDUSTRIAL USE

INPUT

Application rate	Solid		D
Solid application rate applied formulation	??	[kg.m-2]	D
Fluid application rate applied formulation	??	[m3.m-2]	D
Density of product	??	[kg.m-3]	D
Fraction of active ingredient	??	[-]	D
Vacuum pressure or double vacuum?	Vacuum pressure		D
Average daily flux of the active ingredient during storage period	??	[g.m-2.d-1]	D
Concentration in STP effluent, from processing	0,123	[mg.l-1]	O
Effluent discharge rate of this STP	2,00E+06	[l.d-1]	O

PROCESSING

Quantity of active ingredient applied per m3 of wood	??	[kg.m-3]	D
Local emission to air during episode	8,19E-03	[kg.d-1]	S
Local emission to wastewater during episode	0,246	[kg.d-1]	S
Number of emission days per year	250	[-]	O

STORAGE

Surface area of the storage place	525	[m2]	O
Wet soil mass	4,46E+05	[kgwwt]	O
Local emission to industrial soil	??	[kg.d-1]	O
Concentration of substance in soil, initial period	??	[mg.kgwwt-1]	O
Concentration of substance in soil, longer period	??	[mg.kgwwt-1]	O
Local emission to surface water	0	[kg.d-1]	D
Concentration in surface water during emission episode (dissolved)	0,0123	[mg.l-1]	O
Steady state concentration in soil	??	[mg.kgwwt-1]	O
Steady state concentration in soil pore water	??	[mg.l-1]	O
Concentration in industrial/application soil	??	[mg.kgwwt-1]	O
Number of emission days per year	250	[-]	O

DEFAULTS

Effective surface area exposed to rain per unit of storage area	11	[m2.m-2]	D

Volume of wood treated per day		30	[m3.d-1]	O
Storage density of treated wood stacked on storage area		2	[m3.m-2]	D
Depth of receiving soil compartment	0,5		[m]	D
Fraction of rainwater running of storage site	0,5		[-]	D

DEFAULTS (CONTINUED)

Duration of storage of treated wood prior to shipment		35	[d]	O
Number of emission days, initial period		30	[d]	D
Number of emission days, longer period		365	[d]	D
Volume flow rate of creek/river		2,59E+07	[m3.d-1]	D
Fraction of tonnage released to air		1,00E-03	[-]	O
Fraction of tonnage released to wastewater	0,03		[-]	O
Total rate constant for removal from industrial soil	0,0345		[d-1]	O
Soil-water partition coefficient	0,278		[m3.m-3]	O

LOCAL

[INDUSTRIAL USE]

Local emission to air during episode	8,19E-03		[kg.d-1]	S
Emission to air calculated by special scenario	Yes			O
Local emission to wastewater during episode	0,246		[kg.d-1]	S
Emission to water calculated by special scenario	Yes			O
Specific biocides scenario available	Yes			D
Show this step in further calculations	Yes			O
Intermittent release	No			D

DISTRIBUTION

SEWAGE TREATMENT

[INDUSTRIAL USE]

INPUT AND CONFIGURATION [INDUSTRIAL USE]

INPUT

Use or bypass STP (local freshwater assessment)	Use STP			D
Use or bypass STP (local marine assessment)	Bypass STP			D
Local emission to wastewater during episode	0,246		[kg.d-1]	S
Concentration in untreated wastewater	0,123		[mg.l-1]	O
Local emission entering the STP	0,246		[kg.d-1]	O

CONFIGURATION

Type of local STP	With primary settler (9-box)			D
Number of inhabitants feeding this STP		1,00E+04	[eq]	O
Effluent discharge rate of this STP		2,00E+06	[l.d-1]	O
Calculate dilution from river flow rate	No			O

Flow rate of the river	1,8E+04		[m3.d-1]	O
Dilution factor (rivers)		10	[-]	O
Dilution factor (coastal areas)		100	[-]	O
OUTPUT [INDUSTRIAL USE]				
Fraction of emission directed to air by STP	2,99E-09		[%]	O
Fraction of emission directed to water by STP		100	[%]	O
Fraction of emission directed to sludge by STP	0,0325		[%]	O
Fraction of the emission degraded in STP		0	[%]	O
Total of fractions		100	[%]	O
Local indirect emission to air from STP during episode	7,35E-12		[kg.d-1]	O
Concentration in untreated wastewater	0,123		[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent	0,123		[mg.l-1]	O
Concentration in effluent exceeds solubility	No			O
Concentration in dry sewage sludge	0,101		[mg.kg-1]	O
PEC for micro-organisms in the STP	0,123		[mg.l-1]	O
LIFE CYCLE STEPS				
[INDUSTRIAL USE]				
LOCAL CONCENTRATIONS AND DEPOSITIONS [INDUSTRIAL USE]				
AIR				
Concentration in air during emission episode	2,28E-06		[mg.m-3]	O
Annual average concentration in air, 100 m from point source	1,56E-06		[mg.m-3]	O
Total deposition flux during emission episode	8,08E-05		[mg.m-2.d-1]	O
Annual average total deposition flux	5,54E-05		[mg.m-2.d-1]	O
WATER, SEDIMENT				
Concentration in surface water during emission episode (dissolved)	0,0123		[mg.l-1]	O
Concentration in surface water exceeds solubility	No			O
Annual average concentration in surface water (dissolved)	8,42E-03		[mg.l-1]	O
Concentration in seawater during emission episode (dissolved)	1,23E-03		[mg.l-1]	O
Annual average concentration in seawater (dissolved)	8,42E-04		[mg.l-1]	O
SOIL, GROUNDWATER				
Concentration in agric. soil averaged over 30 days	1,56E-04		[mg.kgwwt-1]	O
Concentration in agric. soil averaged over 180	9,79E-05		[mg.kgwwt-	O

days		1]	
Concentration in grassland averaged over 180 days	3,72E-05	[mg.kgwwt-1]	O
Fraction of steady-state (agricultural soil)	1	[-]	O
Fraction of steady-state (grassland soil)	1	[-]	O
LOCAL PECS [INDUSTRIAL USE]			
AIR			
Annual average local PEC in air (total)	1,56E-06	[mg.m-3]	O
WATER, SEDIMENT			
Local PEC in surface water during emission episode (dissolved)	0,0123	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)	No		O
Annual average local PEC in surface water (dissolved)	8,42E-03	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode	0,0103	[mg.kgwwt-1]	O
Local PEC in seawater during emission episode (dissolved)	1,23E-03	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)	No		O
Annual average local PEC in seawater (dissolved)	8,42E-04	[mg.l-1]	O
Local PEC in marine sediment during emission episode	1,03E-03	[mg.kgwwt-1]	O
SOIL, GROUNDWATER			
Local PEC in agric. soil (total) averaged over 30 days	1,56E-04	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days	9,79E-05	[mg.kgwwt-1]	O
Local PEC in grassland (total) averaged over 180 days	3,72E-05	[mg.kgwwt-1]	O
Local PEC in pore water of agricultural soil	5,99E-04	[mg.l-1]	O
Local PEC in pore water of grassland	2,28E-04	[mg.l-1]	O
Local PEC in groundwater under agricultural soil	5,99E-04	[mg.l-1]	O

3.2.2.2.3.2 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 1: EUSES 2.1.2 OUTPUT FILE

Section/parameter	**Actual value**	**Unit**	**Stat**

STUDY

STUDY IDENTIFICATION

Study name	total Cu noise 30			S
Study description				D
Author				D
Institute				D
Address				D
Zip code				D
City				D
Country				D
Telephone				D
Telefax				D
Email				D
Calculations checksum	3C7A2EE1			S

SUBSTANCE

SUBSTANCE IDENTIFICATION

General name	Boron			S
Description	Wolmanit CX-10 familie - Noise barrier			S
CAS-No				D
EC-notification no.				D
EINECS no.				D

PHYSICO-CHEMICAL PROPERTIES

Molecular weight	61,83		[g.mol-1]	S
Melting point	??		[oC]	D
Boiling point	??		[oC]	D
Vapour pressure at test temperature		1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured		20	[oC]	S
Vapour pressure at 25 [oC]	1,41E-06		[Pa]	O
Octanol-water partition coefficient		-1	[log10]	S
Water solubility at test temperature	54,13		[mg.l-1]	S
Temperature at which solubility was measured		20	[oC]	S
Water solubility at 25 [oC]		58	[mg.l-1]	O

PARTITION COEFFICIENTS AND BIOCONCENTRATION FACTORS

SOLIDS-WATER

Organic carbon-water partition coefficient	2,6		[l.kg-1]	S

RELEASE ESTIMATION

BIOCIDE SCENARIO INPUT DATA

Usage/production title			D
Scenario choice for biocides	(8) Wood preservatives		S
Additional scenario information	(8.2.2) Treated wood, noise barrier		S

SERVICE LIFE

Emission scenario	Local soil and wastewater		S

INTERMEDIATE RESULTS

RELEASE FRACTIONS AND EMISSION DAYS

SERVICE LIFE

INPUT

Average daily flux, initial assessment period	0,403	[mg.m-2.d-1]	S

CALCULATIONS

Average rate of active ingredient leached out (initial period)	3,87E-04	[kg.d-1]	S
Local emission from to wastewater, initial period	9,03E-04	[kg.d-1]	S
Concentration of substance in soil, initial period	2,73E-04	[mg.kgwwt-1]	S

DISTRIBUTION

LIFE CYCLE STEPS

LOCAL PECS [SERVICE LIFE]

AIR

Annual average local PEC in air (total)	6,21E-16	[mg.m-3]	O

WATER, SEDIMENT

Local PEC in surface water during emission episode (dissolved)	4,51E-05	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)	No		O
Annual average local PEC in surface water (dissolved)	3,71E-06	[mg.l-1]	O
Local PEC in fresh-water sediment during emission episode	3,79E-05	[mg.kgwwt-1]	O
Local PEC in seawater during emission episode (dissolved)	4,51E-06	[mg.l-1]	O
Qualitative assessment might be needed (TGD Part II, 5.6)	No		O
Annual average local PEC in seawater (dissolved)	3,71E-07	[mg.l-1]	O
Local PEC in marine sediment during emission episode	3,79E-06	[mg.kgwwt-1]	O

SOIL, GROUNDWATER

Local PEC in agric. soil (total) averaged over 30 days	5,03E-07	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days	2,9E-07	[mg.kgwwt-1]	O
Local PEC in grassland (total) averaged over 180 days	6,74E-08	[mg.kgwwt-1]	O
Local PEC in pore water of agricultural soil	1,77E-06	[mg.l-1]	O
Local PEC in pore water of grassland	4,12E-07	[mg.l-1]	O
Local PEC in groundwater under agricultural soil	1,77E-06	[mg.l-1]	O
Local PEC in industrial/application soil	2,73E-04	[mg.kgwwt-1]	O

3.2.2.2.3.3 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 2: EUSES 2.1.2 OUTPUT FILE

Section/parameter	Actual value	Unit	Stat
PHYSICO-CHEMICAL PROPERTIES			
Melting point	??	[oC]	D
Boiling point	??	[oC]	D
Vapour pressure at test temperature	1,00E-06	[Pa]	S
Temperature at which vapour pressure was measured	20	[oC]	S
Vapour pressure at 25 [oC]	1,41E-06	[Pa]	O
Water solubility at test temperature	54,13	[mg.l-1]	S
Temperature at which solubility was measured	20	[oC]	S
Water solubility at 25 [oC]	58	[mg.l-1]	O
Octanol-water partition coefficient	-1	[log10]	S
Henry's law constant at 25 [oC]	1,5E-06	[Pa.m3.mol-1]	O
ENVIRONMENT-EXPOSURE			
RELEASE ESTIMATION			
Tonnage of substance in Europe	0	[tonnes.yr-1]	O
Regional production volume of substance	0	[tonnes.yr-1]	O
ENVIRONMENT-EXPOSURE			
RELEASE ESTIMATION			
[1 "", IC=15/UC=39]			
Industry category	15/0 Others		D
Use category	39 Biocides, non-agricultural		D
Fraction of tonnage for application	1	[-]	D

ENVIRONMENT-EXPOSURE
RELEASE ESTIMATION
[SERVICE LIFE]

Use specific emission scenario	Yes		D
Emission tables	No applicable emission tables		S
Emission scenario	Local wastewater emission and application soil concentration		S
Scenario choice for biocides	(8) Wood preservatives		S
Additional scenario information	(8.2.2) Treated wood, noise barrier		S
Fraction of tonnage released to air	0	[-]	O
Fraction of tonnage released to wastewater	0,7	[-]	O
Fraction of tonnage released to surface water	0	[-]	O
Fraction of tonnage released to industrial soil	0,3	[-]	O
Fraction of tonnage released to agricultural soil	0	[-]	O
Fraction of the main local source	0	[-]	O
Number of emission days per year	365	[-]	O
Local emission to air during episode	0	[kg.d-1]	O
Local emission to wastewater during episode	9,2E-04	[kg.d-1]	O
Intermittent release	No		D

ENVIRONMENT-EXPOSURE
RELEASE ESTIMATION
TOTAL REGIONAL EMISSIONS TO COMPARTMENTS

Total regional emission to air	0	[kg.d-1]	O
Total regional emission to wastewater	0	[kg.d-1]	O
Total regional emission to surface water	0	[kg.d-1]	O
Total regional emission to industrial soil	0	[kg.d-1]	O
Total regional emission to agricultural soil	0	[kg.d-1]	O

ENVIRONMENT-EXPOSURE
PARTITION COEFFICIENTS

Organic carbon-water partition coefficient	2,6	[l.kg-1]	S

ENVIRONMENT-EXPOSURE
DEGRADATION AND TRANSFORMATION

Characterization of biodegradability	Not biodegradable		D
Degradation calculation method in STP	First order, standard OECD/EU tests		D
Rate constant for biodegradation in STP	0	[d-1]	O

Rate constant for biodegradation in surface water	0	[d-1] (12[oC])	O
Rate constant for biodegradation in bulk soil	6,93E-07	[d-1] (12[oC])	O
Rate constant for biodegradation in aerated sediment	6,93E-07	[d-1] (12[oC])	O
Rate constant for hydrolysis in surface water	6,93E-07	[d-1] (12[oC])	O
Rate constant for photolysis in surface water	6,93E-07	[d-1]	O

ENVIRONMENT-EXPOSURE

SEWAGE TREATMENT

LOCAL STP [1 "", IC=15/UC=39][SERVICE LIFE]

OUTPUT

Fraction of emission directed to air by STP	1,44E-06	[%]	O
Fraction of emission directed to water by STP	100	[%]	O
Fraction of emission directed to sludge by STP	0,0325	[%]	O
Fraction of the emission degraded in STP	0	[%]	O
Concentration in untreated wastewater	4,6E-04	[mg.l-1]	O
Concentration of chemical (total) in the STP-effluent	4,6E-04	[mg.l-1]	O
Concentration in effluent exceeds solubility	No		O
Concentration in dry sewage sludge	3,79E-04	[mg.kg-1]	O
PEC for micro-organisms in the STP	4,6E-04	[mg.l-1]	O

ENVIRONMENT-EXPOSURE

DISTRIBUTION

LOCAL SCALE

[1 "", IC=15/UC=39][SERVICE LIFE]

Concentration in air during emission episode	3,69E-15	[mg.m-3]	O
Annual average concentration in air, 100 m from point source	3,69E-15	[mg.m-3]	O
Concentration in surface water during emission episode (dissolved)	4,6E-05	[mg.l-1]	O
Annual average concentration in surface water (dissolved)	4,6E-05	[mg.l-1]	O
Local PEC in surface water during emission episode (dissolved)	4,6E-05	[mg.l-1]	O
Annual average local PEC in surface water (dissolved)	4,6E-05	[mg.l-1]	O
Local PEC in fresh-water sediment during	3,86E-05	[mg.kgw	O

emission episode		wt-1]	
Concentration in seawater during emission episode (dissolved)	4,6E-06	[mg.l-1]	O
Annual average concentration in seawater (dissolved)	4,6E-06	[mg.l-1]	O
Local PEC in seawater during emission episode (dissolved)	4,6E-06	[mg.l-1]	O
Annual average local PEC in seawater (dissolved)	4,6E-06	[mg.l-1]	O
Local PEC in marine sediment during emission episode	3,86E-06	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 30 days	5,13E-07	[mg.kgwwt-1]	O
Local PEC in agric. soil (total) averaged over 180 days	2,95E-07	[mg.kgwwt-1]	O
Local PEC in grassland (total) averaged over 180 days	6,87E-08	[mg.kgwwt-1]	O
Local PEC in groundwater under agricultural soil	1,81E-06	[mg.l-1]	O

3.2.2.2.3.4 SCENARIO [2B]: TREATED WOOD, NOISE BARRIER, TIME 3: EUSES 2.1.2 OUTPUT FILE

IDENTIFICATION OF THE SUBSTANCE			
General name	Boron		S
CAS-No			D
EC-notification no.			D
EINECS no.			D
Molecular weight	61.83	[g.mol-1]	S

3.2.2.3 Refined PECsed calculation, Assessed substance: Copper (i.e. including adsorption of Cu on suspended particles)

3.2.2.3.1 Bridge over pond scenario

Variable/parameter	***Symbol***	***Value***	***Unit***	***S/D/O/P***
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	2,21E+01	mg	S
Cumulative quantity of substance, leached over the intermediate assess-ment period	$Q_{leach,TIME2}$	2,28E+02	mg	S
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME2}$	2,29E+02	mg	S
Concentration of suspended matter in the surface water	SUSPwater	15	$mg.L^{-1}$	D
Water volume under bridge	V_{water}	1000	m^3	D
Surface of stagnant surface water (bridge over pond)	$AREA_{water}$	1000	m^2	
Default depth of the deposited matter layer	$DEPTH_{susp\ dep}$	0,003	m	
$V_{susp\ dep} = DEPTH_{susp\ dep} * AREA_{water}$				
Volume of deposited suspended matter	$V_{susp\ dep}$	3	m^3	O
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	30246	$L.kg^{-1}$	S
Bulk density of (wet) suspended matter	RHO_{susp}	1150	$kg.m^{-3}$	D
Density of solid phase	RHO_{solid}	2500	$kg.m^{-3}$	D
Volume fraction water in susp. matter	$F_{water\text{-}susp}$	0,9	$m^3.m^{-3}$	D
Volume fraction solids in susp. Matter	$F_{solid\text{-}susp}$	0,1	$m^3.m^{-3}$	D
$K_{susp-water} = Fwater_{susp} + Fsolid_{susp} * \frac{Kp_{susp} * RHO_{Solid}}{1000}$				
Suspended matter-water partition coefficient	$K_{susp\text{-}water}$	7562,4	$m^3.m^{-3}$	O
$Clocal_{water,TIME1} = Q_{leach,TIME1} /((1+K_{susp\text{-}water} * SUSPwater*0,000001)*(1000*V_{water} +1000*V_{susp\ dep}*K_{susp\text{-}water})$				
Environmental concentration in water TIME1	$Clocal_{water,TIME1}$	6,51E-06	$mg.L^{-1}$	O

Environmental concentration in water TIME2	$Clocal_{water,TIME2}$	6,74E-05	mg.L-1	O
Environmental concentration in water TIME3	$Clocal_{water,TIME3}$	6,74E-05	mg.L-1	O

$$PEClocal_{sed} = \frac{Ksusp-water}{RHO_{susp}} * PEClocal_{water} * 1000$$

Predicted environmental concentration in sediment TIME1	$PEClocal_{sed,TIME1}$	4,22E-02	$mg.kg^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME2	$PEClocal_{sed,TIME2}$	4,36E-01	$mg.kg^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME3	$PEClocal_{sed,TIME3}$	4,37E-01	$mg.kg^{-1}_{wwt}$	O

3.2.2.3.2 Jetty in a lake

Variable/parameter	Symbol	Value	Unit	S/D/O/P
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	3740,0	mg	S
Cumulative quantity of substance, leached over the intermediate assess-ment period	$Q_{leach,TIME2}$	11100,0	mg	S
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME2}$	13100,0	mg	S
Concentration of suspended matter in the surface water	SUSPwater	15	$mg.L^{-1}$	D
Water volume under bridge	V_{water}	1,60E+04	m^3	D
Surface of stagnant surface water (letty)	$AREA_{water}$	7854	m^2	
Default depth of the deposited matter layer	$DEPTH_{susp\ dep}$	0,003	m	D
$V_{susp\ dep} = DEPTH_{susp\ dep} * AREA_{water}$				
Volume of deposited suspended matter	$V_{susp\ dep}$	23,6	m^3	O
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	30246	$L.kg^{-1}$	S
Bulk density of (wet) suspended matter	RHO_{susp}	1150	$kg.m^{-3}$	D
Density of solid phase	RHO_{solid}	2500	$kg.m^{-3}$	D
Volume fraction water in susp. matter	$F_{water-susp}$	0,9	$m^3.m^{-3}$	D

Volume fraction solids in susp. Matter	$F_{solid-susp}$	0,1	$m^3.m^{-3}$	D

$$K_{susp-water} = Fwater_{susp} + Fsolid_{susp} * \frac{Kp_{susp} * RHO_{Solid}}{1000}$$

Suspended matter-water partition coefficient	$K_{susp-water}$	7562,4	$m^3.m^{-3}$	O

$Clocal_{water,TIME1} = Q_{leach,TIME1} /((1+K_{susp-water} * SUSPwater*0,000001)*(1000*V_{water} +1000*V_{susp\ dep}*K_{susp-water})$

Environmental concentration in water TIME1	$Clocal_{water,TIME1}$	1,32E-05	$mg.L^{-1}$	O
Environmental concentration in water TIME2	$Clocal_{water,TIME2}$	3,93E-05	mg.L-1	O
Environmental concentration in water TIME3	$Clocal_{water,TIME3}$	4,64E-05	mg.L-1	O

$$PEClocal_{sed} = \frac{Ksusp - water}{RHO_{susp}} * PEClocal_{water} * 1000$$

Predicted environmental concentration in sediment TIME1	$PEC_{localsed,TIME1}$	8,71E-02	$mg.kg^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME2	$PEC_{localsed,TIME2}$	2,59E-01	$mg.kg^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME3	$PEC_{localsed,TIME3}$	3,05E-01	$mg.kg^{-1}_{wwt}$	O

3.2.2.3.3 Sheet piling in a waterway

Variable/parameter	Symbol	Value	Unit	S/D/O/P
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	9,88E+02	mg	S
Cumulative quantity of substance, leached over the intermediate assess-ment period	$Q_{leach,TIME2}$	1,28E+02	mg	S
CuCumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME2}$	8,39E+00	mg	S
Concentration of suspended matter in the surface water	SUSPwater	15	$mg.L^{-1}$	D
Water volume per m waterway length	V_{water}	7,5	m^3	D
Solids-water partitioning coefficient for suspended matter	Kp_{susp}	30246	$L^3.kg^{-1}$	S
Bulk density of (wet) suspended matter	RHO_{susp}	1150	$kg.m^{-3}$	D

Density of solid phase	RHO$_{solid}$	2500	kg.m^{-3}	D
Volume fraction water in susp. matter	F$_{water-susp}$	0,9	m^{3}.m^{-3}	D
Volume fraction solids in susp. Matter	F$_{solid-susp}$	0,1	m^{3}.m^{-3}	D

$$K_{susp-water} = Fwater_{susp} + Fsolid_{susp} * \frac{Kp_{susp} * RHO_{Solid}}{1000}$$

Suspended matter-water partition coefficient	K$_{susp-water}$	7562,4	m^{3}.m^{-3}	O

Clocal$_{water,TIME1}$= Q$_{leach,TIME1}$ /((1+K$_{susp-water}$* SUSPwater*0,000001)*(1000*V$_{water}$)

Environmental concentration in water TIME1	Clocal$_{water,TIME1}$	9,06E-02	mg.L^{-1}	O
Environmental concentration in water TIME2	Clocal$_{water,TIME2}$	1,17E-02	mg.L-1	O
Environmental concentration in water TIME3	Clocal$_{water,TIME3}$	7,70E-04	mg.L-1	O

$$PEClocal_{sed} = \frac{Ksusp - water}{RHO_{susp}} * PEClocal_{water} * 1000$$

Predicted environmental concentration in sediment TIME1	PEC$_{localsed,TIME1}$	5,96E+02	mg.kg$^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME2	PEC$_{localsed,TIME2}$	7,72E+01	mg.kg$^{-1}_{wwt}$	O
Predicted environmental concentration in sediment TIME3	PEC$_{localsed,TIME3}$	5,06E+00	mg.kg$^{-1}_{wwt}$	O

3.2.2.4 Assessed substance: 2-Aminoethanol (MEA)

Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC 3 - Wood not covered, not in contact with ground, exposed to weather or subject to frequent wetting (ESD § 4.3.3, p.68)

A) House scenario including removal processes (ESD Table 4.15, p.70, Table 3.5, p.28 and Table 3.6, p.29)

Input

Variable/parameter		*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area		$AREA_{house}$	125	m^2	D	
Duration of the initial assessment period		TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life		TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	**Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m² of treated wood over the initial assessment period		$Q^*_{leach,TIME1}$	227,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m² of treated wood over the intermediate assessment period		$Q^*_{leach,TIME2}$	1308,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m² of treated wood over a longer assessment period		$Q^*_{leach,TIME3}$	1689,7	$mg.m^{-2}$	S	
Soil volume (wet)		V_{soil}	13	m^3	D	
Bulk density of wet soil		RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Additional information needed to estimate emissions taking into account removal processes in the soil						
removal from soil		k	9,90E-02	d^{-1}	S	$LN(2)/DT_{50}$ was used

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,84E+04**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{house} * Q^*_{leach,TIME1}$

Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,64E+05**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**2,11E+05**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3}$
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**9,48E+02**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME1}} = AREA_{house} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**4,48E+02**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME2}} = AREA_{house} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**2,89E+01**	$mg.d^{-1}$	O	$\mathbf{E_{soil,leach,TIME3}} = AREA_{house} * Q^{*}_{leach,TIME3} / TIME3$
Without considering removal processes					
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**1,29E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME1}} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**7,40E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME2}} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**9,56E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,leach,TIME3}} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
For wood which was treated *in situ* emissions to soil can occur during the application itself and from leaching from treated wood in service. The total local concentration in soil is calculated below.					
TOTAL concentration in local soil at the end of the initial assessment period	$Clocal_{soil,total,TIME1}$	**1,29E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME1}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME1}$
TOTAL concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,total,TIME2}$	**7,40E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME2}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME2}$
TOTAL concentration in local soil at the end of a longer assessment period	$Clocal_{soil,total,TIME3}$	**9,56E+00**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,total,TIME3}} = Clocal_{soil,brush} + Clocal_{soil,leach,TIME3}$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**4,11E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME1}} = [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME1*k}$
Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**2,05E-01**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME2}} = [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**1,32E-02**	$mg.kg_{wwt}^{-1}$	O	$\mathbf{Clocal_{soil,TIME3}} = [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k) - Clocal_{soil,brush\_house}] * e^{-TIME3*k}$

1) S: data set; D: default; O: output; P: pick list

B) Noise barrier scenario including removal processes (ESD Table 4.17, p.74, Table 3.5, p.28 and Table 3.6, p.29)

Input					
Variable/paramet	*Symbol*	*Value*	*Unit*	*S/D/O*	*References / Calculation formulas*

er				*/P 1*	*/ Explanations*
Leachable wood area	$AREA_{noise-barrier}$	3000	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life) **Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	227,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	1308,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	1689,7	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	250	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Fraction released to soil	F_{soil}	0,3	[-]	D	
Fraction released to the STP	F_{STP}	0,7	[-]	D	
Additional information needed to estimate emissions taking into account removal processes in the soil					
removal from soil	k	0,099021026	d^{-1}	S	Value set in table A above. Editable in table A only.
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O /P 1*	*References / Calculation formulas / Explanations*
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,05E+05**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,18E+06**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**1,52E+06**	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{noise-barrier} * F_{Soil} * Q^*_{leach,TIME3}$

Emissions to soil					
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**6,82E+03**	$mg.d^{-1}$	O	$E_{soil,leach,TIME1} = AREA_{noise-barrier} * F_{soil} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**3,23E+03**	$mg.d^{-1}$	O	$E_{soil,leach,TIME2} = AREA_{noise-barrier} * F_{soil} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**2,08E+02**	$mg.d^{-1}$	O	$E_{soil,leach,TIME3} = AREA_{noise-barrier} * F_{soil} * Q^{*}_{leach,TIME3} / TIME3$
Emissions to STP					
Local daily emission rate to the STP following leaching from treated wood during the initial assessment period	$E_{STP,TIME1}$	**1,59E+04**	$mg.d^{-1}$	O	$E_{STP,TIME1} = AREA_{noise-barrier} * F_{STP} * Q^{*}_{leach,TIME1}/TIME1$
Local daily emission rate to the STP following leaching from treated wood during the intermediate assessment period	$E_{STP,TIME2}$	**7,53E+03**	$mg.d^{-1}$	O	$E_{STP,TIME2} = AREA_{noise-barrier} * F_{STP} * Q^{*}_{leach,TIME2}/TIME2$
Local daily emission rate to the STP following leaching from treated wood during the longer assessment period	$E_{STP,TIME3}$	**4,86E+02**	$mg.d^{-1}$	O	$E_{STP,TIME3} = AREA_{noise-barrier} * F_{STP} * Q^{*}_{leach,TIME3}/TIME3$
Without considering removal processes					
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**4,82E-01**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,leach,TIME1} = Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**2,77E+00**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,leach,TIME2} = Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**3,58E+00**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,leach,TIME3} = Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**1,54E-01**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,TIME1} = [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME1*k}$
Concentration in local soil over the intermediate assessment period	$Clocal_{soil,TIME2}$	**7,67E-02**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,TIME2} = [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**4,95E-03**	$mg.kg_{ww}^{-1}$	O	$Clocal_{soil,TIME3} = [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME3*k}$

1) S: data set; D: default; O: output; P: pick list

C) Bridge over pond scenario including removal processes (ESD Table 4.18, p.76 and Table 3.8, p.31/32)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*

For wood which is treated *in situ* emissions to soil can occur during the application itself and from leaching from the treated wood in service. Select below whether the scenario should cover *in situ* treatment or only leaching from wood in service. If *in situ* treatment is to be covered the emissions from application need to be calculated in advance (spreadsheet "PT8-prof&amateur in situ treatm"). Please note that *in situ* brushing is not possible for the noise barrier scenario.

Cover *in situ* treatment ?	**No**					
Concentration in local water at the end of the day of application		$Clocal_{water,brush\_bridge}$	**0,00E+00**	$mg.l^{-1}$	O	If *in situ* treatment is covered, this value has to be calculated in advance in the spreadsheet "PT8-prof&amateur in situ treatm"; once calculated, the value is automatically copied here.
Leachable wood area		$AREA_{bridge}$	10	m^2	D	
Duration of the initial assessment period		TIME1	30	d	D	
Duration of an intermediate assessment period not dependent of the service life		TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	**Vacuum pressure treatment**	TIME3	**7300**	d	D/P	Pick-list: ESD § 4.3.2 (default values for service life of treated wood depend on the application method/process)
Cumulative quantity of substance leached out of 1 m² of treated wood over the initial assessment period		$Q^{*}_{leach,TIME1}$	227,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m² of treated wood over the intermediate assessment period		$Q^{*}_{leach,TIME2}$	1308,4	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m² of treated wood over a longer assessment period		$Q^{*}_{leach,TIME3}$	1689,7	$mg.m^{-2}$	S	
Water volume under bridge		V_{water}	1000	m^3	D	

Additional information needed to estimate emissions taking into account removal processes in the water body

removal from water	k	4,62E-02	d^{-1}	S	$LN(2)/DT_{50}$ was used

Output

Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/O/P* [1]	*References / Calculation formulas / Explanations*
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,27E+03**	mg	O	$\mathbf{Q_{leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1}$
Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**1,31E+04**	mg	O	$\mathbf{Q_{leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2}$

Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	1,69E+04	mg	O	$\mathbf{Q_{leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3}$
Average daily emission due to leaching over the initial assessment period	$E_{water,leach,TIME1}$	7,58E+01	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME1}} = AREA_{bridge} * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission due to leaching over the intermediate assessment period	$E_{water,leach,TIME2}$	3,58E+01	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME2}} = AREA_{bridge} * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission due to leaching over a longer duration	$E_{water,leach,TIME3}$	2,31E+00	$mg.d^{-1}$	O	$\mathbf{E_{water,leach,TIME3}} = AREA_{bridge} * Q^{*}_{leach,TIME3} / TIME3$

Without considering removal processes

Concentration in local water at the end of the initial assessment period	$Clocal_{water,leach,TIME1}$	2,27E-03	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME1}} = Q_{leach,TIME1} * 0.001 / V_{water}$
Concentration in local water at the end of the intermediate assessment period	$Clocal_{water,leach,TIME2}$	1,31E-02	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME2}} = Q_{leach,TIME2} * 0.001 / V_{water}$
Concentration in local water at the end of a longer assessment period	$Clocal_{water,leach,TIME3}$	1,69E-02	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,leach,TIME3}} = Q_{leach,TIME3} * 0.001 / V_{water}$

For wood which was treated *in situ* emissions to water can occur during the application itself and from leaching from treated wood in service. The total local concentration in water is calculated below.

TOTAL concentration in local water at the end of the initial assessment period	$Clocal_{water,total,TIME1}$	2,27E-03	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME1}} = Clocal_{water,brush} + Clocal_{water,leach,TIME1}$
TOTAL concentration in local water at the end of the intermediate assessment period	$Clocal_{water,total,TIME2}$	1,31E-02	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME2}} = Clocal_{water,brush} + Clocal_{water,leach,TIME2}$
TOTAL concentration in local water at the end of a longer assessment period	$Clocal_{water,total,TIME3}$	1,69E-02	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,total,TIME3}} = Clocal_{water,brush} + Clocal_{water,leach,TIME3}$

Considering removal processes in the water body (Table 3.8, p.31/32)

ESD Eq. 3.16) Time weighted concentration in local water over the initial assessment period	$Clocal_{water,TIME1}$	7,53E-04	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME1}} = [E_{water,leach,TIME1}/(V_{water}*k*1000)] * [1-(1-e^{-TIME1*k})/(k*TIME1)]$
Time weighted concentration in local water over the intermediate assessment period	$Clocal_{water,TIME2}$	7,30E-04	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME2}} = [E_{water,leach,TIME2}/(V_{water}*k*1000)] * [1-(1-e^{-TIME2*k})/(k*TIME2)]$
ESD Eq. 3.17) Time weighted concentration in local water over a longer duration	$Clocal_{water,TIME3}$	4,99E-05	$mg.l^{-1}$	O	$\mathbf{Clocal_{water,TIME3}} = [E_{water,leach,TIME3}/(V_{water}*k*1000)] * [1-(1-e^{-TIME3*k})/(k*TIME3)]$

1) S: data set; D: default; O: output; P: pick list

Emission estimation for treated wood in service (ESD § 4.3, p.65) - Emission scenario for UC4a - Wood in contact with the ground (ESD § 4.3.4, p.76)

A) Transmission pole (ESD Table 4.19 p.78, Table 3.5, p.28 and Table 3.6, p.29)

Input					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/ O/P* [1]	*References / Calculation formulas / Explanations*
Leachable wood area above soil	$AREA_{pole,above}$	5,5	m^2	D	
Leachable wood area below soil	$AREA_{pole,below}$	1,6	m^2	D	
Duration of the initial assessment period	TIME1	30	d	D	
Duration of an intermediate assessment period	TIME2	365	d	D	Follow up of the 2nd EU Leaching workshop: The calculation of Time 2 is currently only used for a validation/impact assessment; it should **not** be used for decision making!
Duration of a longer assessment period (service life)	TIME3	7300	d	D	ESD § 4.3.2, #213, p.68
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the initial assessment period	$Q^*_{leach,TIME1}$	28559	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over the intermediate assessment period	$Q^*_{leach,TIME2}$	46242	$mg.m^{-2}$	S	
Cumulative quantity of substance leached out of 1 m^2 of treated wood over a longer assessment period	$Q^*_{leach,TIME3}$	61465	$mg.m^{-2}$	S	
Soil volume (wet)	V_{soil}	2,97	m^3	D	
Bulk density of wet soil	RHO_{soil}	1700	$kg_{wwt}.m^{-3}$	D	
Additional information needed to estimate emissions taking into account removal processes in the soil					
removal from soil	k	9,90E-02	d^{-1}	D	$LN(2)/DT_{50}$ was used
Output					
Variable/parameter	*Symbol*	*Value*	*Unit*	*S/D/ O/P* [1]	*References / Calculation formulas / Explanations*
Cumulative quantity of substance, leached over the initial assessment period	$Q_{leach,TIME1}$	**2,03E+05**	mg	O	$\mathbf{Q_{leach,TIME1}} = (AREA_{pole,above} + AREA_{pole,below}) * Q^*_{leach,TIME1}$

Cumulative quantity of substance, leached over the intermediate assessment period	$Q_{leach,TIME2}$	**3,28E+05**	mg	O	**$Q_{leach,TIME2}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME2}$
Cumulative quantity of substance, leached over a longer assessment period	$Q_{leach,TIME3}$	**4,36E+05**	mg	O	**$Q_{leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3}$
Average daily emission of substance due to leaching over the initial assessment period	$E_{soil,leach,TIME1}$	**6,76E+03**	mg.d^{-1}	O	**$E_{soil,leach,TIME1}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME1} / TIME1$
Average daily emission of substance due to leaching over the intermediate assessment period	$E_{soil,leach,TIME2}$	**9,00E+02**	mg.d^{-1}	O	**$E_{soil,leach,TIME2}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME2} / TIME2$
Average daily emission of substance due to leaching over a longer duration	$E_{soil,leach,TIME3}$	**5,98E+01**	mg.d^{-1}	O	**$E_{soil,leach,TIME3}$** = $(AREA_{pole,above} + AREA_{pole,below}) * Q^{*}_{leach,TIME3} / TIME3$
Without considering removal processes in the receiving environmental compartments					
Concentration in local soil at the end of the initial assessment period	$Clocal_{soil,leach,TIME1}$	**4,02E+01**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,leach,TIME1}$** = $Q_{leach,TIME1} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of the intermediate assessment period	$Clocal_{soil,leach,TIME2}$	**6,50E+01**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,leach,TIME2}$** = $Q_{leach,TIME2} / (V_{soil} * RHO_{soil})$
Concentration in local soil at the end of a longer assessment period	$Clocal_{soil,leach,TIME3}$	**8,64E+01**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,leach,TIME3}$** = $Q_{leach,TIME3} / (V_{soil} * RHO_{soil})$
Considering removal processes in the soil (Table 3.5, p.28 and Table 3.6, p.29)					
ESD Eq. 3.11) Concentration in local soil after the initial assessment period	$Clocal_{soil,TIME1}$	**1,32E+01**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME1}$** = $[E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME1}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME1*k}$
Concentration in local soil after the intermediate assessment period	$Clocal_{soil,TIME2}$	**1,80E+00**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME2}$** = $[E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME2}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME2*k}$
ESD Eq. 3.12) Concentration in local soil over a longer duration	$Clocal_{soil,TIME3}$	**1,31E-01**	mg.kg_{wwt}^{-1}	O	**$Clocal_{soil,TIME3}$** = $[E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] - [E_{soil,leach,TIME3}/(V_{soil} * RHO_{soil} * k)] * e^{-TIME3*k}$

1) S: data set; D: default; O: output; P: pick list

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 280
* Input file generated on    : 18-01-2021
* -------------------------------------------------------------------
-----------
*
* Location            : CHATEAUDUN
* Meteo station       : CHAT-M
* Soil type           : CHAT-S_Soil
* Crop calendar       : CHAT-GRASS
* Substance           : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : FOCUS
*
* End of PEARL REPORT: Header


* PEARL REPORT: Leaching
* Start date       :   01-Jan-1901
* End date         :   31-Dec-1926
* Target depth     :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth
=     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth
=     0.10 m

* Leaching summary for compound MEA
* Molar mass (g.mol-1)                              :     61.1
```

```
* Saturated vapour pressure (Pa)                          :   50.0    ;
measured at (C)  20.0
* Solubility in water (mg.L-1)                            :  0.100E+07;
measured at (C)  20.0
* Half-life (d)                                           :      7.0;
measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :
0.115
* Freundlich exponent (-)                                 :     1.00
* ------------------------------------------------------------------------
---------------------------------------------------------------
* Period        From          To               Water percolated
Substance leached               Average substance
* number                                   below target depth (mm)
below target depth (kg/ha)         concentration in water
*
at target depth (ug/L)
* ------------------------------------------------------------------------
---------------------------------------------------------------
   1     01-Jan-1907 31-Dec-1907                        349.647
0.0000006                          0.000
   2     01-Jan-1908 31-Dec-1908                        170.555
0.0000001                          0.000
   3     01-Jan-1909 31-Dec-1909                        321.632
0.0000047                          0.001
   4     01-Jan-1910 31-Dec-1910                        304.898
0.0000085                          0.003
   5     01-Jan-1911 31-Dec-1911                        418.049
0.0000201                          0.005
   6     01-Jan-1912 31-Dec-1912                        259.246
0.0000035                          0.001
   7     01-Jan-1913 31-Dec-1913                        343.074
0.0000040                          0.001
   8     01-Jan-1914 31-Dec-1914                        381.122
0.0000016                          0.000
   9     01-Jan-1915 31-Dec-1915                        199.608
0.0000039                          0.002
  10     01-Jan-1916 31-Dec-1916                        420.177
0.0000026                          0.001
  11     01-Jan-1917 31-Dec-1917                        182.835
0.0000029                          0.002
  12     01-Jan-1918 31-Dec-1918                        225.666
0.0000002                          0.000
  13     01-Jan-1919 31-Dec-1919                        295.403
0.0000003                          0.000
  14     01-Jan-1920 31-Dec-1920                        322.410
0.0000089                          0.003
  15     01-Jan-1921 31-Dec-1921                        147.661
0.0000000                          0.000
  16     01-Jan-1922 31-Dec-1922                        117.497
0.0000000                          0.000
```

```
  17     01-Jan-1923 31-Dec-1923                               184.663
0.0000000                          0.000
  18     01-Jan-1924 31-Dec-1924                               225.946
0.0000001                          0.000
  19     01-Jan-1925 31-Dec-1925                               196.551
0.0000005                          0.000
  20     01-Jan-1926 31-Dec-1926                               214.515
0.0000005                          0.000

* The average concentration of MEA closest to the 80th percentile is
0.001782 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 281
* Input file generated on    : 18-01-2021
* ----------------------------------------------------------------------------
*
* Location           : HAMBURG
* Meteo station      : HAMB-M
* Soil type          : HAMB-S_Soil
* Crop calendar      : HAMB-GRASS
* Substance          : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : No
*
* End of PEARL REPORT: Header


* PEARL REPORT: Leaching
* Start date     :   01-Jan-1901
* End date       :   31-Dec-1926
* Target depth   :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m


* Leaching summary for compound MEA
* Molar mass (g.mol-1)                              :     61.1
* Saturated vapour pressure (Pa)                    :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                      :  0.100E+07; measured at (C)  20.0
* Half-life (d)                                     :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.117
* Freundlich exponent (-)                           :     1.00
* ----------------------------------------------------------------------------------------------------
------------------------------
* Period        From          To                Water percolated                Substance leached
Average substance
* number                              below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                      at target depth
(ug/L)
* ----------------------------------------------------------------------------------------------------
------------------------------
   1      01-Jan-1907 31-Dec-1907                          61.097                           0.0000088
0.014
   2      01-Jan-1908 31-Dec-1908                          14.547                          -0.0000027
0.000
   3      01-Jan-1909 31-Dec-1909                         197.059                           0.0000362
0.018
   4      01-Jan-1910 31-Dec-1910                         225.661                           0.0000362
0.016
   5      01-Jan-1911 31-Dec-1911                         206.159                           0.0000349
0.017
   6      01-Jan-1912 31-Dec-1912                         415.362                           0.0001013
0.024
   7      01-Jan-1913 31-Dec-1913                         447.797                           0.0002099
0.047
   8      01-Jan-1914 31-Dec-1914                         202.845                           0.0000370
0.018
   9      01-Jan-1915 31-Dec-1915                         266.318                           0.0000807
0.030
  10      01-Jan-1916 31-Dec-1916                         272.402                           0.0001236
0.045
```

```
 11    01-Jan-1917 31-Dec-1917            162.944            0.0000170
0.010
 12    01-Jan-1918 31-Dec-1918            137.798            0.0000197
0.014
 13    01-Jan-1919 31-Dec-1919            262.216            0.0000686
0.026
 14    01-Jan-1920 31-Dec-1920            263.899            0.0000504
0.019
 15    01-Jan-1921 31-Dec-1921            101.459            0.0000012
0.001
 16    01-Jan-1922 31-Dec-1922             -2.306           -0.0000010
0.000
 17    01-Jan-1923 31-Dec-1923            208.543            0.0000315
0.015
 18    01-Jan-1924 31-Dec-1924            173.929            0.0000545
0.031
 19    01-Jan-1925 31-Dec-1925            347.039            0.0000782
0.023
 20    01-Jan-1926 31-Dec-1926            411.646            0.0002276
0.055

* The average concentration of MEA closest to the 80th percentile is    0.030830 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 282
* Input file generated on    : 18-01-2021
* ---------------------------------------------------------------------------
*
* Location           : JOKIOINEN
* Meteo station      : JOKI-M
* Soil type          : JOKI-S_Soil
* Crop calendar      : JOKI-GRASS
* Substance          : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : No
*
* End of PEARL REPORT: Header



* PEARL REPORT: Leaching
* Start date      :   01-Jan-1901
* End date        :   31-Dec-1926
* Target depth    :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m


* Leaching summary for compound MEA
* Molar mass (g.mol-1)                         :     61.1
* Saturated vapour pressure (Pa)                    :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                   :  0.100E+07; measured at (C)  20.0
* Half-life (d)                              :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.242
* Freundlich exponent (-)                       :     1.00
* ----------------------------------------------------------------------------------------------------
------------------------------
* Period         From           To                Water percolated                  Substance leached
Average substance
* number                              below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                    at target depth
(ug/L)
* ----------------------------------------------------------------------------------------------------
------------------------------
   1      01-Jan-1907 31-Dec-1907                          104.163                          0.0000104
0.010
   2      01-Jan-1908 31-Dec-1908                           98.890                          0.0000279
0.028
   3      01-Jan-1909 31-Dec-1909                          186.912                          0.0001198
0.064
   4      01-Jan-1910 31-Dec-1910                          345.861                          0.0001167
0.034
   5      01-Jan-1911 31-Dec-1911                          156.983                          0.0000225
0.014
   6      01-Jan-1912 31-Dec-1912                          198.539                          0.0000421
0.021
   7      01-Jan-1913 31-Dec-1913                          379.139                          0.0003239
0.085
   8      01-Jan-1914 31-Dec-1914                          152.608                          0.0000954
0.063
   9      01-Jan-1915 31-Dec-1915                          292.208                          0.0000393
0.013
  10      01-Jan-1916 31-Dec-1916                          312.571                          0.0003486
0.112
```

```
 11    01-Jan-1917 31-Dec-1917          215.976           0.0000287
0.013
 12    01-Jan-1918 31-Dec-1918           86.029           0.0000301
0.035
 13    01-Jan-1919 31-Dec-1919           17.532           0.0000035
0.020
 14    01-Jan-1920 31-Dec-1920           -3.899          -0.0000026
0.000
 15    01-Jan-1921 31-Dec-1921            0.653          -0.0000018
0.000
 16    01-Jan-1922 31-Dec-1922           19.910          -0.0000007
0.000
 17    01-Jan-1923 31-Dec-1923          361.777           0.0001894
0.052
 18    01-Jan-1924 31-Dec-1924          443.310           0.0001556
0.035
 19    01-Jan-1925 31-Dec-1925          169.727           0.0000195
0.011
 20    01-Jan-1926 31-Dec-1926           83.212           0.0000167
0.020

* The average concentration of MEA closest to the 80th percentile is     0.057447 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 283
* Input file generated on    : 18-01-2021
* -----------------------------------------------------------------------------
*
* Location          : KREMSMUENSTER
* Meteo station     : KREM-M
* Soil type         : KREM-S_Soil
* Crop calendar     : KREM-GRASS
* Substance         : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : No
*
* End of PEARL REPORT: Header
```

```
* PEARL REPORT: Leaching
* Start date     :   01-Jan-1901
* End date       :   31-Dec-1926
* Target depth   :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m

* Leaching summary for compound MEA
* Molar mass (g.mol-1)                          :     61.1
* Saturated vapour pressure (Pa)                    :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                   :  0.100E+07; measured at (C)  20.0
* Half-life (d)                              :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.133
* Freundlich exponent (-)                          :     1.00
* ---------------------------------------------------------------------------------------------------
------------------------------
* Period          From           To                Water percolated                Substance leached
Average substance
* number                          below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                      at target depth
(ug/L)
* ---------------------------------------------------------------------------------------------------
------------------------------
   1      01-Jan-1907 31-Dec-1907                       393.056                         0.0000040
0.001
   2      01-Jan-1908 31-Dec-1908                       266.020                         0.0000038
0.001
   3      01-Jan-1909 31-Dec-1909                       482.235                         0.0000224
0.005
   4      01-Jan-1910 31-Dec-1910                       533.787                         0.0000949
0.018
   5      01-Jan-1911 31-Dec-1911                       479.779                         0.0000984
0.021
   6      01-Jan-1912 31-Dec-1912                       297.239                         0.0000053
0.002
   7      01-Jan-1913 31-Dec-1913                       456.552                         0.0000132
0.003
   8      01-Jan-1914 31-Dec-1914                       316.863                         0.0000315
0.010
   9      01-Jan-1915 31-Dec-1915                       197.373                         0.0000067
0.003
  10      01-Jan-1916 31-Dec-1916                       247.073                         0.0000008
0.000
```

```
 11    01-Jan-1917 31-Dec-1917                    319.876              0.0000164
0.005
 12    01-Jan-1918 31-Dec-1918                    263.488              0.0000070
0.003
 13    01-Jan-1919 31-Dec-1919                    384.471              0.0000046
0.001
 14    01-Jan-1920 31-Dec-1920                    218.037              0.0000026
0.001
 15    01-Jan-1921 31-Dec-1921                    267.841              0.0000023
0.001
 16    01-Jan-1922 31-Dec-1922                     -1.617              0.0000002
0.000
 17    01-Jan-1923 31-Dec-1923                    -46.247             -0.0000004
0.000
 18    01-Jan-1924 31-Dec-1924                    375.384              0.0000253
0.007
 19    01-Jan-1925 31-Dec-1925                    200.881              0.0000110
0.005
 20    01-Jan-1926 31-Dec-1926                    249.922              0.0000129
0.005

* The average concentration of MEA closest to the 80th percentile is     0.006103 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 284
* Input file generated on    : 18-01-2021
* --------------------------------------------------------------------------
*
* Location           : OKEHAMPTON
* Meteo station      : OKEH-M
* Soil type          : OKEH-S_Soil
* Crop calendar      : OKEH-GRASS
* Substance          : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : No
*
* End of PEARL REPORT: Header


* PEARL REPORT: Leaching
* Start date      :   01-Jan-1901
* End date        :   31-Dec-1926
* Target depth    :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m

* Leaching summary for compound MEA
* Molar mass (g.mol-1)                          :     61.1
* Saturated vapour pressure (Pa)                   :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                  :  0.100E+07; measured at (C)  20.0
* Half-life (d)                             :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.134
* Freundlich exponent (-)                       :     1.00
* ----------------------------------------------------------------------------------------------
------------------------------
* Period          From            To                 Water percolated                Substance leached
Average substance
* number                              below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                          at target depth
(ug/L)
* ----------------------------------------------------------------------------------------------
------------------------------
   1      01-Jan-1907 31-Dec-1907                             516.408                        0.0000402
0.008
   2      01-Jan-1908 31-Dec-1908                             135.632                        0.0000054
0.004
   3      01-Jan-1909 31-Dec-1909                             401.862                        0.0000484
0.012
   4      01-Jan-1910 31-Dec-1910                             271.998                        0.0000382
0.014
   5      01-Jan-1911 31-Dec-1911                             455.551                        0.0001180
0.026
   6      01-Jan-1912 31-Dec-1912                             458.739                        0.0000882
0.019
   7      01-Jan-1913 31-Dec-1913                             582.500                        0.0000606
0.010
   8      01-Jan-1914 31-Dec-1914                             303.718                        0.0000287
0.009
   9      01-Jan-1915 31-Dec-1915                             256.445                        0.0000417
0.016
  10      01-Jan-1916 31-Dec-1916                             489.267                        0.0000553
0.011
```

```
 11   01-Jan-1917 31-Dec-1917                272.472              0.0000261
0.010
 12   01-Jan-1918 31-Dec-1918                437.262              0.0000668
0.015
 13   01-Jan-1919 31-Dec-1919                569.851              0.0000811
0.014
 14   01-Jan-1920 31-Dec-1920                369.111              0.0000683
0.018
 15   01-Jan-1921 31-Dec-1921                302.713              0.0000114
0.004
 16   01-Jan-1922 31-Dec-1922                386.288              0.0000440
0.011
 17   01-Jan-1923 31-Dec-1923                602.171              0.0000989
0.016
 18   01-Jan-1924 31-Dec-1924                520.372              0.0000352
0.007
 19   01-Jan-1925 31-Dec-1925                316.136              0.0000321
0.010
 20   01-Jan-1926 31-Dec-1926                503.214              0.0002752
0.055

* The average concentration of MEA closest to the 80th percentile is    0.017454 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 285
* Input file generated on    : 18-01-2021
* ----------------------------------------------------------------------------
*
* Location           : PIACENZA
* Meteo station      : PIAC-M
* Soil type          : PIAC-S_Soil
* Crop calendar      : PIAC-GRASS
* Substance          : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : FOCUS
*
* End of PEARL REPORT: Header


* PEARL REPORT: Leaching
* Start date      :   01-Jan-1901
* End date        :   31-Dec-1926
* Target depth    :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m


* Leaching summary for compound MEA
* Molar mass (g.mol-1)                          :     61.1
* Saturated vapour pressure (Pa)                     :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                   :  0.100E+07; measured at (C)  20.0
* Half-life (d)                               :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.103
* Freundlich exponent (-)                          :     1.00
* ---------------------------------------------------------------------------------------------------
-------------------------------
* Period          From            To                  Water percolated                  Substance leached
Average substance
* number                              below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                                        at target depth
(ug/L)
* ---------------------------------------------------------------------------------------------------
-------------------------------
   1      01-Jan-1907 31-Dec-1907                              568.118                           0.0000537
0.009
   2      01-Jan-1908 31-Dec-1908                              421.490                           0.0000474
0.011
   3      01-Jan-1909 31-Dec-1909                              402.541                           0.0000559
0.014
   4      01-Jan-1910 31-Dec-1910                              573.892                           0.0003369
0.059
   5      01-Jan-1911 31-Dec-1911                              441.854                           0.0000366
0.008
   6      01-Jan-1912 31-Dec-1912                              365.648                           0.0000252
0.007
   7      01-Jan-1913 31-Dec-1913                               29.635                          -0.0000073
0.000
   8      01-Jan-1914 31-Dec-1914                              803.785                           0.0002959
0.037
   9      01-Jan-1915 31-Dec-1915                               75.617                          -0.0000055
0.000
  10      01-Jan-1916 31-Dec-1916                              467.658                           0.0000347
0.007
```

```
 11   01-Jan-1917 31-Dec-1917                208.980                 0.0000503
0.024
 12   01-Jan-1918 31-Dec-1918                214.665                 0.0000191
0.009
 13   01-Jan-1919 31-Dec-1919                166.241                -0.0000027
0.000
 14   01-Jan-1920 31-Dec-1920                166.862                 0.0000029
0.002
 15   01-Jan-1921 31-Dec-1921                109.718                 0.0000002
0.000
 16   01-Jan-1922 31-Dec-1922                190.802                 0.0000124
0.007
 17   01-Jan-1923 31-Dec-1923                111.404                -0.0000026
0.000
 18   01-Jan-1924 31-Dec-1924                449.764                 0.0001012
0.023
 19   01-Jan-1925 31-Dec-1925                411.370                 0.0000188
0.005
 20   01-Jan-1926 31-Dec-1926                513.578                 0.0000339
0.007

* The average concentration of MEA closest to the 80th percentile is    0.018197 ug/L

* End of PEARL REPORT: Leaching
```

```
* PEARL REPORT: Header
* Results from the PEARL model  (c) Alterra, PBL and RIVM
* PEARL kernel version       : 3.1.2
* SWAP kernel version        : swap3234
* PEARL created on           : 18-Feb-2011
*
* PEARL was called from      : FOCUSPEARL,version 4.4.4
* Working directory          : C:\tools\Pearldb
* Run ID                     : 286
* Input file generated on    : 18-01-2021
* ----------------------------------------------------------------------------
*
* Location           : PORTO
* Meteo station      : PORT-M
* Soil type          : PORT-S_Soil
* Crop calendar      : PORT-GRASS
* Substance          : MEA
* Application scheme : Wolmanit-grass
* Deposition scheme  : No
* Irrigation scheme  : FOCUS
*
* End of PEARL REPORT: Header



* PEARL REPORT: Leaching
* Start date      :   01-Jan-1901
* End date        :   31-Dec-1926
* Target depth    :   1.00 m
* Annual incorporation at 01-Jan; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Feb; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Mar; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Apr; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-May; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Jun; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Sep; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Oct; dosage =     0.0038 kg.ha-1; depth =     0.10 m
```

```
* Annual incorporation at 01-Nov; dosage =     0.0038 kg.ha-1; depth =     0.10 m
* Annual incorporation at 01-Dec; dosage =     0.0038 kg.ha-1; depth =     0.10 m

* Leaching summary for compound MEA
* Molar mass (g.mol-1)                              :     61.1
* Saturated vapour pressure (Pa)                    :   50.0    ; measured at (C)  20.0
* Solubility in water (mg.L-1)                      :  0.100E+07; measured at (C)  20.0
* Half-life (d)                                 :      7.0; measured at (C)  12.0
* Kom (coef. for sorption on organic matter) (L.kg-1) :      8.7
* KF    (overall sorption coefficient of the target layer) (L.kg-1) :     0.151
* Freundlich exponent (-)                           :     1.00
* -----------------------------------------------------------------------------------------------
------------------------------
* Period          From            To                  Water percolated                Substance leached
Average substance
* number                                   below target depth (mm)     below target depth (kg/ha)
concentration in water
*                                                                                       at target depth
(ug/L)
* -----------------------------------------------------------------------------------------------
------------------------------
   1      01-Jan-1907 31-Dec-1907                          577.879                         0.0000286
0.005
   2      01-Jan-1908 31-Dec-1908                          729.397                         0.0000448
0.006
   3      01-Jan-1909 31-Dec-1909                          921.598                         0.0002390
0.026
   4      01-Jan-1910 31-Dec-1910                          774.654                         0.0001563
0.020
   5      01-Jan-1911 31-Dec-1911                          902.974                         0.0002324
0.026
   6      01-Jan-1912 31-Dec-1912                          516.754                         0.0000263
0.005
   7      01-Jan-1913 31-Dec-1913                          485.365                         0.0000043
0.001
   8      01-Jan-1914 31-Dec-1914                          684.566                         0.0000514
0.008
   9      01-Jan-1915 31-Dec-1915                          549.059                         0.0000213
0.004
  10      01-Jan-1916 31-Dec-1916                          842.122                         0.0001362
0.016
```

```
 11    01-Jan-1917 31-Dec-1917                        714.370                 0.0001157
0.016
 12    01-Jan-1918 31-Dec-1918                        767.080                 0.0001466
0.019
 13    01-Jan-1919 31-Dec-1919                        916.166                 0.0000789
0.009
 14    01-Jan-1920 31-Dec-1920                        548.145                 0.0000738
0.013
 15    01-Jan-1921 31-Dec-1921                        394.871                 0.0000164
0.004
 16    01-Jan-1922 31-Dec-1922                        574.858                 0.0000433
0.008
 17    01-Jan-1923 31-Dec-1923                        681.308                 0.0000750
0.011
 18    01-Jan-1924 31-Dec-1924                        298.926                 0.0000025
0.001
 19    01-Jan-1925 31-Dec-1925                        352.114                 0.0000117
0.003
 20    01-Jan-1926 31-Dec-1926                        460.780                 0.0000071
0.002

* The average concentration of MEA closest to the 80th percentile is    0.017650 ug/L

* End of PEARL REPORT: Leaching
```

3.3 New information on the active substance

In the course of the application for product authorisation, the supplier of the active substance boric acid submitted (new) ecotoxicological data from a REACH dossier for refinement of the PNECsoil as well as an expert opinion for revision of the soil (dissipation) DT_{50} value for boric acid. This information was sent directly to the authorites via e-mail.

Some of the submitted ecotoxicological data were already evaluated during active substance approval for boric acid (The Netherlands, 2009),

The remaining new data were evaluated, but not considered relevant for the following reasons:

- None of the reported effect values is lower than the lowest NOEC of 2 mg B/kg dwt soil used in the CAR for boric acid (The Netherlands, 2009) to derive the agreed $PNEC_{soil}$ (for details please refer to Confidential Annex).
- The data do not alter the agreed assessment factor of 5, which was applied to the lowest NOEC in order to derive the PNEC soil in the CAR for boric acid (Netherlands, 2009).

As a conclusion, the data were not considered further in the risk assessment for boric acid. The agreed $PNEC_{soil}$ from the CAR for boric acid (Netherlands, 2009) was used in the risk assessment.

The presented results in the expert opinion on dissipation of boron in soil were not considered acceptable for the following reasons:

- The underlying data from the REACH dossier on boric acid used for the calculations were not submitted.
- The calculations for the alternative leaching rate constants were performed according to the OECD Series on Emission Scenario Documents n°2 Emission Scenario Document for Wood Preservatives, Part 2 (2000). The default values used for calculating leaching rate constants and DT_{50} dissipation values are different to those in the TGD (EC, 2003) and in the Guidance on BPR, Vol IV Environment, Part B+C (2017) and were therefore not accepted for EU risk assessment.

The values discussed in the expert opinion were therefore not used further in the risk assessment.

For further details, please confer to chapter 3.6.12 in the confidential annex.

<u>Overall conclusion on the new active substance data:</u>

The new data for the active substance boric acid did not turn out to be relevant/acceptable. Therefore, the risk assessment for boric acid is based on the data included in the LoEP of the AR for boric acid (The Netherlands, 2009).

3.4 Residue behaviour

No new information available.

3.5 Summaries of the efficacy studies (B.6.7-01 - B6.7-13)

The summaries of the efficacy studies are presented in the IUCLID-Dossier for the Wolmanit CX-10_family.

3.6 Confidential annex

Please see separate document.

3.7 Other

3.7.1 Reference list (excluding list of studies, cf. to chapter 3.1)

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Commission Directive 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC (Text with EEA relevance)
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006L0015

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