EXPOSURE SCENARIO FOR COMMUNICATION

Substance Name: Diammonium decaborate
EC Number: 234-521-1
CAS Number: 12007-89-5
Registration Number: 01-2119970312-43-0001
Date of Generation/Revision: 11/01/2023
Author: Chemservice S.A.

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0. Qualitative assessment – Additional conditions and measures based on human health classification

The substance is classified as toxic to reproduction (specific effect: “d”) with a specific concentration limit of ≥3.6 % for Diammonium decaborate anhydrous and 4.8 % for Ammonium pentaborate tetrahydrate. Due to the substance’s classification the following measures are suggested to ensure that the risk is adequately controlled.

General RMMs and OCs

- Assumes any measure to eliminate exposure is considered.
- Ensure a very high level of containment, except for short term exposures e.g. taking samples.
- Assumes closed system to allow for easy maintenance.
- Ensure to keep equipment under negative pressure if possible.
- Ensure staff is controlled upon entry to work area.
- Ensure all equipment is well maintained.
- Assumes a permit to work for maintenance work.
- Assumes regular cleaning of equipment and work area.
- Ensure management/supervision in place to check that the RMMs in place are being used correctly and OCs followed.
- Ensure training for staff on good practice.
- Ensure procedures and training for emergency decontamination and disposal.
- Assumes a good standard of personal hygiene.
- Ensure recording of any ‘near miss’ situations.

PPE

- Wear a substance/task appropriate respirator.
- Wear substance/task appropriate gloves.
- Wear full skin coverage with appropriate barrier material.
- Wear chemical goggles.

Additional precautionary statements

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- IF exposed or concerned: Get medical advice/attention.
- Store locked up.
- Dispose of contents/container in accordance with local/regional/national/international regulation.

1. ES 1: Formulation or re-packing; Various products (PC 9a, PC 12)

1.1. Use descriptors

ES name: *Formulation into mixture*
Product category: Coatings and Paints, Thinners, paint removers (PC 9a), Fertilizers (PC 12)

Environment		SPERC	
1: *Formulation into mixture*	ERC 2	*CEPE 2.4c.v2*	*SPERC*
Worker		SWED	
2: *Transfer to silos or via trucks to warehouses*	PROC 8a		
3: *Closed transfer of borate from road tankers to large vessels or containers (e.g. silos) at site*	PROC 1		
4: *Attach/detach loading chute to/from road tanker*	PROC 8b		
5: *Storage of borates - indoor*	PROC 2		
6: *Storage of borates - outdoor*	PROC 2		
7: *Transfer of borates to mixing vessel with no dedicated engineering controls in place for reducing the exposure*	PROC 8a		
8: *Mixing in closed or largely closed production processes at high temperature - solid mixture*	PROC 2		
9: *Mixing in closed or largely closed production processes at high temperature - liquid mixture*	PROC 2		
10: *Mixing of solid mixture*	PROC 3		
11: *Mixing of liquid mixture*	PROC 3		
12: *Transfer of solid mixtures*	PROC 8b		
13: *Transfer of liquid mixtures*	PROC 8b		
14: *Packaging of substances into small containers (including packing and unpacking) - solid*	PROC 9		
15: *Packaging of substances into small containers (including packing and unpacking) - liquid*	PROC 9		
16: *Taking samples (<1kg/sample) - solid*	PROC 9		
17: *Taking samples (<1kg/sample) - liquid*	PROC 9		
18: *Laboratory work including weighing and quality control processes - solid*	PROC 15		
19: *Laboratory work including weighing and quality control processes - liquid*	PROC 15		
20: *Maintenance & routine cleaning - solid*	PROC 28		
21: *Maintenance & routine cleaning - liquid*	PROC 28		

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation into mixture (ERC 2)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.444 tonnes/day
Annual amount per site ≤ 100 tonnes/year
Technical and organisational conditions and measures
Assumes that the installation is controlled under IED. The solvent usage is minimized or a solvent management plan (95 – 97 % efficiency) is in place.

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Indoor use

1.2.2. Control of worker exposure: Transfer to silos or via trucks to warehouses (PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 6 h/day
Covers transfer of powders < 1000 kg/min
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers height during transfer < 0.5 m.
Ensure that the handling reduces contact between product and adjacent air (e.g. dumping powders in a big bag through a small opening).
Ensure that distance between the source of emission and the worker is at least 1m.
Covers the outdoor application where the worker is located further than 4 meters from the emission source

1.2.3. Control of worker exposure: Closed transfer of borate from road tankers to large vessels or containers (e.g. silos) at site (PROC 1)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.

Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

1.2.4. Control of worker exposure: Attach/detach loading chute to/from road tanker (PROC 8b)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers handling of objects with limited visible residual dust (thin layer visible).
Assumes regular work procedures

1.2.5. Control of worker exposure: Storage of borates - indoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.6. Control of worker exposure: Storage of borates - outdoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

1.2.7. Control of worker exposure: Transfer of borates to mixing vessel with no dedicated engineering controls in place for reducing the exposure (PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of powders < 1000 kg/min
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Covers height during transfer < 0.5 m.
Ensure that the handling reduces contact between product and adjacent air (e.g. dumping powders in a big bag through a small opening).
Ensure that distance between the source of emission and the worker is at least 1m.

1.2.8. Control of worker exposure: Mixing in closed or largely closed production processes at high temperature - solid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 150 °C

1.2.9. Control of worker exposure: Mixing in closed or largely closed production processes at high temperature - liquid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 150 °C

1.2.10. Control of worker exposure: Mixing of solid mixture (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 150 °C

1.2.11. Control of worker exposure: Mixing of liquid mixture (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 150 °C

1.2.12. Control of worker exposure: Transfer of solid mixtures (PROC 8b)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.13. Control of worker exposure: Transfer of liquid mixtures (PROC 8b)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.14. Control of worker exposure: Packaging of substances into small containers (including packing and unpacking) - solid (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.15. Control of worker exposure: Packaging of substances into small containers (including packing and unpacking) - liquid (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.16. Control of worker exposure: Taking samples (<1kg/sample) - solid (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.17. Control of worker exposure: Taking samples (<1kg/sample) - liquid (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.18. Control of worker exposure: Laboratory work including weighing and quality control processes - solid (PROC 15)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.19. Control of worker exposure: Laboratory work including weighing and quality control processes - liquid (PROC 15)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.20. Control of worker exposure: Maintenance & routine cleaning - solid (PROC 28)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.2.21. Control of worker exposure: Maintenance & routine cleaning - liquid (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Formulation into mixture (ERC 2)

Release route	**Release rate**	**Release estimation method**
Water	0.022 kg/day	SPERC
Air	0.043 kg/day	SPERC
Soil	0 kg/day	SPERC

Protection target	**Exposure estimate**	**RCR**
Fresh water	1.35E-3 mg/L (EUSES 2.1.2)	< 0.01
Marine water	1.34E-4 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	0.011 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	5.52E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	7.39E-6 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.14E-3 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

1.3.2. Worker exposure: Transfer to silos or via trucks to warehouses (PROC 8a)

Route of exposure and type of effects	**Exposure estimate**	**RCR**
Inhalation, systemic, long term	0.83 mg/m³ (ART)	0.154
Dermal, systemic, long term	13.71 mg/kg bw/day (TRA Workers 3.0)	0.054
Combined, systemic, long term		0.208

1.3.3. Worker exposure: Closed transfer of borate from road tankers to large vessels or containers (e.g. silos) at site (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	7E-3 mg/m³ (TRA Workers 3.0)	< 0.01
Dermal, systemic, long term	0.034 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		< 0.01

1.3.4. Worker exposure: Attach/detach loading chute to/from road tanker (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.63 mg/m³ (ART)	0.117
Dermal, systemic, long term	13.71 mg/kg bw/day (TRA Workers 3.0)	0.054
Combined, systemic, long term		0.171

1.3.5. Worker exposure: Storage of borates - indoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1 mg/m³ (TRA Workers 3.0)	0.185
Dermal, systemic, long term	1.37 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.191

1.3.6. Worker exposure: Storage of borates - outdoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.7 mg/m³ (TRA Workers 3.0)	0.13
Dermal, systemic, long term	1.37 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.135

1.3.7. Worker exposure: Transfer of borates to mixing vessel with no dedicated engineering controls in place for reducing the exposure (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.72 mg/m³ (ART)	0.133
Dermal, systemic, long term	13.71 mg/kg bw/day (TRA Workers 3.0)	0.054
Combined, systemic, long term		0.187

1.3.8. Worker exposure: Mixing in closed or largely closed production processes at high temperature - solid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

1.3.9. Worker exposure: Mixing in closed or largely closed production processes at high temperature - liquid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

1.3.10. Worker exposure: Mixing of solid mixture (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.113

1.3.11. Worker exposure: Mixing of liquid mixture (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.113

1.3.12. Worker exposure: Transfer of solid mixtures (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.75 mg/m³ (TRA Workers 3.0)	0.139
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.171

1.3.13. Worker exposure: Transfer of liquid mixtures (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.75 mg/m³ (TRA Workers 3.0)	0.139
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.171

1.3.14. Worker exposure: Packaging of substances into small containers (including packing and unpacking) - solid (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.84 mg/m³ (TRA Workers 3.0)	0.156
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.172

1.3.15. Worker exposure: Packaging of substances into small containers (including packing and unpacking) - liquid (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.84 mg/m³ (TRA Workers 3.0)	0.156
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.172

1.3.16. Worker exposure: Taking samples (<1kg/sample) - solid (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.24 mg/m³ (TRA Workers 3.0)	0.044
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.061

1.3.17. Worker exposure: Taking samples (<1kg/sample) - liquid (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.24 mg/m³ (TRA Workers 3.0)	0.044
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.061

1.3.18. Worker exposure: Laboratory work including weighing and quality control processes - solid (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.204 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.056

1.3.19. Worker exposure: Laboratory work including weighing and quality control processes - liquid (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.204 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.056

1.3.20. Worker exposure: Maintenance & routine cleaning - solid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.7 mg/m³ (ECETOC TRA Workers)	0.13
Dermal, systemic, long term	13.71 mg/kg bw/day (ECETOC TRA Workers)	0.054
Combined, systemic, long term		0.184

1.3.21. Worker exposure: Maintenance & routine cleaning - liquid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (ECETOC TRA Workers)	0.111
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.144

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' dermal exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7. The workers' inhalation exposure for most of the PROCs is assessed using TRA Workers v3.0 as implemented in CHESAR. Only for some PROCs the inhalation exposure is assessed using ART v1.5.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7. Hereby, SPERC CEPE SPERC 2.4c.v2 is used.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron

(B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are "equivalent" to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  ART v1.5: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Workroom size, Transfer rate, Transfer type, Drop height, Level of contamination, Distance of source to buildings, Segregation of the source, Personal enclosure, RPE.
  Remark: ART predicts air concentrations in a worker's personal breathing zone outside of any Respiratory Protection Equipment (RPE). Therefore, the use of RPE has to be considered separately.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Daily use amount, Annual use amount, Number of emission days, Discharge rate of STP, Release factors.

Further details on scaling are provided in ECHA's Guidance for downstream users v2.1 (October 2014) as well as in ECHA's Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 1.3.

2. ES 2: Use at industrial sites; Other (PC 0); Various sectors (SU 16, SU 23)

2.1. Use descriptors

ES name: *Industrial use in electrolytic capacitors*
Product category: Other (PC 0)
Sector of use: Manufacture of computer, electronic and optical products, electrical equipment (SU 16), Electricity, steam, gas water supply and sewage treatment (SU 23)

Environment		SPERC
1: *Industrial use in electrolytic capacitors*	ERC 5	*Eurometaux SPERC 5.2.v3*
Worker		SWED
2: *Storage of solid mixture*	PROC 2	
3: *Storage of liquid mixture*	PROC 2	
4: *Chemical production in closed continuous system with occasional exposure - solid mixture*	PROC 2	
5: *Chemical production in closed continuous system with occasional exposure - liquid mixture*	PROC 2	
6: *Chemical production in closed batch system with occasional exposure - solid mixture*	PROC 3	
7: *Chemical production in closed batch system with occasional exposure - liquid mixture*	PROC 3	
8: *Mixing or blending in batch processes - solid mixture*	PROC 5	
9: *Mixing or blending in batch processes - liquid mixture*	PROC 5	
10: *Transfer at non-dedicated facilities - solid mixture*	PROC 8a	
11: *Transfer at non-dedicated facilities - liquid mixture*	PROC 8a	
12: *Transfer at dedicated facilities - solid mixture*	PROC 8b	
13: *Transfer at dedicated facilities - liquid mixture*	PROC 8b	
14: *Small volume transfer - solid mixture*	PROC 9	
15: *Small volume transfer - liquid mixture*	PROC 9	
16: *Sampling - solid mixture*	PROC 9	
17: *Quality control - solid mixture*	PROC 15	
18: *Quality control - liquid mixture*	PROC 15	
19: *Maintenance and cleaning - solid mixture*	PROC 28	
20: *Maintenance and cleaning - liquid mixture*	PROC 28	
Subsequent service life exposure scenario(s)		
ES 6: Service life (worker at industrial site); Electrical batteries and accumulators (AC 3)		
ES 8: Service life (professional worker); Electrical batteries and accumulators (AC 3)		
ES 9: Service life (consumers); Electrical batteries and accumulators (AC 3)		

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Industrial use in electrolytic capacitors (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.091 tonnes/day
Annual amount per site ≤ 20 tonnes/year
Technical and organisational conditions and measures
Assumes air emission is reduced by one or more of the following RMMs: electrostatic precipitators, wet electrostatic precipitators, cyclones, fabric/bag filter or ceramic/metal mesh filter.
Assumes on site treatment of wastewater with either chemical precipitation, sedimentation, filtration, electrolysis, reverse osmosis or ion exchange.
Conditions and measures related to biological sewage treatment plant
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
No application of sewage sludge to soil
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

2.2.2. Control of worker exposure: Storage of solid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.3. Control of worker exposure: Storage of liquid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.4. Control of worker exposure: Chemical production in closed continuous system with occasional exposure - solid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.5. Control of worker exposure: Chemical production in closed continuous system with occasional exposure - liquid mixture (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.6. Control of worker exposure: Chemical production in closed batch system with occasional exposure - solid mixture (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.7. Control of worker exposure: Chemical production in closed batch system with occasional exposure - liquid mixture (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.8. Control of worker exposure: Mixing or blending in batch processes - solid mixture (PROC 5)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.9. Control of worker exposure: Mixing or blending in batch processes - liquid mixture (PROC 5)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.10. Control of worker exposure: Transfer at non-dedicated facilities - solid mixture (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of powders < 1000 kg/min
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that the handling reduces contact between product and adjacent air (e.g. dumping powders in a big bag through a small opening).
Ensure that distance between the source of emission and the worker is at least 1m.

2.2.11. Control of worker exposure: Transfer at non-dedicated facilities - liquid mixture (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of liquid < 1000 l/min
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.
Covers splash loading.

2.2.12. Control of worker exposure: Transfer at dedicated facilities - solid mixture (PROC 8b)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.13. Control of worker exposure: Transfer at dedicated facilities - liquid mixture (PROC 8b)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.14. Control of worker exposure: Small volume transfer - solid mixture (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.15. Control of worker exposure: Small volume transfer - liquid mixture (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.16. Control of worker exposure: Sampling - solid mixture (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.17. Control of worker exposure: Quality control - solid mixture (PROC 15)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.18. Control of worker exposure: Quality control - liquid mixture (PROC 15)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.19. Control of worker exposure: Maintenance and cleaning - solid mixture (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day

Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.2.20. Control of worker exposure: Maintenance and cleaning - liquid mixture (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Industrial use in electrolytic capacitors (ERC 5)

Release route	Release rate	Release estimation method
Water	2.73E-3 kg/day	SPERC
Air	2.73E-3 kg/day	SPERC
Soil	0.909 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	3.72E-4 mg/L (EUSES 2.1.2)	< 0.01
Marine water	3.66E-5 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	1.36E-3 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	4.29E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	4.57E-7 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	8.09E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

2.3.2. Worker exposure: Storage of solid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

2.3.3. Worker exposure: Storage of liquid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

2.3.4. Worker exposure: Chemical production in closed continuous system with occasional exposure - solid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

2.3.5. Worker exposure: Chemical production in closed continuous system with occasional exposure - liquid mixture (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

2.3.6. Worker exposure: Chemical production in closed batch system with occasional exposure - solid mixture (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.113

2.3.7. Worker exposure: Chemical production in closed batch system with occasional exposure - liquid mixture (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.113

2.3.8. Worker exposure: Mixing or blending in batch processes - solid mixture (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.05 mg/m³ (TRA Workers 3.0)	0.194
Dermal, systemic, long term	0.823 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.198

2.3.9. Worker exposure: Mixing or blending in batch processes - liquid mixture (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.05 mg/m³ (TRA Workers 3.0)	0.194
Dermal, systemic, long term	0.823 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.198

2.3.10. Worker exposure: Transfer at non-dedicated facilities - solid mixture (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.1 mg/m³ (ART)	0.204
Dermal, systemic, long term	0.823 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.207

2.3.11. Worker exposure: Transfer at non-dedicated facilities - liquid mixture (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.27 mg/m³ (ART)	0.05
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.082

2.3.12. Worker exposure: Transfer at dedicated facilities - solid mixture (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.75 mg/m³ (TRA Workers 3.0)	0.139
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.171

2.3.13. Worker exposure: Transfer at dedicated facilities - liquid mixture (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.75 mg/m³ (TRA Workers 3.0)	0.139
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.171

2.3.14. Worker exposure: Small volume transfer - solid mixture (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.84 mg/m³ (TRA Workers 3.0)	0.156
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.172

2.3.15. Worker exposure: Small volume transfer - liquid mixture (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.84 mg/m³ (TRA Workers 3.0)	0.156
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.172

2.3.16. Worker exposure: Sampling - solid mixture (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.24 mg/m³ (TRA Workers 3.0)	0.044
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.061

2.3.17. Worker exposure: Quality control - solid mixture (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.204 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.112

2.3.18. Worker exposure: Quality control - liquid mixture (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.204 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.112

2.3.19. Worker exposure: Maintenance and cleaning - solid mixture (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (ECETOC TRA Workers)	0.111
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.144

2.3.20. Worker exposure: Maintenance and cleaning - liquid mixture (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (ECETOC TRA Workers)	0.111
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.144

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your

own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed “scaling”. Scaling instructions are given below.

Human health: The workers’ dermal exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7. The workers’ inhalation exposure for most of the PROCs is assessed using TRA Workers v3.0 as implemented in CHESAR. Only for some PROCs the inhalation exposure is assessed using ART v1.5.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7. Hereby, Eurometaux SpERC 5.2.v3 is used.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are “equivalent” to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  ART v1.5: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, Workroom size, Transfer rate, Transfer loading type, Transfer type, Drop height, Distance of source to buildings, Segregation of the source, Personal enclosure, RPE.
  Remark: ART predicts air concentrations in a worker’s personal breathing zone outside of any Respiratory Protection Equipment (RPE). Therefore, the use of RPE has to be considered separately.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario. –

- **Environment:**
  Daily use amount, Annual use amount, Number of emission days, Discharge rate of STP, Release factors.

Further details on scaling are provided in ECHA’s Guidance for downstream users v2.1 (October 2014) as well as in ECHA’s Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 2.3.

3. ES 3: Use at industrial sites; Coatings and Paints, Thinners, paint removers (PC 9a); Building and construction work (SU 19)

3.1. Use descriptors

ES name: *Industrial use of varnish*
Product category: Coatings and Paints, Thinners, paint removers (PC 9a)
Sector of use: Building and construction work (SU 19)

Environment		SPERC
1: *Use at industrial site leading to inclusion into/onto article.*	ERC 5	*Eurometaux SPERC 5.1.v3*
Worker		SWED
2: *Transfer of varnish - indoor*	PROC 8a	
3: *Transfer of varnish - outdoor*	PROC 8a	
4: *Storage*	PROC 2	
5: *Spraying of varnish - indoor*	PROC 7	
6: *Spraying of varnish - outdoor*	PROC 7	
7: *Rolling and brushing of varnish - indoor*	PROC 10	
8: *Rolling and brushing of varnish - outdoor*	PROC 10	
9: *Dipping and pouring of varnish - indoor*	PROC 13	
10: *Dipping and pouring of varnish - outdoor*	PROC 13	
11: *Maintenance and cleaning - indoor*	PROC 28	
12: *Maintenance and cleaning - outdoor*	PROC 28	
Subsequent service life exposure scenario(s)		
ES 5: Service life (worker at industrial site); Metal articles: Large surface area articles (AC 7a)		
ES 7: Service life (professional worker); Metal articles: Large surface area articles (AC 7a)		

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Use at industrial site leading to inclusion into/onto article. (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.364 tonnes/day
Annual amount per site ≤ 80 tonnes/year
Technical and organisational conditions and measures
Assumes air emission is reduced by one or more of the following RMMs: electrostatic precipitators, wet electrostatic precipitators, cyclones, fabric/bag filter or ceramic/metal mesh filter.
Assumes on site treatment of wastewater with either chemical precipitation, sedimentation, filtration, electrolysis, reverse osmosis or ion exchange.
Conditions and measures related to biological sewage treatment plant
Provide onsite wastewater treatment.
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
No application of sewage sludge to soil

Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

3.2.2. Control of worker exposure: Transfer of varnish - indoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of liquid < 1000 l/min
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.
Covers splash loading.

3.2.3. Control of worker exposure: Transfer of varnish - outdoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of liquid < 1000 l/min
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.
Covers splash loading.

3.2.4. Control of worker exposure: Storage (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

3.2.5. Control of worker exposure: Spraying of varnish - indoor (PROC 7)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Moderate application rate (0.3 - 3 l/minute)
Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that direction of application is only horizontal or downward.
Spraying with no or low compressed air use

3.2.6. Control of worker exposure: Spraying of varnish - outdoor (PROC 7)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 4 h/day
Moderate application rate (0.3 - 3 l/minute)
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Ensure that direction of application is only horizontal or downward.
Spraying with no or low compressed air use

3.2.7. Control of worker exposure: Rolling and brushing of varnish - indoor (PROC 10)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

3.2.8. Control of worker exposure: Rolling and brushing of varnish - outdoor (PROC 10)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.2.9. Control of worker exposure: Dipping and pouring of varnish - indoor (PROC 13)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

3.2.10. Control of worker exposure: Dipping and pouring of varnish - outdoor (PROC 13)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers open baths or reservoirs with surface > 3 m²

3.2.11. Control of worker exposure: Maintenance and cleaning - indoor (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day

Technical and organisational conditions and measures
Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C

3.2.12. Control of worker exposure: Maintenance and cleaning - outdoor (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with medium to high viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Use at industrial site leading to inclusion into/onto article. (ERC 5)

Release route	Release rate	Release estimation method
Water	1.818 kg/day	SPERC
Air	0.727 kg/day	SPERC
Soil	3.636 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	0.091 mg/L (EUSES 2.1.2)	0.031
Marine water	9.11E-3 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	0.909 mg/L (EUSES 2.1.2)	0.091
Agricultural soil	1.4E-3 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	1.22E-4 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	0.02 mg/kg bw/day (EUSES 2.1.2)	0.117
Man via environment - combined routes		0.117

3.3.2. Worker exposure: Transfer of varnish - indoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.27 mg/m³ (ART)	0.05
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.082

3.3.3. Worker exposure: Transfer of varnish - outdoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.53 mg/m³ (ART)	0.098
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.131

3.3.4. Worker exposure: Storage (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

3.3.5. Worker exposure: Spraying of varnish - indoor (PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.22 mg/m³ (ART)	0.041
Dermal, systemic, long term	25.71 mg/kg bw/day (TRA Workers 3.0)	0.101
Combined, systemic, long term		0.142

3.3.6. Worker exposure: Spraying of varnish - outdoor (PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.97 mg/m³ (ART)	0.18
Dermal, systemic, long term	2.572 mg/kg bw/day (TRA Workers 3.0)	0.01
Combined, systemic, long term		0.19

3.3.7. Worker exposure: Rolling and brushing of varnish - indoor (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	16.45 mg/kg bw/day (TRA Workers 3.0)	0.065
Combined, systemic, long term		0.176

3.3.8. Worker exposure: Rolling and brushing of varnish - outdoor (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.59 mg/m³ (ART)	0.109
Dermal, systemic, long term	16.45 mg/kg bw/day (TRA Workers 3.0)	0.065
Combined, systemic, long term		0.174

3.3.9. Worker exposure: Dipping and pouring of varnish - indoor (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.088

3.3.10. Worker exposure: Dipping and pouring of varnish - outdoor (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	5.9E-3 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.033

3.3.11. Worker exposure: Maintenance and cleaning - indoor (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (ECETOC TRA Workers)	0.111
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.144

3.3.12. Worker exposure: Maintenance and cleaning - outdoor (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	7.4E-4 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.033

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' dermal exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7. The workers' inhalation exposure for most of the PROCs is assessed using TRA Workers v3.0 as implemented in CHESAR and for some PROCs the inhalation exposure is assessed using ART v1.5.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7. Hereby, Eurometaux SPERC 5.1.v3 is used.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are “equivalent” to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  ART v1.5: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, Workroom size, Transfer rate, Transfer loading type, Application rate for spraying, Spraying direction, Spraying technique, Open surface area, Scale of application, Surface area treated/contaminated, Level of contamination, Distance of source to buildings, Segregation of the source, Personal enclosure, RPE.
  Remark: ART predicts air concentrations in a worker’s personal breathing zone outside of any Respiratory Protection Equipment (RPE). Therefore, the use of RPE has to be considered separately.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Daily use amount, Annual use amount, Number of emission days, Discharge rate of STP, Release factors.

Further details on scaling are provided in ECHA’s Guidance for downstream users v2.1 (October 2014) as well as in ECHA’s Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 3.3.

4. ES 4: Widespread use by professional workers; Fertilizers (PC 12); Agriculture, forestry, fishery (SU 1)

4.1. Use descriptors

ES name: *Professional use of micronutrient fertilisers*
Product category: Fertilizers (PC 12)
Sector of use: Agriculture, forestry, fishery (SU 1)

Environment	
1: *Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor/outdoor)*	ERC 8d, ERC 8a
Worker	
2: *Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - indoor*	PROC 8a
3: *Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - outdoor*	PROC 8a
4: *Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - indoor, e.g. in greenhouses*	PROC 2
5: *Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - outdoor*	PROC 2
6: *Storage of liquid fertiliser - indoor*	PROC 2
7: *Storage of liquid fertiliser - outdoor*	PROC 2
8: *Storage of non-granular and granular fertiliser - indoor*	PROC 2
9: *Storage of non-granular and granular fertiliser - outdoor*	PROC 2
10: *Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - indoor*	PROC 3
11: *Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - outdoor*	PROC 3
12: *Filling liquid foliar fertiliser into tractor-pulled spraybar - indoor*	PROC 8a
13: *Filling liquid foliar fertiliser into tractor-pulled spraybar - outdoor*	PROC 8a
14: *Filling liquid foliar fertiliser into a knapsack sprayer - indoor*	PROC 9
15: *Filling liquid foliar fertiliser into a knapsack sprayer - outdoor*	PROC 9
16: *Automated fertigation of plants in greenhouses*	PROC 3
17: *Automated fertigation of plants in fields*	PROC 3
18: *Automated irrigation - indoor*	PROC 11
19: *Automated irrigation - outdoor*	PROC 11
20: *Spreading of solid fertiliser using spreader hopper*	PROC 11
21: *Spray application of liquid foliar fertiliser with knapsack sprayer*	PROC 11
22: *Spray application of liquid foliar fertiliser with tractor-pulled spraybar*	PROC 11
23: *Maintenance and routine cleaning - indoor, liquid*	PROC 28
24: *Maintenance and routine cleaning - outdoor, liquid*	PROC 28
25: *Maintenance and routine cleaning- indoor, solid*	PROC 28
26: *Maintenance and routine cleaning- outdoor, solid*	PROC 28

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor/outdoor) (ERC 8d, ERC 8a)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

4.2.2. Control of worker exposure: Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - indoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of powders < 100 kg/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that the handling reduces contact between product and adjacent air (e.g. dumping powders in a big bag through a small opening).
Covers height during transfer < 0.5 m.

4.2.3. Control of worker exposure: Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - outdoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.

Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of powders < 10 kg/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Ensure that the handling reduces contact between product and adjacent air (e.g. dumping powders in a big bag through a small opening).
Covers height during transfer < 0.5 m.

4.2.4. Control of worker exposure: Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - indoor, e.g. in greenhouses (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.5. Control of worker exposure: Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - outdoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

4.2.6. Control of worker exposure: Storage of liquid fertiliser - indoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Substance contained within a sealed and enclosed system.; Material transfer entirely enclosed with high containment valves.; The enclosure is not opened during the activity.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Covers open baths or reservoirs with surface < 0.1 m²
Ensure that distance between the source of emission and the worker is at least 1m.

4.2.7. Control of worker exposure: Storage of liquid fertiliser - outdoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Substance contained within a sealed and enclosed system.; Material transfer entirely enclosed with high containment valves.; The enclosure is not opened during the activity.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers open baths or reservoirs with surface < 0.1 m²
Ensure that distance between the source of emission and the worker is at least 1m.
Covers the outdoor application where the worker is located further than 4 meters from the emission source

4.2.8. Control of worker exposure: Storage of non-granular and granular fertiliser - indoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; Medium dustiness: Handling the product in its dry form results in a dust cloud that settles quickly due to gravity. For example, sand.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.9. Control of worker exposure: Storage of non-granular and granular fertiliser - outdoor (PROC 2)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; Medium dustiness: Handling the product in its dry form results in a dust cloud that settles quickly due to gravity. For example, sand.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

4.2.10. Control of worker exposure: Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - indoor (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

4.2.11. Control of worker exposure: Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - outdoor (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

4.2.12. Control of worker exposure: Filling liquid foliar fertiliser into tractor-pulled spraybar - indoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of liquid < 100 l/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Covers splash loading.

4.2.13. Control of worker exposure: Filling liquid foliar fertiliser into tractor-pulled spraybar - outdoor (PROC 8a)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of liquid < 100 l/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers splash loading.

4.2.14. Control of worker exposure: Filling liquid foliar fertiliser into a knapsack sprayer - indoor (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of liquid < 10 l/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Covers splash loading.

4.2.15. Control of worker exposure: Filling liquid foliar fertiliser into a knapsack sprayer - outdoor (PROC 9)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Covers transfer of liquid < 10 l/min
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Covers splash loading.

4.2.16. Control of worker exposure: Automated fertigation of plants in greenhouses (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of liquid < 100 l/min
Technical and organisational conditions and measures
Use in contained systems; Transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.; The enclosure is not opened during the activity.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.

4.2.17. Control of worker exposure: Automated fertigation of plants in fields (PROC 3)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Covers transfer of liquid < 100 l/min
Technical and organisational conditions and measures
Use in contained systems; Transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.; The enclosure is not opened during the activity.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.
Covers the outdoor application where the worker is located further than 4 meters from the emission source

4.2.18. Control of worker exposure: Automated irrigation - indoor (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Moderate application rate (0.3 - 3 l/minute)
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Spraying with no or low compressed air use
Ensure that direction of application is only downward.
Ensure that distance between the source of emission and the worker is at least 1m.

4.2.19. Control of worker exposure: Automated irrigation - outdoor (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Moderate application rate (0.3 - 3 l/minute)
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Outdoors, not close to buildings
Assumes process temperature up to 40 °C
Ensure that distance between the source of emission and the worker is at least 1m.
Covers the outdoor application where the worker is located further than 4 meters from the emission source

4.2.20. Control of worker exposure: Spreading of solid fertiliser using spreader hopper (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Outdoors, not close to buildings
Assumes process temperature up to 40 °C
Covers powder spraying.
Ensure that direction of application is only downward.
Ensure that distance between the source of emission and the worker is at least 1m.

4.2.21. Control of worker exposure: Spray application of liquid foliar fertiliser with knapsack sprayer (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Low application rate (0.03 - 0.3 l/minute)
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Outdoors, not close to buildings
Assumes process temperature up to 40 °C
Spraying with no or low compressed air use
Ensure that direction of application is only downward.

4.2.22. Control of worker exposure: Spray application of liquid foliar fertiliser with tractor-pulled spraybar (PROC 11)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Outdoors, not close to buildings
Assumes process temperature up to 40 °C
Ensure that direction of application is only horizontal or downward.
Ensure that distance between the source of emission and the worker is at least 1m.
Covers the outdoor application where the worker is located further than 4 meters from the emission source

4.2.23. Control of worker exposure: Maintenance and routine cleaning - indoor, liquid (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C

4.2.24. Control of worker exposure: Maintenance and routine cleaning - outdoor, liquid (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Liquid
Covers liquids with low to medium viscosity.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

4.2.25. Control of worker exposure: Maintenance and routine cleaning- indoor, solid (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Covers room volume ≥ 100 m³
Assumes process temperature up to 40 °C
Assumes regular work procedures
Covers handling of objects with visible residual dust (e.g. object covered with dust from surrounding dusty activities).

4.2.26. Control of worker exposure: Maintenance and routine cleaning- outdoor, solid (PROC 28)

Product (article) characteristics
Covers concentrations up to 25 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Powders, granules or pelletised material
Covers the use of fine dust materials.
Covers dry product with <5 % moisture content.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Effective housekeeping practices (e.g. daily cleaning using appropriate methods, preventive maintenance of machinery, use of protective clothing that will repel spills and reduce personal cloud) in place.
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C
Assumes regular work procedures
Covers handling of objects with visible residual dust (e.g. object covered with dust from surrounding dusty activities).

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor/outdoor) (ERC 8d)

Release route	Release rate	Release estimation method
Water	1.65E-3 kg/day	ERC
Air	1.65E-3 kg/day	ERC
Soil	3.3E-4 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	3.18E-4 mg/L (EUSES 2.1.2)	< 0.01
Marine water	3.12E-5 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	8.25E-4 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	4.3E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	2.49E-13 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.25E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

4.3.2. Worker exposure: Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - indoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.73 mg/m³ (ART)	0.135
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.168

4.3.3. Worker exposure: Transfer of bulk bags to storage as well as transfer and discharge of bulk bags into spreader hopper - outdoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.48 mg/m³ (ART)	0.089
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.121

4.3.4. Worker exposure: Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - indoor, e.g. in greenhouses (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

4.3.5. Worker exposure: Closed transfer of boron-containing liquid fertiliser e.g. to storage or from storage to fertigation system - outdoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.42 mg/m³ (TRA Workers 3.0)	0.078
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.081

4.3.6. Worker exposure: Storage of liquid fertiliser - indoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.1E-5 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		< 0.01

4.3.7. Worker exposure: Storage of liquid fertiliser - outdoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.5E-7 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		< 0.01

4.3.8. Worker exposure: Storage of non-granular and granular fertiliser - indoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.114

4.3.9. Worker exposure: Storage of non-granular and granular fertiliser - outdoor (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.42 mg/m³ (TRA Workers 3.0)	0.078
Dermal, systemic, long term	0.822 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.081

4.3.10. Worker exposure: Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - indoor (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.6 mg/m³ (TRA Workers 3.0)	0.111
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.113

4.3.11. Worker exposure: Dissolving of non-granular boron-containing fertiliser in water in spreader tank or container - outdoor (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.42 mg/m³ (TRA Workers 3.0)	0.078
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.079

4.3.12. Worker exposure: Filling liquid foliar fertiliser into tractor-pulled spraybar - indoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.062 mg/m³ (ART)	0.011
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.044

4.3.13. Worker exposure: Filling liquid foliar fertiliser into tractor-pulled spraybar - outdoor (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.074 mg/m³ (ART)	0.014
Dermal, systemic, long term	8.226 mg/kg bw/day (TRA Workers 3.0)	0.032
Combined, systemic, long term		0.046

4.3.14. Worker exposure: Filling liquid foliar fertiliser into a knapsack sprayer - indoor (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.019 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.02

4.3.15. Worker exposure: Filling liquid foliar fertiliser into a knapsack sprayer - outdoor (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.022 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	4.116 mg/kg bw/day (TRA Workers 3.0)	0.016
Combined, systemic, long term		0.02

4.3.16. Worker exposure: Automated fertigation of plants in greenhouses (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.1E-4 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		< 0.01

4.3.17. Worker exposure: Automated fertigation of plants in fields (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	1.5E-6 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	0.414 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		< 0.01

4.3.18. Worker exposure: Automated irrigation - indoor (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.28 mg/m³ (ART)	0.052
Dermal, systemic, long term	6.428 mg/kg bw/day (TRA Workers 3.0)	0.025
Combined, systemic, long term		0.077

4.3.19. Worker exposure: Automated irrigation - outdoor (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.44 mg/m³ (ART)	0.081
Dermal, systemic, long term	6.428 mg/kg bw/day (TRA Workers 3.0)	0.025
Combined, systemic, long term		0.107

4.3.20. Worker exposure: Spreading of solid fertiliser using spreader hopper (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.26 mg/m³ (ART)	0.048
Dermal, systemic, long term	6.428 mg/kg bw/day (TRA Workers 3.0)	0.025
Combined, systemic, long term		0.073

4.3.21. Worker exposure: Spray application of liquid foliar fertiliser with knapsack sprayer (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.47 mg/m³ (ART)	0.087
Dermal, systemic, long term	6.428 mg/kg bw/day (TRA Workers 3.0)	0.025
Combined, systemic, long term		0.112

4.3.22. Worker exposure: Spray application of liquid foliar fertiliser with tractor-pulled spraybar (PROC 11)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.44 mg/m³ (ART)	0.081
Dermal, systemic, long term	6.428 mg/kg bw/day (TRA Workers 3.0)	0.025
Combined, systemic, long term		0.107

4.3.23. Worker exposure: Maintenance and routine cleaning - indoor, liquid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	2E-3 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.033

4.3.24. Worker exposure: Maintenance and routine cleaning - outdoor, liquid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	2.5E-3 mg/m³ (ART)	< 0.01
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.033

4.3.25. Worker exposure: Maintenance and routine cleaning- indoor, solid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.4 mg/m³ (ART)	0.074
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.106

4.3.26. Worker exposure: Maintenance and routine cleaning- outdoor, solid (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.48 mg/m³ (ART)	0.089
Dermal, systemic, long term	8.226 mg/kg bw/day (ECETOC TRA Workers)	0.032
Combined, systemic, long term		0.121

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' dermal exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7. The workers' inhalation exposure for most of the PROCs is assessed using ART v1.5. Only for some PROCs the inhalation exposure is assessed using TRA Workers v3.0 as implemented in CHESAR.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are "equivalent" to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  ART v1.5: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, Workroom size, Transfer rate, Transfer loading type, Transfer type, Drop height, Application rate for spraying, Spraying direction, Spraying technique, Open surface area, Surface area of treated/contaminated object, Level of contamination, Work procedure, Distance of source to buildings, Segregation of the source, Personal enclosure, RPE.
  .
  Remark: ART predicts air concentrations in a worker's personal breathing zone outside of any Respiratory Protection Equipment (RPE). Therefore, the use of RPE has to be considered separately.

Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Release factors.

Further details on scaling are provided in ECHA's Guidance for downstream users v2.1 (October 2014) as well as in ECHA's Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 4.3.

5. ES 5: Service life (worker at industrial site); Metal articles: Large surface area articles (AC 7a)

5.1. Use descriptors

ES name: *Industrial service life of varnished articles*
Article category: Metal articles: Large surface area articles (AC 7a)

Environment	
1: *Processing of articles at industrial sites with low release*	ERC 12a
2: *Use of articles at industrial sites with low release*	ERC 12c
Worker	
3: *Handling of articles - indoor*	PROC 21
4: *Handling of articles - outdoor*	PROC 21
5: *High (mechanical) energy work-up of articles - indoor*	PROC 24
6: *High (mechanical) energy work-up of articles - outdoor*	PROC 24
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 3: Use at industrial sites; Coatings and Paints, Thinners, paint removers (PC 9a); Building and construction work (SU 19)	

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Processing of articles at industrial sites with low release (ERC 12a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.4 tonnes/day
Annual amount per site ≤ 8 tonnes/year
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow ≥ 1.8E4 m³/day

5.2.2. Control of environmental exposure: Use of articles at industrial sites with low release (ERC 12c)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.4 tonnes/day
Annual amount per site ≤ 8 tonnes/year
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow ≥ 1.8E4 m³/day

5.2.3. Control of worker exposure: Handling of articles - indoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.4. Control of worker exposure: Handling of articles - outdoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

5.2.5. Control of worker exposure: High (mechanical) energy work-up of articles - indoor (PROC 24)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

5.2.6. Control of worker exposure: High (mechanical) energy work-up of articles - outdoor (PROC 24)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Processing of articles at industrial sites with low release (ERC 12a)

Release route	Release rate	Release estimation method
Water	10 kg/day	ERC
Air	10 kg/day	ERC
Soil	10 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	0.5 mg/L (EUSES 2.1.2)	0.172
Marine water	0.05 mg/L (EUSES 2.1.2)	0.017
Sewage Treatment Plant	4.998 mg/L (EUSES 2.1.2)	0.5
Agricultural soil	0.032 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	1.52E-4 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	0.024 mg/kg bw/day (EUSES 2.1.2)	0.14
Man via environment - combined routes		0.14

5.3.2. Environmental release and exposure: Use of articles at industrial sites with low release (ERC 12c)

Release route	Release rate	Release estimation method
Water	0.2 kg/day	ERC
Air	0.2 kg/day	ERC
Soil	0 kg/day	ERC

5.3.3. Worker exposure: Handling of articles - indoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.1 mg/m³ (TRA Workers 3.0)	0.019
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.02

5.3.4. Worker exposure: Handling of articles - outdoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.07 mg/m³ (TRA Workers 3.0)	0.013
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.014

5.3.5. Worker exposure: High (mechanical) energy work-up of articles - indoor (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.1 mg/m³ (TRA Workers 3.0)	0.019
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.02

5.3.6. Worker exposure: High (mechanical) energy work-up of articles - outdoor (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.07 mg/m³ (TRA Workers 3.0)	0.013
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.014

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are "equivalent" to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Daily use amount, Annual use amount, Number of emission days, Discharge rate of STP, Receiving surface water flow rate, Release factors.

Further details on scaling are provided in ECHA's Guidance for downstream users v2.1 (October 2014) as well as in ECHA's Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 5.3.

6. ES 6: Service life (worker at industrial site); Electrical batteries and accumulators (AC 3)

6.1. Use descriptors

ES name: *Industrial service life of electronic articles*
Article category: Electrical batteries and accumulators (AC 3)

Environment	
1: *Use of articles at industrial sites with low release*	ERC 12c
Worker	
2: *Handling of articles*	PROC 21
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 2: Use at industrial sites; Other (PC 0); Various sectors (SU 16, SU 23)	

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: Use of articles at industrial sites with low release (ERC 12c)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 1 tonnes/day
Annual amount per site ≤ 20 tonnes/year
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow ≥ 2E3 m³/day
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow ≥ 1.8E4 m³/day

6.2.2. Control of worker exposure: Handling of articles (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personal operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: Use of articles at industrial sites with low release (ERC 12c)

Release route	Release rate	Release estimation method
Water	0.5 kg/day	ERC
Air	0.5 kg/day	ERC
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	0.025 mg/L (EUSES 2.1.2)	< 0.01
Marine water	2.52E-3 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	0.25 mg/L (EUSES 2.1.2)	0.025
Agricultural soil	2.02E-3 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	7.62E-6 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.2E-3 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

6.3.2. Worker exposure: Handling of articles (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.1 mg/m³ (TRA Workers 3.0)	0.019
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.02

6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are “equivalent” to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Daily use amount, Annual use amount, Number of emission days, Discharge rate of STP, Receiving surface water flow rate, Release factors.

Further details on scaling are provided in ECHA’s Guidance for downstream users v2.1 (October 2014) as well as in ECHA’s Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 6.3.

7. ES 7: Service life (professional worker); Metal articles: Large surface area articles (AC 7a)

7.1. Use descriptors

ES name: *Professional service life of varnished articles*
Article category: Metal articles: Large surface area articles (AC 7a)

Environment	
1: *Widespread use of articles with low release (indoor/outdoor)*	ERC 10a, ERC 11a
Worker	
2: *Handling of articles - indoor*	PROC 21
3: *Handling of articles - outdoor*	PROC 21
4: *High (mechanical) energy work-up of articles - indoor*	PROC 24
5: *High (mechanical) energy work-up of articles - outdoor*	PROC 24
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 3: Use at industrial sites; Coatings and Paints, Thinners, paint removers (PC 9a); Building and construction work (SU 19)	

7.2. Conditions of use affecting exposure

7.2.1. Control of environmental exposure: Widespread use of articles with low release (indoor/outdoor) (ERC 10a, ERC 11a)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

7.2.2. Control of worker exposure: Handling of articles - indoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

7.2.3. Control of worker exposure: Handling of articles - outdoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

7.2.4. Control of worker exposure: High (mechanical) energy work-up of articles - indoor (PROC 24)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

7.2.5. Control of worker exposure: High (mechanical) energy work-up of articles - outdoor (PROC 24)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.

Other conditions affecting workers exposure
Outdoor use
Assumes process temperature up to 40 °C

7.3. Exposure estimation and reference to its source

7.3.1. Environmental release and exposure: Widespread use of articles with low release (indoor/outdoor) (ERC 10a)

Release route	Release rate	Release estimation method
Water	1.41E-3 kg/day	ERC
Air	2.2E-5 kg/day	ERC
Soil	1.41E-3 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	3.06E-4 mg/L (EUSES 2.1.2)	< 0.01
Marine water	3E-5 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	7.04E-4 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	4.29E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	2.46E-13 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.21E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

7.3.2. Worker exposure: Handling of articles - indoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.057

7.3.3. Worker exposure: Handling of articles - outdoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.21 mg/m³ (TRA Workers 3.0)	0.039
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.04

7.3.4. Worker exposure: High (mechanical) energy work-up of articles - indoor (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.057

7.3.5. Worker exposure: High (mechanical) energy work-up of articles - outdoor (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.21 mg/m³ (TRA Workers 3.0)	0.039
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.04

7.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed "scaling". Scaling instructions are given below.

Human health: The workers' exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are "equivalent" to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Release factors.

Further details on scaling are provided in ECHA's Guidance for downstream users v2.1 (October 2014) as well as in ECHA's Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 7.3.

8. ES 8: Service life (professional worker); Electrical batteries and accumulators (AC 3)

8.1. Use descriptors

ES name: *Professional service life of electronic articles*
Article category: Electrical batteries and accumulators (AC 3)

Environment	
1: *Widespread use of articles with low release (outdoor/indoor)*	ERC 10a, ERC 11a
Worker	
2: *Handling of articles- indoor*	PROC 21
3: *Handling of articles - outdoor*	PROC 21
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 2: Use at industrial sites; Other (PC 0); Various sectors (SU 16, SU 23)	

8.2. Conditions of use affecting exposure

8.2.1. Control of environmental exposure: Widespread use of articles with low release (outdoor/indoor) (ERC 10a, ERC 11a)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

8.2.2. Control of worker exposure: Handling of articles- indoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

8.2.3. Control of worker exposure: Handling of articles - outdoor (PROC 21)

Product (article) characteristics
Covers concentrations up to 0.5 %
Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day

Technical and organisational conditions and measures
Please also refer to section 0. for technical and organisational conditions and measures to ensure that the risk is adequately controlled.
Conditions and measures related to personal protection, hygiene and health evaluation
Please also refer to section 0. for conditions and measures related to personal protection and hygiene to ensure that the risk is adequately controlled.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 40 °C

8.3. Exposure estimation and reference to its source

8.3.1. Environmental release and exposure: Widespread use of articles with low release (outdoor/indoor) (ERC 10a)

Release route	Release rate	Release estimation method
Water	3.52E-4 kg/day	ERC
Air	5.5E-6 kg/day	ERC
Soil	3.52E-4 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.53E-4 mg/L (EUSES 2.1.2)	< 0.01
Marine water	2.47E-5 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	1.76E-4 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	4.26E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	2.31E-13 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.05E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

8.3.2. Worker exposure: Handling of articles- indoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.057

8.3.3. Worker exposure: Handling of articles - outdoor (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.3 mg/m³ (TRA Workers 3.0)	0.056
Dermal, systemic, long term	0.283 mg/kg bw/day (TRA Workers 3.0)	< 0.01
Combined, systemic, long term		0.057

8.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
The conditions of use at downstream users' sites may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and your own practice it does not mean that the use is not covered. The risk may still be adequately controlled. The way in

which you determine if your conditions are equivalent or lower is termed “scaling”. Scaling instructions are given below.

Human health: The workers’ exposure is assessed using TRA Workers 3.0 as implemented in CHESAR v.3.7.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether your conditions are “equivalent” to the conditions defined in the exposure scenario. If your conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for scaling.

- **Workers:**
  TRA Workers v3.0: Duration of activity, Percentage of substance in mixture/article, General ventilation, Local exhaust ventilation, Operating temperature, PPE.

  Remark regarding RMMs: Effectiveness is the key information related to risk management measures. You can be sure that your risk management measures are covered if their effectiveness is equal to, or higher than, what is specified in the exposure scenario.

- **Environment:**
  Release factors.

Further details on scaling are provided in ECHA’s Guidance for downstream users v2.1 (October 2014) as well as in ECHA’s Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 8.3.

9. ES 9: Service life (consumers); Electrical batteries and accumulators (AC 3)

9.1. Use descriptors

ES name: *Consumer service life of electronic articles*
Article category: Electrical batteries and accumulators (AC 3)

Environment	
1: *Widespread use of articles with low release (outdoor/indoor)*	ERC 10a, ERC 11a
Consumer	
2: *Electrical batteries and accumulators*	AC 3
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 2: Use at industrial sites; Other (PC 0); Various sectors (SU 16, SU 23)	

9.2. Conditions of use affecting exposure

9.2.1. Control of environmental exposure: Widespread use of articles with low release (outdoor/indoor) (ERC 10a, ERC 11a)

Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Municipal sewage treatment plant is assumed.

9.2.2. Control of consumer exposure: Electrical batteries and accumulators (AC 3)

Product (article) characteristics
Covers concentrations up to 0.5 %
Covers the use of solid, non or low-dusty materials.
Inhalation exposure is considered to be not relevant.
Dermal exposure assumed to be negligible
Oral exposure is considered to be not relevant.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 1 events per day

9.3. Exposure estimation and reference to its source

9.3.1. Environmental release and exposure: Widespread use of articles with low release (outdoor/indoor) (ERC 10a)

Release route	Release rate	Release estimation method
Water	3.52E-4 kg/day	ERC
Air	5.5E-6 kg/day	ERC
Soil	3.52E-4 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.53E-4 mg/L (EUSES 2.1.2)	< 0.01
Marine water	2.47E-5 mg/L (EUSES 2.1.2)	< 0.01
Sewage Treatment Plant	1.76E-4 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	4.26E-4 mg/kg dw (EUSES 2.1.2)	< 0.01
Man via environment - Inhalation (systemic effects)	2.31E-13 mg/m³ (EUSES 2.1.2)	< 0.01
Man via environment - Oral	1.05E-5 mg/kg bw/day (EUSES 2.1.2)	< 0.01
Man via environment - combined routes		< 0.01

9.3.2. Consumer exposure: Electrical batteries and accumulators (AC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0 mg/m³ (TRA Consumers 3.1)	< 0.01
Dermal, systemic, long term	0 mg/kg bw/day (TRA Consumers 3.1)	< 0.01
Oral, systemic, long term	0 mg/kg bw/day (TRA Consumers 3.1)	< 0.01
Combined, systemic, long term		< 0.01

9.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance:
This exposure scenario for consumer users is addressed to formulators so that they can use the herein provided information in the design of consumer products. The conditions of use may differ in some way from those described in the exposure scenario. In case of differences between the description of conditions of use in the exposure scenario and the use of your products by consumers it does not mean that the use is not covered. The risk may still be adequately controlled. The way in which you determine if your conditions are equivalent or lower is termed “scaling”. Scaling instructions are given below.

Human health: The consumers’ exposure is assessed using TRA Consumers v3.1 as implemented in CHESAR v.3.7.

Environment: Emissions to the environment are estimated using EUSES v.2.1.2 as implemented in CHESAR v3.7.

Since the derived PNECs and DNELs are based on elemental Boron, the human health and environmental exposure assessment is conducted for Boron, too. Therefore, the respective phys-chem parameters of Boron are used for the assessment. For comparative purposes, exposures to borates are often expressed in terms of boron (B) equivalents based on the fraction of boron in the source substance on a molecular weight basis. Conversion factors are given below..

Conversion factors to Boron equivalents:

• Diammonium decaborate: 0.2702

• Ammonium pentaborate tetrahydrate: 0.1986

Scaling tool:
Please use the above indicated publicly available modelling tools for scaling.

Scaling instructions:
Scaling can be used to check whether the consumers’ conditions are “equivalent” to the conditions defined in the exposure scenario. If the conditions of use differ slightly from those indicated in the respective exposure scenario you might be able to demonstrate that, under your conditions of use, the exposure levels are equivalent or lower than under the described conditions. It may be possible to demonstrate this by compensating a variation in one particular condition with a variation in other conditions.

Scalable parameters:
In the following, the key determinants which are likely to vary in the actual use situation are given to be used for

scaling.

- **Consumers:**
  Percentage of substance in mixture/article, Frequency of use over a day.

- **Environment:**
  Release factors.

Further details on scaling are provided in ECHA's Guidance for downstream users v2.1 (October 2014) as well as in ECHA's Practical Guide 13 (June 2012).

Boundaries of scaling:
RCRs not to be exceeded are described in Section 9.3.