SAFETY DATA SHEET

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

1.1 Product identifier

Product name : ***Solubor*® DF**

Product code : Not available.

Product description : Not available.

Product type : Solid.

Other means of identification : Not available.

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

Material uses : Refer to the table "Identified uses" below.

Identified uses
Importing and packaging Agriculture (Fertilisers) *A complete list of uses is provided in the introduction to Annex - Exposure Scenarios*

Uses advised against	Reason
Consumer uses.	Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

1.3 Details of the supplier of the safety data sheet

Borax Europe Limited
6 St. James's Square
London, SW1Y 4AD
United Kingdom
T: +44 (0)20 7781 2000

Borax Francais S.A.S.
Usine/Siège Social
Route de Bourbourg
59411 Coudekerque-Branche
Cedex, France
T: +33 3 28 29 28 30

Rio Tinto Iron & Titanium GmbH
Alfred-Herrhausen-Allee 3-5,
65760 Eschborn
Germany
T: +49 6196 96000

e-mail address of person responsible for this SDS : rtb.sds@riotinto.com

1.4 Emergency telephone number

National advisory body/Poison Centre

Telephone number : 0344 892 0111
UK National Poisons Information Services (NPIS)

For medical advice contact:
NHS 111 in England: 111
NHS 24 in Scotland: 111
NHS Direct in Wales: 111 or 0845 4647

Supplier

Telephone number : +44 (0) 1235 239 670 (Rio Tinto Borates)
For advice on chemical emergencies, spillages, fires or First Aid.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Mixture

Classification according to UK CLP/GHS

Eye Irrit. 2, H319
Repr. 1B, H360FD

The product is classified as hazardous according to UK CLP Regulation SI 2019/720 as amended.

See Section 16 for the full text of the H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Causes serious eye irritation.
May damage fertility. May damage the unborn child.

Precautionary statements

General : Do not handle until all safety precautions have been read and understood.

Prevention : Wear eye protection.

Response : IF exposed or concerned: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage : Not applicable.

Disposal : Dispose of contents/container in accordance with local regulation.

Supplemental label elements : Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Restricted to professional users.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Not applicable.

Tactile warning of danger : Not applicable.

2.3 Other hazards

SECTION 2: Hazards identification

Product meets the criteria for PBT or vPvB according to Regulation (EC) No. 1907/2006, Annex XIII : This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

Other hazards which do not result in classification : May be harmful if swallowed.

SECTION 3: Composition/information on ingredients

3.2 Mixtures : Mixture

Product/ingredient name	Identifiers	%	Classification	Type
boric acid	UK (GB) REACH #: UK-01-2184483912-2 REACH #: 01-2119486683-25 EC: 233-139-2 CAS: 10043-35-3 Index: 005-007-00-2	≥25 - ≤50	Repr. 1B, H360FD: C≥ 5.5%	[1]
disodium tetraborate pentahydrate	UK (GB) REACH #: UK-01-1578446138-4 REACH #: 01-2119490790-32 EC: 215-540-4 CAS: 12179-04-3 Index: 005-011-02-9	≥25 - ≤50	Eye Irrit. 2, H319 Repr. 1B, H360FD: C≥ 6.5%	[1]
Pentaboron sodium octaoxide pentahydrate	REACH #: 01-2119970731-35 EC: 234-522-7 CAS: 12631-71-9	≥10 - ≤25	Repr. 2, H361d: C≥ 5.2% **See Section 16 for the full text of the H statements declared above.**	[1]

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs, vPvBs or Substances of equivalent concern, or have been assigned a workplace exposure limit and hence require reporting in this section.

Type

[1] Substance classified with a health or environmental hazard

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact : Use eye wash fountain or fresh water to cleanse the eye. If irritation persists for more than 30 minutes, seek medical attention.

Inhalation : If symptoms such as nose or throat irritation are observed, remove to fresh air.

Skin contact : No treatment necessary.

Ingestion : Swallowing small quantities (one teaspoon) will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

Protection of first-aiders : No special protective clothing is required

4.2 Most important symptoms and effects, both acute and delayed

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

SECTION 4: First aid measures

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

Ingestion : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician : Supportive care only is required for adult ingestion of less than a few grams of the product. For ingestion of larger amounts, maintain fluid and electrolyte balance and maintain adequate kidney function. Gastric lavage is only recommended for heavily exposed, symptomatic patients in whom emesis has not emptied the stomach. Hemodialysis should be reserved for patients with massive acute absorption, especially for patients with compromised renal function. Boron analyses of urine or blood are only useful for verifying exposure and are not useful for evaluating severity of poisoning or as a guide in treatment.

Specific treatments : No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : None. The product is not flammable, combustible or explosive.

Hazardous combustion products : None.

5.3 Advice for firefighters

Special protective actions for fire-fighters : None.

Special protective equipment for fire-fighters : Not applicable.

Additional information : Not explosive.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Eye protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.

For emergency responders : Eye protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.

SECTION 6: Accidental release measures

6.2 Environmental precautions : The product is a water-soluble white powder that may cause damage to trees or vegetation by root absorption. Avoid contamination of water bodies during clean up and disposal. Advise local water authority that none of the affected water should be used for irrigation or for the abstraction of potable water until natural dilution returns the boron value to its normal environmental background level or meets local water quality standards.

6.3 Methods and material for containment and cleaning up

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

6.4 Reference to other sections : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures : Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimise caking of the product, bags should be handled on a first-in first-out basis.

Storage temperature: Ambient temperature
Storage pressure: Ambient pressure
Special sensitivity: Moisture (Caking)

7.3 Specific end use(s)

Recommendations : Refer to Annex - Exposure Scenarios

Industrial sector specific solutions : Not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

Biological exposure indices

No exposure indices known.

SECTION 8: Exposure controls/personal protection

Recommended monitoring procedures : In the absence of a national OEL, Rio Tinto Borates recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m^3. To convert product into equivalent boron (B) content, multiply by 0.167.

DNELs/DMELs

Product/ingredient name	Type	Exposure	Value	Population	Effects
Solubor® DF	DNEL	Long term Oral	1.02 mg/kg bw/day	General population [Consumers]	Systemic
	DNEL	Short term Oral	1.02 mg/kg bw/day	General population [Consumers]	Systemic
	DNEL	Short term Inhalation	15.09 mg/m^3	General population [Consumers]	Local
	DNEL	Long term Inhalation	15.09 mg/m^3	General population [Consumers]	Local
	DNEL	Long term Inhalation	15.09 mg/m^3	Workers	Local
	DNEL	Short term Inhalation	15.09 mg/m^3	Workers	Local
	DNEL	Long term Inhalation	8.68 mg/m^3	Workers	Systemic
	DNEL	Long term Inhalation	4.37 mg/m^3	General population [Consumers]	Systemic
	DNEL	Long term Dermal	205.4 mg/kg bw/day	General population [Consumers]	Systemic
	DNEL	Long term Dermal	407.2 mg/kg bw/day	Workers	Systemic

PNECs

Product/ingredient name	Compartment Detail	Value	Method Detail
Solubor® DF	Fresh water	2.02 mg B/L	-
	Marine water	2.02 mg B/L	-
	Water - intermittent	13.7 mg B/L	-
	Air	0 No exposure expected	-
	Soil	5.4 mg B/kg dry soil	-
	Sediment	0 Waived due to lack of partitioning to sediment	-
	Sewage Treatment Plant	10 mg B/L	-

8.2 Exposure controls

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 8: Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. Recommended: Eye protection according to CEN 166:2001 is required.

Skin protection

Hand protection : Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty

Body protection : No special protective clothing is required.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Where airborne concentrations are expected to exceed exposure limits, respirators should be used. (CEN 149:2001).

Environmental exposure controls : Limiting releases from site: Where appropriate, material should be recovered and recycled through the process. Spillages of powder or granulated borates should be swept or vacuumed up immediately and placed in containers for disposal in order to prevent unintentional release to the environment. Waste containing borates should be handled as an hazardous waste and removed by licensed operator to an offsite location where it can be incinerated or disposed to a hazardous landfill.

Water Emissions: Storage should be sheltered from precipitation. Avoid spillage into water and cover drains. Removal from water can only be accomplished by very specific treatment technologies including ion exchange resins, reverse osmosis etc. Removal efficiency is dependent upon a number of factors and will vary from 40 to 90%. Much of the technology is currently not appropriate to high volume or mixed waste streams. Boron is not removed in considerable amounts in conventional STP. If sites discharge to a municipal STP the concentration of boron should not exceed the PNEC in the municipal STP

Air Emissions: Emissions to air can be removed by one or more of the following dust-control measures: electrostatic precipitators, cyclones, fabric or bag filters, membrane filters, ceramic and metal mesh filters, and wet scrubbers

SECTION 9: Physical and chemical properties

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Solid. [Crystalline solid.]

Colour : White.

Odour : Odourless.

Odour threshold : Not applicable. Odourless.

Melting point/freezing point : >500°C

Initial boiling point and boiling range : Not applicable. [melting point >300°C]

Flammability (solid, gas) : Non-flammable. The product is not flammable, combustible or explosive.

Upper/lower flammability or explosive limits : Not applicable. Non-flammable.

Flash point : Not applicable. inorganic mixture

Auto-ignition temperature : Not applicable (solid). [Not self-heating.]

Decomposition temperature : Not applicable. Melting point>300°C

pH : 7.4 [Conc. (% w/w): 10%]

Viscosity : Dynamic: Not applicable (not liquid). [solid substance]
Kinematic: Not applicable (not liquid). [solid substance]

Solubility in water : 9.5% at 20 °C

SECTION 9: Physical and chemical properties

Partition coefficient: n-octanol/ water : There are no data available on the mixture itself. [inorganic mixture]

Vapour pressure : Not applicable. Melting point>300°C

Evaporation rate : Not applicable (solid). [Non-volatile.]

Relative density : 1.49 @ 23°C (Boric acid); 2.35 @ 26°C (Disodium tetraborate anhydrous); 1.72 @ 23°C (Disodium tetraborate decahydrate); 1.691 @ 20°C (Pentaboron sodium octaoxide pentahydrate)

Density : 1.87 g/cm³ [22°C (71.6°F)]

Bulk density : Not available. Depends on batch.

Granulometry : Not available. Depends on batch.

Vapour density : Not applicable. Melting point>300°C

Explosive properties : Not explosive.

Oxidising properties : Not oxidising.

Particle characteristics

Median particle size : Not available.

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability : Under ambient temperatures, the product is stable. When heated it loses water, eventually forming anhydrous borates.

10.3 Possibility of hazardous reactions : Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.

10.4 Conditions to avoid : Avoid contact with strong reducing agents by storing according to good industrial practice

10.5 Incompatible materials : Strong reducing agents

10.6 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
boric acid	LC50 Inhalation Dusts and mists	Rat	>2 mg/l	4 hours
	LD50 Dermal	Rabbit	>2000 mg/kg body weight	-
	LD50 Oral	Rat	2000 to 5000 mg/kg body weight	-
disodium tetraborate pentahydrate	LC50 Inhalation Dusts and mists	Rat	>2 mg/l	4 days
	LD50 Dermal	Rabbit	>2000 mg/kg body weight	-
	LD50 Oral	Rat	3305 mg/kg body weight	-
Pentaboron sodium octaoxide pentahydrate	LC50 Inhalation Vapour	Rat	2.12 mg/l Disodium tetraborate pentahydrate	4 hours

SECTION 11: Toxicological information

	LD50 Dermal	Rabbit	>2000 mg/kg body weight Boric acid	-
	LD50 Oral	Rat - Male	3200 to 3400 mg/kg body weight Disodium tetraborate pentahydrate	-

Conclusion/Summary : Based on the available data, the classification criteria are not met.

Acute toxicity estimates

N/A

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
boric acid	Eyes - Cornea opacity	New Zealand White Rabbit	<1	0.1 g	-
	Skin - Primary dermal irritation index (PDII)	New Zealand White Rabbit	0.1	0.5 g moistened with saline	-
disodium tetraborate pentahydrate	Eyes - Irritant	New Zealand White Rabbit	-	0.08 ml equivalent	-
	Skin - No irritation.	New Zealand White Rabbit	-	0.5 g moistened with saline	-
Pentaboron sodium octaoxide pentahydrate	Eyes - No irritation.	New Zealand White Rabbit	<1	0.1 g Sodium Pentaborate	-
	Skin - No irritation.	New Zealand White Rabbit	-	0.5 g moistened with saline (Disodium tetraborate pentahydrate)	-

Conclusion/Summary

Skin : Non-irritant to skin.

Eyes : Irritating, fully reversible in 14 days. Classification: Eye irritation Category 2 (Hazard statements: H319 Causes serious eye irritation.)
Many years of occupational exposure indicate no adverse effects on human eye.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result
boric acid	Respiratory	Guinea pig	Not sensitizing
	skin	Guinea pig	Not sensitizing
disodium tetraborate pentahydrate	skin	Guinea pig	Not sensitizing

Conclusion/Summary

Skin : Non-sensitiser to skin. Based on the available data, the classification criteria are not met.

Respiratory : No respiratory sensitisation studies have been conducted. There are no data to suggest that boric acid is a respiratory sensitiser. Based on the available data, the classification criteria are not met.

Mutagenicity

SECTION 11: Toxicological information

Product/ingredient name	Test	Experiment	Result
boric acid	(based on boric acid)	Experiment: In vitro Subject: Mammalian-Animal Cell: Germ	Negative
disodium tetraborate pentahydrate	(based on boric acid)	Experiment: In vitro Subject: Mammalian-Animal Cell: Germ	Negative

Conclusion/Summary : Not mutagenic (based on boric acid). Based on the available data, the classification criteria are not met.

Carcinogenicity

Product/ingredient name	Result	Species	Dose	Exposure
boric acid	Negative - Oral - TC	Mouse	446 to 1150 mg/kg bw /day (mg Boric acid / kg body weight / day)	Oral feeding study
disodium tetraborate pentahydrate	Negative - Oral - NOEL	Rat	446 to 1150 mg/kg mg Boric acid/ kg bw/ day	Oral feeding study (based on boric acid)

Conclusion/Summary : No evidence of carcinogenicity in mice. Based on the available data, the classification criteria are not met.

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Effects	Exposure
boric acid	Negative	Negative	Negative	Human	No adverse fertility effects in male workers. Epidemiological studies of human developmental effects have shown an absence of effects in exposed borate workers and populations living in areas with high environmental levels of boron.	Combined oral ingestion and inhalation.
	Positive	-	Positive	Rat	NOAEL in rats for developmental effects on the foetus including foetal	Oral feeding study

SECTION 11: Toxicological information

					weight loss and minor skeletal variations is 9.6 mg B/kg body weight; NOAEL in rats for maternal toxicity is 13.3 mg B/kg body weight	
	-	Positive	-	Rat	NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight.	Oral feeding study
disodium tetraborate pentahydrate	Negative	Negative	Negative	Human	No adverse fertility effects in male workers. Epidemiological studies of human developmental effects have shown an absence of effects in exposed borate workers and populations living in areas with high environmental levels of boron.	Combined oral ingestion and inhalation.
	Positive	-	Positive	Rat	NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor	Oral feeding study

SECTION 11: Toxicological information

	-	Positive	-	Rat	skeletal variations is 9.6 mg B/kg body weight; NOAEL in rats for maternal toxicity is 13.3 mg B/kg body weight NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight.	Oral feeding study

Conclusion/Summary : Reprotoxicity studies have been conducted with boric acid and disodium tetraborate. A multigeneration study in the rat gave a NOAEL for fertility in males of 17.5 mg B/kg/day. Developmental effects have been observed in laboratory animals, the most sensitive species being the rat with a NOAEL of 9.6 mg B/kg bw/day. Boric acid and Disodium tetraborate are classified under the 1st ATP to CLP as Repr. 1B; H360FD. While boron has been shown to adversely affect male reproduction in laboratory animals, there was no clear evidence of male reproductive effects attributable to boron in studies of highly exposed workers.

Teratogenicity

Conclusion/Summary : See Reproductive toxicity.

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

Aspiration hazard

Product/ingredient name	Result
Solubor ®	Physical form of solid powder indicates no aspiration hazard potential.

Information on likely routes of exposure : Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because product is poorly absorbed through intact skin. **Product is not intended for ingestion.**

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

SECTION 11: Toxicological information

Skin contact : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

Ingestion : This product is not intended for ingestion. Small amounts (e.g., a teaspoon) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms. Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

Ingestion : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid and sodium borate dust.
Human epidemiological studies indicate no effect on fertility in occupational populations with chronic exposures to borate dust and indicate no effect to a general population with high exposures to borates in the environment.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure
boric acid	Chronic NOAEL Oral	Rat	17.5 mg/kg 0; 33 (5.9); 100 (17.5); 334 (58.5) mg boric acid (B)/kg bw per day (nominal in diet); and 0; 52 (5.9); 155 (17.5); 516 (58.5) mg borax (B)/kg/day (nominal in diet)	Oral feeding study
disodium tetraborate pentahydrate	Chronic NOAEL Oral	Rat	17.5 mg/kg 0; 33 (5.9); 100	Oral feeding study

SECTION 11: Toxicological information

			(17.5); 334 (58.5) mg boric acid (B)/kg bw per day (nominal in diet); and 0; 52 (5.9); 155 (17.5); 516 (58.5) mg borax (B)/kg/day (nominal in diet)	

Conclusion/Summary : A NOAEL of 17.5 mg B/kg body weight/day equivalent to 100 mg boric acid/kg body weight/day was determined in a chronic feeding study (2 years) in rats and is based on testes effects.

Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid and sodium borate dust.

Human epidemiological studies indicate no effect on fertility in occupational populations with chronic exposures to borate dust and indicate no effect to a general population with high exposures to borates in the environment.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : May damage fertility. May damage the unborn child.

Toxicokinetics

Absorption : Absorption of borates via the oral route is nearly 100 %. For the inhalation route also 100 % absorption is assumed as worst case scenario. Dermal absorption through intact skin is very low with a percent dose absorbed of < 0.5 %.

Distribution : Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues.

Metabolism : In the blood boric acid is the main species present and is not further metabolised

Elimination : Boric acid is excreted rapidly, with elimination half-lives of 1 h in the mouse, 3 h in the rat and < 27.8 h in humans, and has low potential for accumulation. Boric acid is mainly excreted in the urine.

Other information : Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
boric acid	EC50 52.4 mg/l (as Boron)	*Pseudokirchneriella subcapitata*	Fresh water - Acute
	LC50 91 mg/l (as Boron)	*Ceriodaphnia dubia*	Fresh water - Acute
	LC50 79.7 mg/l (as Boron)	*Pimephales promelas*	Fresh water - Acute
	NOEC 6.4 mg/l (as Boron)	*Brachydanio rerio*	Fresh water - Chronic
	NOEC 14.2 mg/l (as Boron)	*Daphnia magna*	Fresh water - Chronic
	NOEC 17.5 mg/l (as Boron)	*Pseudokirchneriella subcapitata*	Fresh water - Chronic
disodium tetraborate	EC50 52.4 mg/l (as Boron)	*Pseudokirchneriella subcapitata*	Fresh

SECTION 12: Ecological information

pentahydrate	LC50 91 mg/l (as Boron)	*Ceriodaphnia dubia*	water - Acute Fresh
	LC50 79.7 mg/l (as Boron)	*Pimephales promelas*	water - Acute Fresh
	NOEC 6.4 mg/l (as Boron)	*Brachydanio rerio*	water - Acute Fresh
	NOEC 14.2 mg/l (as Boron)	*Daphnia magna*	water - Chronic Fresh
	NOEC 17.5 mg/l (as Boron)	*Pseudokirchneriella subcapitata*	water - Chronic Fresh

Conclusion/Summary : Note that the data values are expressed as boron equivalents. To convert product into equivalent boron (B) content, multiply by 0.167. Studies judged to be unreliable or with insufficient information to evaluate are not included.

Boron is an essential micronutrient for healthy growth of plants; however, it can be harmful to boron sensitive plants in high quantities. Care should be taken to minimize the amount of this product released to the environment.

12.2 Persistence and degradability

Conclusion/Summary : Not applicable. Inorganic substance

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
boric acid	-0.757	-	Low
disodium tetraborate pentahydrate	-0.757	-	Low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Mobility : The product is soluble in water and is leachable through normal soil. Adsorption to soils or sediments is insignificant.

12.5 Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

12.6 Other adverse effects : No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

SECTION 13: Disposal considerations

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous waste : Yes. This product is classified as toxic to reproduction (Repr. 1B) and falls within scope of Directive 2008/98/EC as hazardous waste (H10)

Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
14.2 UN proper shipping name	-	-	-	-
14.3 Transport hazard class(es)	-	-	-	-
14.4 Packing group	-	-	-	-
14.5 Environmental hazards	No.	No.	No.	No.

14.6 Special precautions for user : Not applicable.

14.7 Maritime transport in bulk according to IMO instruments : Not available.

SECTION 15: Regulatory information

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

UK (GB)/REACH

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

Intrinsic property	Ingredient name	Status	Reference number	Date of revision
Toxic to reproduction	boric acid disodium tetraborate, anhydrous	Candidate Candidate	- -	6/18/2010 6/18/2010

SECTION 15: Regulatory information

Ozone depleting substances

Not listed.

Prior Informed Consent (PIC)

Not listed.

Persistent Organic Pollutants

Not listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Product/ingredient name	%	Designation [Usage]
boric acid disodium tetraborate pentahydrate	≥25 - ≤50 ≥25 - ≤50	30 30

Labelling : Restricted to professional users.

Seveso Directive

This product is not controlled under the Seveso Directive.

EU regulations

Industrial emissions (integrated pollution prevention and control) - Air : Not listed

Industrial emissions (integrated pollution prevention and control) - Water : Not listed

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : All components are listed or exempted.

Canada : All components are listed or exempted.

China : All components are listed or exempted.

Eurasian Economic Union : **Russian Federation inventory**: All components are listed or exempted.

Japan : **Japan inventory (CSCL)**: Not determined.
Japan inventory (ISHL): Not determined.

New Zealand : All components are listed or exempted.

Philippines : All components are listed or exempted.

Republic of Korea : All components are listed or exempted.

Taiwan : All components are listed or exempted.

Thailand : Not determined.

Turkey : Not determined.

SECTION 15: Regulatory information

United States : Not determined.

Viet Nam : All components are listed or exempted.

15.2 Chemical safety assessment : This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
GB CLP = UK CLP (EC No 1272/2008) on the Classification, Labelling and Packaging of Substances and Mixtures as amended by (EU Exit) Regulations 2019 No. 720 and amendments
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = GB CLP-specific Hazard statement
N/A = Not available
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
SGG = Segregation Group
vPvB = Very Persistent and Very Bioaccumulative

Key literature references and sources for data : For general information on the toxicology of borates see Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'.

Procedure used to derive the classification

Classification	Justification
Eye Irrit. 2, H319 Repr. 1B, H360FD	Expert judgment Regulatory data

Full text of abbreviated H statements

H319	Causes serious eye irritation.
H360FD	May damage fertility. May damage the unborn child.
H361d	Suspected of damaging the unborn child.

Full text of classifications

Eye Irrit. 2	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2
Repr. 1B	REPRODUCTIVE TOXICITY - Category 1B
Repr. 2	REPRODUCTIVE TOXICITY - Category 2

Additional information : Restricted to professional users.
Do not ingest.
Keep out of reach of children.
Refer to safety data sheet.
Not for use in drugs, biocides or for food preservation
Use only as directed.

Date of printing : 9/19/2023

Date of issue/ Date of revision : 9/19/2023

Date of previous issue : No previous validation

Version : 1

UK GB / 4.13 / EN-GB

Notice to reader

Disclaimer:
U.S. Borax Inc. or Borax Europe Limited or Borax Français S.A.S. or Rio Tinto Iron & Titanium GmbH or Rio Tinto Minerals Asia Pte. Ltd. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgement in determining its appropriateness for a particular purpose.
U.S. BORAX INC. or BORAX EUROPE LIMITED or BORAX FRANÇAIS S.A.S. or RIO TINTO IRON & TITANIUM GMBH or RIO TINTO MINERALS ASIA PTE. LTD. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY,

SECTION 16: Other information

FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY U.S. BORAX INC. or BORAX EUROPE LIMITED or BORAX FRANÇAIS S.A.S. or RIO TINTO IRON & TITANIUM GMBH or RIO TINTO MINERALS ASIA PTE. LTD. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OR RELIANCE UPON THIS INFORMATION.

Annex: Exposure Scenarios

The following table lists the uses identified and registered for this substance. Each use has a number of applicable human health, environmental and consumer exposure scenarios. These can be found at www.borax.com/EU-REACH/exposure-scenarios

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
1	Abrasives	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Sodium pentaborate (CAS 12007-92-0)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of abrasives	15	-	0: other	2, 8a, 24, 28	4	-	
		ES 4	Professional use of abrasives	15	-	0: other	2, 8a, 24, 28	8a, 8d	-	
		ES 5	Consumer use of cutting wheels	-	-	0: other	-	8a, 8d	-	
2	Adhesives	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of adhesives	6a, 6b, 16, 17, 18, 19	-	1	2, 7, 8b, 10, 11, 13, 28	5	ES 5, ES 6, ES 7	
		ES 4	Consumer use of boron containing adhesives	-	-	1	-	8c, 8f	ES 7	
		ES 5	Industrial service life of adhesed articles	-	2, 8, 11	-	21	12a, 12c	-	
		ES 6	Professional service life of adhesed articles	-	2, 8, 11	-	21	10a, 11a	-	
		ES 7	Consumer service life of adhesed articles	-	2, 8, 11	-	-	10a, 11a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
3	Agriculture	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Professional use of micronutrient fertilizers	1	-	12	2, 3, 7, 8a, 9, 11, 28	8a, 8d	-	
		ES 4	Consumer use of boron containing micronutrient fertiliser	-	-	12	-	8a, 8d	-	
4	Analytical reagent	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Laboratory use of analytical reagent by the industry	24	-	21	2, 9, 15, 28	4, 6b	-	
		ES 4	Laboratory use of analytical reagent by professionals	24	-	21	2, 9, 15, 28	8a, 8b	-	
5	Autocausticing	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Processing aid	6b	-	20	1, 2, 3, 8a, 8b, 9, 15, 28	4, 6b	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
6	Catalysts	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Boron production	8	-	32	1, 2, 4, 8a, 8b, 9	6a	-	
		ES 4	Polymer production	17	-	32	1, 2, 4, 8a, 8b, 9	6b	-	
7	Cellulose insulation	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3)Disodium tetraborate (CAS 1330-43-4)Disodium octaborate (CAS 12008-41-2)Sodium pentaborate (CAS 12007-92-0)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of cellulose insulation	19	-	0: other	2, 11, 28	5	ES 5, ES 6, ES 7	
		ES 4	Professional use of cellulose insulation	19	-	0: other	2, 11, 28	8c, 8f	ES 5, ES 6, ES 7	
		ES 5	Industrial service life of cellulose insulation	-	4a	-	21	12a, 12c	-	
		ES 6	Professional service life of cellulose insulation	-	4a	-	21	10a, 11a	-	
		ES 7	Consumer service life of cellulose insulation	-	4a	-	-	10a, 11a	-	
8	Ceramics	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Production of frits	13	-	20	0: other, 1, 2, 3, 7, 8b, 13, 15, 28	6a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
9	Chemical synthesis	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Manufacture of new chemicals using borates as intermediate	8	-	21	1, 2, 8a, 8b, 9, 15, 28	6a	-	
		ES 4	Manufacture of new chemicals using borates as processing aid	8	-	21	1, 2, 8a, 8b, 9, 15, 28	6b, 6c	-	
10	Coatings	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of paints and coatings	7, 19	-	9a, 18	2, 7, 8a, 10, 13, 28	5	ES 5, ES 6, ES 7	
		ES 4	Professional use of paints and coatings	7, 19	-	9a, 18	2, 8a, 10, 11, 13, 28	5	ES 5, ES 6, ES 7	
		ES 5	Industrial service life of coated articles	-	7a, 8	-	21, 24	12a, 12c	-	
		ES 6	Professional service life of coated articles	-	7a, 8	-	21, 24	10a, 11a	-	
		ES 7	Consumer service life of coated articles	-	7a, 8	-	-	10a, 11a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
11	Construction material	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2) Sodium pentaborate (CAS 12007-92-0)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of borates in construction materials (plaster boards, wood)	19	-	0: other, 8	2, 8a, 21, 28	5	ES 6, ES 7, ES 8	
		ES 4	Professional use of construction materials (plaster boards, wood)	19	-	0: other, 8	2, 8a, 21, 28	8c, 8f	ES 6, ES 7, ES 8	
		ES 5	Consumer use of construction material (plaster boards, wood)	-	-	0: other	-	8c	ES 8	
		ES 6	Industrial service life of construction material	-	4a, 11a	-	21	12a, 12c	-	
		ES 7	Professional service life of construction material	-	4a, 11a	-	21	10a, 11a	-	
		ES 8	Consumer service life of construction material	-	4a, 11a	-	-	10a, 11a	-	
12	Detergents	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Professional use of detergents	0: other	-	35	2, 8a, 19, 28	8a	-	
		ES 4	Consumer use of detergents	-	-	35	-	8a	-	
13	Glass	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Production of fiberglass, high alkali glass and low alkali glass	13	-	0: other	0: other, 1, 2, 8b, 9, 15, 28	6a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
14	Industrial fluid	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	General industrial use of lubricants and greases in vehicles or machinery (ATIEL-ATC Use Group B(i))	0: other	-	16, 17, 24	1, 2, 8b, 9, 28	4, 7	-	
		ES 4	(Industrial) Use of lubricants and greases in open systems (ATIEL ATC Use Group C(i))	0: other	-	24	2, 7, 8b, 9, 10, 13, 28	4, 7	-	
		ES 5	(Industrial) Use of lubricants in high energy open processes (ATIEL ATC Use Group F(i))	0: other	-	24, 25	2, 8b, 17, 18, 28	4	-	
		ES 6	General professional use of lubricants and greases in vehicles or machinery (ATIEL-ATC Group B(p))	15, 17	-	16, 17, 24	1, 2, 8a, 8b, 20	9a, 9b	-	
		ES 7	(Professional) Use of lubricants and greases in open systems (ATIEL-ATC Group C(p))	15, 17	-	24	2, 8a, 10, 11, 13	8a, 8d	-	
		ES 8	(Professional) use of lubricants in high energy open processes (ATIEL-ATC Group F(p))	15, 17	-	24, 25	2, 8a, 17, 18	8a	-	
		ES 9	General consumer use of lubricants and greases in vehicles or machinery (ATIEL-ATC Group B(c))	-	-	24	-	9a, 9b	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
15	Leather manufacture	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use in leather manufacturing	5	-	23	2, 8a, 9, 10, 13, 28	6b	-	
		ES 4	Professional use in leather manufacturing	5	-	23	2, 8a, 9, 10, 13, 28	8b	-	
16	Maritime industry	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial production of marine ropes	1, 2b	-	0: other	2, 7, 8a, 13, 28	5	ES 5, ES 6	
		ES 4	Professional production of marine ropes	1, 2b	-	0: other	2, 8a, 11, 13, 28	8c, 8f	ES 5, ES 6	
		ES 5	Industrial service life of marine ropes	-	5h	-	21	12a, 12c	-	
		ES 6	Professional service life of marine ropes	-	5h	-	21	10a, 11a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
17	Metallurgy	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	**all ES:** Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) **ES 1-6, ES 9, ES 11-13:** Boric oxide (CAS 1303-86-2) **ES 1-2, ES 8, ES 10:** Disodium octaborate (CAS 12008-41-2) **ES 1-2, ES 7, ES 11-13:** Sodium metaborate (CAS 7775-19-1) **ES 1-2, ES 4-7, ES 9, ES 11-13:** Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Formulation into alloys	14	-	7	0: other, 1, 2, 8a, 8b, 9, 15, 28	5	ES 11, ES 12, ES 13	
		ES 4	Industrial use of fluxes for (precious) metal smelting	14	-	7	0: other, 1, 2, 8a, 8b, 9, 15, 28	6b	-	
		ES 5	Industrial use of flux pastes for coating brazing and welding rods	15	-	38	2, 8a, 28	5	ES 11, ES 12, ES 13	
		ES 6	Industrial use of welding, brazing or soldering rods	14, 15, 17, 19	-	38	2, 8a, 25, 28	4, 6b	-	
		ES 7	Use of borates in metal treatment (plating, passivation, galvanising, cleaning, etc)	14, 17	-	14	2, 7, 8a, 8b, 10, 13, 28	5	ES 11, ES 12, ES 13	
		ES 8	Industrial use for slag stabilisation treatment	14	-	7	2, 4, 8a, 28	6b	-	
		ES 9	Professional use of welding, brazing or soldering rods	14, 15, 17, 19	-	38	2, 8a, 25, 28	8a, 8d	-	
		ES 10	Professional use for slag stabilisation treatment	14	-	7	2, 4, 8a, 28	8b	-	
		ES 11	Industrial service life of metal articles	-	7	-	21	12a, 12c	-	
		ES 12	Professional service life of metal articles	-	7	-	21	10a, 11a	-	
		ES 13	Consumer service life of metal articles	-	7	-	-	10a, 11a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
18	Non oxide ceramics	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Intermediate use in the production of non oxide ceramic powders	13	-	0: other	0: other, 1, 2, 8a, 8b, 9, 15, 24, 28	6a	-	
19	Nuclear applications	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of borates in closed nuclear system	23	-	37	1, 2, 8a, 8b, 9, 15, 28	4, 6b	-	
20	Oil industry	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Disodium octaborate (CAS 12008-41-2) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of cement	2b	-	0: other	1, 2, 8b, 9, 15, 28	6b	-	
21	Photography	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of photographic solutions	7	-	30	2, 4, 8a, 13, 28	4	-	
		ES 4	Professional use of photographic solutions	7	-	30	2, 4, 8a, 9, 13, 28	8a	-	

Identified Use Number	Identified Use	Exposure Scenario (ES)		Sector of Use (SU)	Article Category (AC)	Product Category (PC)	Process Category (PROC)	Env. Release Category (ERC)	Subsequent Service Life	Borate
22	Printing paper	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4) Sodium metaborate (CAS 7775-19-1) Sodium pentaborate (CAS 12007-92-0) Dipotassium tetraborate (CAS 1332-77-0) Potassium pentaborate (CAS 11128-29-3)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Use of borate PVA solutions for printing	7	-	26	2, 3, 4, 8a, 28	5	ES 5, ES 6	
		ES 4	Use of borate PVA solutions for printing	7	-	26	2, 3, 4, 8a, 28	8c	ES 5, ES 6	
		ES 5	Professional service life of printed paper	-	8	-	21	10a, 11a	-	
		ES 6	Consumer service life of printed paper	-	8	-	-	10a, 11a	-	
23	Refractories	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Boric oxide (CAS 1303-86-2) Disodium tetraborate (CAS 1330-43-4)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Industrial use of refractory mixtures	14	-	15	2, 3, 7. 23	6b	-	
24	Tablet production and use	ES 1	Formulation into mixture	-	-	0: other	1, 2, 3, 8a, 8b, 9, 15, 28	2	-	Boric acid (CAS 10043-35-3) Disodium tetraborate (CAS 1330-43-4)
		ES 2	Formulation into solid matrix	-	-	0: other	1, 2, 7, 8a, 8b, 9, 14, 15, 23, 24, 28	3	-	
		ES 3	Swimming pool tablet use	0: other	-	37	2, 8a, 26, 28	8a, 8d	-	