SAFETY DATA SHEET

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

1.1 Product identifier

Product name : ***Granubor*** ®

Chemical name : Disodium tetraborate pentahydrate

Index number : 005-011-02-9

EC number : 215-540-4

REACH Registration number

Registration number	Legal entity
01-2119490790-32-0019	-

CAS number : 12179-04-3

Product type : Solid.

Other means of identification : Borax pentahydrate, Sodium tetraborate pentahydrate, Borax 5 mol

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

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

1.4 Emergency telephone number

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

National advisory body/Poison Centre

Telephone number : +353 (0)1 809 2166 (Available to the public 8 am – 10 pm)

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 : Mono-constituent substance

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

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

The product is classified as hazardous according to Regulation (EC) 1272/2008 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 :

PBT	P	B	T	vPvB	vP	vB
Not applicable. (Inorganic substance.)	Not applicable	Not applicable	Not applicable	Not applicable. (Inorganic substance.)	Not applicable	Not applicable

Product meets the criteria for endocrine disrupting properties according to Regulation (EC) No. 1907/2006. : Not applicable. Based on the available data, the classification criteria are not met.

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

SECTION 3: Composition/information on ingredients

3.1 Substances : Mono-constituent substance

Product/ingredient name	Identifiers	%	Classification	Specific Conc. Limits, M-factors and ATEs	Type
disodium tetraborate pentahydrate	REACH #: 01-2119490790-32 EC: 215-540-4 CAS: 12179-04-3 Index: 005-011-02-9	>99	Eye Irrit. 2, H319 Repr. 1B, H360FD **See Section 16 for the full text of the H statements declared above.**	-	[1]

Type

[1] Constituent

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

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:
irritation
watering
redness

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

SECTION 4: First aid measures

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. Vacuum or sweep up material and place in a designated, labelled 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. Vacuum or sweep up material and place in a designated, labelled 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

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker exposure or environmental releases.

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

Biological exposure indices

No exposure indices known.

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 0.1484.

DNELs/DMELs

Product/ingredient name	Result
disodium tetraborate pentahydrate	**DNEL - Workers - Long term - Inhalation** 17.04 mg/m³ Effects: Local **DNEL - Workers - Short term - Inhalation** 17.04 mg/m³ Effects: Local **DNEL - Workers - Long term - Inhalation** 9.8 mg/m³ Effects: Systemic **DNEL - Workers - Long term - Dermal** 458.2 mg/kg bw/day Effects: Systemic **DNEL - General population - Consumers - Short term - Inhalation** 17.04 mg/m³ Effects: Local **DNEL - General population - Consumers - Short term - Oral** 1.15 mg/kg bw/day Effects: Systemic **DNEL - General population - Consumers - Long term - Inhalation** 17.04 mg/m³ Effects: Local **DNEL - General population - Consumers - Long term - Oral** 1.15 mg/kg bw/day Effects: Systemic **DNEL - General population - Consumers - Long term - Inhalation** 4.9 mg/m³ Effects: Systemic **DNEL - General population - Consumers - Long term - Dermal** 231.8 mg/kg bw/day Effects: Systemic **DNEL - General population - Long term - Oral**

SECTION 8: Exposure controls/personal protection

0.79 mg/kg bw/day
Effects: Systemic

DNEL - General population - Long term - Inhalation
3.4 mg/m³
Effects: Systemic

DNEL - Workers - Long term - Inhalation
6.7 mg/m³
Effects: Systemic

DNEL - General population - Long term - Dermal
159.5 mg/kg bw/day
Effects: Systemic

DNEL - Workers - Long term - Dermal
316.4 mg/kg bw/day
Effects: Systemic

PNECs

Product/ingredient name	Result
Disodium tetraborate pentahydrate	**Fresh water** 2.9 mg B/L **Marine water** 2.9 mg B/L **Water - intermittent** 13.7 mg B/L **Air** 0 No exposure expected **Soil** 5.7 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.

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

SECTION 8: Exposure controls/personal 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]

Colour : White.

Odour : Odourless.

Odour threshold : Not applicable. [Odourless.]

Melting point/freezing point : >1000°C

Boiling point or initial boiling point and boiling range : Not applicable. [melting point >300°C]

Flammability : Non-flammable. The product is not flammable, combustible or explosive.

Lower and upper explosion limit : Not applicable. Non-flammable.

Flash point : Not applicable. Inorganic substance.

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

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

pH : 9.23 [Conc. (% w/w): 3.5%]

Viscosity : Dynamic (room temperature): Not applicable (not liquid). [solid substance]
Kinematic (room temperature): Not applicable (not liquid). [solid substance]
Kinematic (40°C): Not applicable (not liquid). [solid substance]

Solubility in water : 49.74 g/l

Partition coefficient n-octanol/water (log Pow) : -1.53 @ 22 °C (decahydrate)

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

SECTION 9: Physical and chemical properties

Relative density : 2.35 @ 26°C (anhydrous); 1.72 @ 23°C (decahydrate)

Density : 1.72 g/cm³ [23°C (73.4°F)]

Bulk density : Not available. Depends on batch.

Granulometry : Not available. Depends on batch.

Relative vapour density : Not applicable. Melting point >300 °C

Particle characteristics

Median particle size : Not available.

9.2 Other information

9.2.1 Information with regard to physical hazard classes

Explosive properties : Not explosive.

Oxidising properties : Not oxidising.

9.2.2 Other safety characteristics

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

Molecular weight : 291.35

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 ($Na_2B_4O_7$).

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 hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Product/ingredient name	Result
disodium tetraborate pentahydrate	**Rat - Oral - LD50** 3305 mg/kg EPA [FIFRA Guidelines] Toxic effects: Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms. **Rabbit - Dermal - LD50** >2000 mg/kg EPA [FIFRA Guidelines] Toxic effects: Poorly absorbed through intact skin. **Rat - Inhalation - LC50 Dusts and mists** >2 mg/l [4 days] OECD 403 [Acute Inhalation Toxicity] Toxic effects: Low acute inhalation toxicity. LC_{50} in rats is > 2.0

SECTION 11: Toxicological information

mg/l (or g/m^3).Based on the available data, the classification criteria are not met.

Conclusion/Summary [Product] : May be harmful if swallowed.

Acute toxicity estimates

N/A

Skin corrosion/irritation

Product/ingredient name	Result
disodium tetraborate pentahydrate	**New Zealand White Rabbit - Skin - No irritation.** EPA Amount/concentration applied: 0.5 g moistened with saline

Conclusion/Summary [Product] : Non-irritating to the skin. Based on the available data, the classification criteria are not met.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	Non-irritant to skin.

Serious eye damage/eye irritation

Product/ingredient name	Result
disodium tetraborate pentahydrate	**New Zealand White Rabbit - Eyes - Irritant** OECD 405 Amount/concentration applied: 0.08 ml equivalent Fully reversible in more than 7 days

Conclusion/Summary [Product] : Causes serious eye irritation. Irritating, fully reversible in 14 days. Many years of occupational exposure indicate no adverse effects on human eye.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	Causes serious eye irritation.

Respiratory corrosion/irritation

Not available.

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

Respiratory or skin sensitization

Product/ingredient name	Result
disodium tetraborate pentahydrate	**Guinea pig - skin** OECD 406 Not sensitizing

Skin

Conclusion/Summary [Product] : Not a skin sensitiser. Based on the available data, the classification criteria are not met.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	Non-sensitiser to skin.

Respiratory

SECTION 11: Toxicological information

Conclusion/Summary [Product] : No respiratory sensitisation studies have been conducted. There are no data to suggest that disodium tetraborates are respiratory sensitisers. Based on the available data, the classification criteria are not met.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	No respiratory sensitisation studies have been conducted. There are no data to suggest that disodium tetraborates are respiratory sensitisers. Based on the available data, the classification criteria are not met.

Germ cell mutagenicity

Product/ingredient name	Result
disodium tetraborate pentahydrate	**In vitro - Mammalian-Animal - Germ** (based on boric acid) 1000 to 10000 ppm Result: Negative

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

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	Boric acid is not mutagenic and has been tested in 2 year bioassays to be negative for carcinogenicity. Accordingly a classification for these endpoints for disodium tetraborates is not required under EC Directive 67/548/EEC or under CLP Regulation (EC) 1272/2008.

Carcinogenicity

Product/ingredient name	Result
disodium tetraborate pentahydrate	**Rat - Oral - NOEL** OECD 451 equivalent [Carcinogenicity Studies] 446 to 1150 mg/kg Result: Negative

Conclusion/Summary [Product] : No evidence of carcinogenicity (based on boric acid). Based on the available data, the classification criteria are not met.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	No evidence of carcinogenicity (based on boric acid). Based on the available data, the classification criteria are not met.

Reproductive toxicity

Product/ingredient name	Result
disodium tetraborate pentahydrate	**Rat - Oral** OECD 416 [Three-generation feeding study. Two-Generation Reproduction Toxicity Study] Effects: NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight. Fertility effects: Positive **Human - Inhalation** Effects: 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. Maternal toxicity: Negative Fertility effects: Negative Developmental: Negative

SECTION 11: Toxicological information

Rat - Oral
Prenatal Developmental Toxicity Study
Effects: NOAEL in rats for developmental effects on the foetus including foetal 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
Maternal toxicity: Positive
Developmental: Positive

Conclusion/Summary [Product] : 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. 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.

Ingredient name	Conclusion/Summary
disodium tetraborate pentahydrate	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. Disodium tetraborate is 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. Disodium tetraborate is 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.

Specific target organ toxicity (single exposure)

Product/ingredient name	Result
Based on the available data, the classification criteria are not met.	

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Result
Based on the available data, the classification criteria are not met.	

Aspiration hazard

Product/ingredient name	Result
Disodium tetraborate pentahydrate	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:
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
disodium tetraborate pentahydrate	**Chronic - Rat - Oral - NOAEL** OECD 452 [Chronic toxicity study of boric acid and disodium tetraborate decahydrate, similar to OECD 452.] 17.5 mg/kg Toxic effects: A NOAEL of 17.5 mg B/kg bw/day equivalent to 118 mg sodium tetraborate pentahydrate/kg bw/day was determined in a chronic feeding study (2 years) in rats and is based on testes effects. Other effects (renal, hematopoietic systems) are only observed at even higher doses.

SECTION 11: Toxicological information

Conclusion/Summary [Product] : A NOAEL of 17.5 mg B/kg bw/day equivalent to 118 mg sodium tetraborate pentahydrate/kg bw/day was determined in a chronic feeding study (2 years) in rats and is based on testes effects. Other effects (renal, hematopoietic systems) are only observed at even higher doses.

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.

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

Not applicable.

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

11.2.2 Other information

Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result
disodium tetraborate pentahydrate	**NOEC** Fish. *Brachydanio rerio* 6.4 mg/l - (as Boron) **LC50** Invertebrate *Ceriodaphnia dubia* 91 mg/l - (as Boron) **LC50** Fish. *Pimephales promelas* 79.7 mg/l - (as Boron) **NOEC** Algae *Pseudokirchneriella subcapitata* 17.5 mg/l - (as Boron)

SECTION 12: Ecological information

NOEC
Invertebrate
Daphnia magna
14.2 mg/l - (as Boron)

EC50
Algae
Pseudokirchneriella subcapitata
52.4 mg/l - (as Boron)

Conclusion/Summary [Product] : Note that the data values are expressed as boron equivalents. To convert this product into equivalent boron (B) content, multiply by 0.1484. 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

Not available.

Conclusion/Summary [Product] : Not applicable. Inorganic substance.

12.3 Bioaccumulative potential

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

12.4 Mobility in soil

Soil/water partition coefficient

Not available.

Results of PMT and vPvM assessment

Product/ingredient name	PMT	P	M	T	vPvM	vP	vM
disodium tetraborate pentahydrate	Not applicable. (Inorganic substance.)	Not applicable	Not applicable	Not applicable	Not applicable. (Inorganic substance.)	Not applicable	Not applicable

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

Conclusion/Summary : The product does not meet the criteria to be considered as a PMT or vPvM.

12.5 Results of PBT and vPvB assessment

Regulation (EC) No. 1907/2006 [REACH]

According to the results of its assessment, this substance is not a PBT or a vPvB.

Regulation (EC) No. 1272/2008 [CLP]

Product/ingredient name	PBT	P	B	T	vPvB	vP	vB
disodium tetraborate pentahydrate	Not applicable. (Inorganic substance.)	Not applicable	Not applicable	Not applicable	Not applicable. (Inorganic substance.)	Not applicable	Not applicable

SECTION 12: Ecological information

Conclusion/Summary Regulation (EC) No. 1272/2008 [CLP] : The product does not meet the criteria to be considered as a PBT or vPvB.

12.6 Endocrine disrupting properties

Not applicable.

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

12.7 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

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. 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.

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) Dispose via a licensed waste disposal contractor

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 : Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number or ID 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.

SECTION 14: Transport information

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

EU Regulation (EC) No. 1907/2006 (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	Disodium tetraborate anhydrous	Included	ED/30/2010	6/18/2010

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

Product/ingredient name	%	Designation [Usage]
disodium tetraborate pentahydrate	>99	30

Labelling : Restricted to professional users.

Other EU regulations

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

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

Explosive precursors : Not applicable.

(EC) No 273/2004 on drug precursors

Not listed.

(EC) No 111/2005 Trade between the Union and third countries in drug precursors

Not listed.

Ozone depleting substances (EU 2024/590)

Not listed.

Prior Informed Consent (PIC) (649/2012/EU)

Not listed.

Persistent Organic Pollutants

Not listed.

Seveso Directive

This product is not controlled under the Seveso Directive.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

SECTION 15: Regulatory information

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.
Chile	:	Not determined.
China	:	All components are listed or exempted.
Colombia	:	Not determined.
Eurasian Economic Union	:	**Russian Federation inventory**: All components are listed or exempted.
Japan	:	**Japan inventory (CSCL)**: All components are listed or exempted. **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	:	All components are listed or exempted.
Turkey	:	Not determined.
United States	:	All components are active or exempted.
Viet Nam	:	All components are listed or exempted.

15.2 Chemical safety assessment : Complete.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = 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 according to Regulation (EC) No. 1272/2008 [CLP/GHS]

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

Full text of abbreviated H statements

SECTION 16: Other information

H319 H360FD	Causes serious eye irritation. May damage fertility. May damage the unborn child.

Full text of classifications [CLP/GHS]

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

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

Date of issue/ Date of revision : 21/08/2026

Date of previous issue : 17/11/2022

Version : 1.02

Europe / 4.15 / EN-GB

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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	-	