Safety Data Sheet

BEU-US-BXMG
Page 1 of 14

1.1 Product Identifier
Chemical name: Sodium tetraborate decahydrate
CAS No: 1303-96-4
REACH Registration Number: 01-2119490790-32-0000
EC No: 215-540-4
Synonyms: Disodium tetraborate decahydrate, Borax
Product Name: Borax MG
Grades: Manufacturing Grade

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified Uses: Biocidal active ingredient
Uses advised against: Consumer uses above the specific concentration limit.

1.3 Details of the supplier of the SDS
Company Name: Borax Europe Limited
Address: 6 St. James's Square
London, SW1Y 4AD
United Kingdom
Telephone number: +44 (0)20 7781 2000
Email: rtm.msds@riotinto.com

1.4 Emergency telephone number: + 44 (0) 1235 239 670
Official advisory body telephone number: None

2.1 Classification of the substance or mixture

Classification (CLP Regulation (EC) No 1272/2008): Classified as toxic for reproduction (Repr. 1B; H360FD) and as an eye irritant (Eye Irrit. 2; H319).

Sodium tetraborate decahydrate has a specific concentration limit of ≥ 8.5% for toxic for reproduction classification and ≥ 10% for eye irritant classification.

Classification (Directive 67/548/EEC): Classified as toxic for reproduction (Repr. Cat 2; R60-61) and as an eye irritant (Xi; R36).

Sodium tetraborate decahydrate has a specific concentration limit of ≥ 8.5% for toxic for reproduction classification and ≥ 20% for eye irritant classification.

Refer to Section 16 for the full text of Hazard Statements and R-phrases mentioned above.
2.2 Label Elements
Labelling according to Regulation (EC) No 1272/2008 (CLP)

Hazard Pictograms

Signal word: Danger

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

Precautionary statements:
P202: Do not handle until all safety precautions have been read and understood.
P281: Use personal protective equipment as required.
P308+P313: IF exposed or concerned: Get medical advice.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501: Dispose of contents/container in accordance with local regulation.

Supplemental Information
Restricted to professional users.

2.3 Other Hazards
H303: May be harmful if swallowed.

Section 3 Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS#</th>
<th>EC#</th>
<th>% content</th>
<th>Classification (1272/2008/EC)</th>
<th>Classification (67/548/EEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium tetraborate decahydrate</td>
<td>1303-96-4</td>
<td>215-540-4</td>
<td>&gt;99.4</td>
<td>Repr. 1B; H360FD Eye Irrit. 2; H319</td>
<td>Repr. Cat 2; R60-61 XI; R36</td>
</tr>
</tbody>
</table>

Refer to Section 16 for the full text of Hazard statements and R-phrases mentioned above.

Section 4 First aid measures

4.1 Description of First aid measures
Protection of first-aiders: No special protective clothing is required.

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

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

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.

4.2 **Most important symptoms and effects both acute and delayed:** 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 (see Section 11).

4.3 **Indication of any immediate medical attention and special treatment needed:** Note to physicians: 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.

**Section 5**

**Fire-fighting measures**

5.1 **Extinguishing media**

**Suitable extinguishing media:** Use extinguishing media that are appropriate to local circumstances and the surrounding environment.

**Unsuitable extinguishing media:** None

5.2 **Special hazards arising from substance or mixture**

None. The product is not flammable, combustible or explosive.

5.3 **Advice for fire fighters**

Not applicable. The product is itself a flame retardant.

**Section 6**

**Accidental release measures**

6.1 **Personal precaution, protective equipment and emergency procedures**

**For non-emergency personnel:**
Eye protection according to CEN166:1996, Respirators (CEN149).

**For emergency responders:**
Eye protection according to CEN166:1996, Respirators (CEN149).

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**

**Appropriate containment:** Avoid spillage into water and cover drains.

**Land spill:** Vacuum, shovel or sweep up and place in containers for disposal in accordance with applicable local regulations.

**Spillage into water:** Where possible, remove any intact containers from the water.

6.4 **Reference to other sections**

Refer to sections 8, 12 and 13.

**Section 7**

**Handling and storage**

7.1 **Precautions for safe handling**
Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills. Do not eat, drink and smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas.

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
Storage pressure: Atmospheric
Special sensitivity: Moisture (Caking)

7.3 Specific end use(s)
Refer to Annex – Exposure Scenarios.

Section 8 Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values: In the absence of a national OEL, Rio Tinto Borax 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 0.113.

### OELs of Member States of the EEA

**Substance:** Disodium tetraborate decahydrate, CAS#: 12179-04-3

<table>
<thead>
<tr>
<th>Country</th>
<th>8-hr TWA OEL (mg/m$^3$)</th>
<th>15 min STEL (mg/m$^3$)</th>
<th>Legal basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>2</td>
<td>6</td>
<td>Moniteur Belge no. 187, 30 June 2011</td>
</tr>
<tr>
<td>Estonia</td>
<td>2</td>
<td>5</td>
<td>Annex of Regulation No. 293 of 18 September 2001), as amended November 2011</td>
</tr>
<tr>
<td>France</td>
<td>5</td>
<td>-</td>
<td>Threshold Limit Values (VLEP) for Occupational Exposure to Chemicals in France, INRS, 10-01-2008</td>
</tr>
<tr>
<td>Germany</td>
<td>4</td>
<td>8</td>
<td>TRGS 900 Arbeitsplatzgrenzwerte, 12-01-2012</td>
</tr>
<tr>
<td>Iceland</td>
<td>2</td>
<td>-</td>
<td>Regulation 390/2009 on Pollution Limits and Measures to Reduce Pollution at the Workplace, 2-04-2009</td>
</tr>
<tr>
<td>Italy</td>
<td>2</td>
<td>6</td>
<td>Decree n. 105, 3-08-2009</td>
</tr>
<tr>
<td>Poland</td>
<td>0.5 *</td>
<td>2 *</td>
<td>Regulation of 29 November 2002 regarding maximum permissible concentrations and intensities in working environment, as amended by DzU, no. 274, item 1621, 21 December 2011</td>
</tr>
<tr>
<td>Portugal</td>
<td>5</td>
<td>-</td>
<td>NP 1796-2004, Valores limite de exposiciao (VLEs) profissional a agentes quimicos, 3rd edition, June 2004</td>
</tr>
<tr>
<td>Spain</td>
<td>6</td>
<td>-</td>
<td>Valores Limites Ambientales (VLAs), Table 1, Limites de Exposición Profesional para Agentes Químicos 2011</td>
</tr>
<tr>
<td>Sweden</td>
<td>2</td>
<td>5</td>
<td>National Board of Occupational Safety and Health, Occupational Exposure Limit Values (AFS 2007:2)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5</td>
<td>5</td>
<td>Limit Values at the Workplace 2011, as per SUVA</td>
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</tbody>
</table>
**DNEls**

<table>
<thead>
<tr>
<th>Route of exposure</th>
<th>Acute effects local</th>
<th>Acute effects systemic</th>
<th>Chronic effects local</th>
<th>Chronic effects systemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>Not Required</td>
<td>*</td>
<td>1.51 mg/kg/day</td>
<td>*</td>
</tr>
<tr>
<td>Inhalation</td>
<td>22.3 mg/m³</td>
<td>*</td>
<td>12.76 mg/m³</td>
<td>22.3 mg/m³</td>
</tr>
<tr>
<td>Dermal</td>
<td>*</td>
<td>*</td>
<td>599.6 mg/kg/day</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>303.5 mg/kg/day</td>
<td></td>
</tr>
</tbody>
</table>

* No hazard identified


<table>
<thead>
<tr>
<th>Compartment (Environment)</th>
<th>PNEC (added values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water, fresh and marine</td>
<td>2.02 mg B/L</td>
</tr>
<tr>
<td>Water, intermittent</td>
<td>13.7 mg B/L</td>
</tr>
<tr>
<td>Air</td>
<td>No exposure expected</td>
</tr>
<tr>
<td>Soil</td>
<td>5.4 mg B/kg dry soil</td>
</tr>
<tr>
<td>Sediment</td>
<td>Waived due to lack of partitioning to sediment</td>
</tr>
<tr>
<td>STP</td>
<td>10 mg B/L</td>
</tr>
</tbody>
</table>

### 8.2 Exposure controls

**Appropriate engineering controls:** Use local exhaust ventilation to keep airborne concentrations of dust below permissible exposure limits.

**Personal protection equipment:**
Eye and face protection: Eye protection according to CEN166:1996 is required.
Skin protection: Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty.
Respiratory protection: Where airborne concentrations are expected to exceed exposure limits, respirators should be used. (CEN149).

**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

#### 9.1 Information on basic physical and chemical properties

**Appearance:** White, crystalline solid

**Odour:** Odourless

**Odour threshold:** Not applicable: odourless

**pH @ 20°C:** 9.3 (0.1% solution); 9.2% (1.0% solution); 9.3 (4.7% solution)
Melting point/Freezing point: >1000°C
Initial boiling point and boiling range: Not applicable: melting point >300°C
Flash point: Not applicable: inorganic substance
Evaporation rate: Not applicable: non-volatile
Flammability: Non-flammable (used as a flame retardant)
Upper/lower flammability or explosive limits: Not applicable: non-flammable
Vapour pressure: Not applicable: melting point >300°C
Vapour density: Not applicable: melting point >300°C
Relative density: 1.72@23°C Water: 49.74
Solubility(ies):
Partition coefficient; n-octanol/water: Log P_{ow} = -1.53 @ 22°C
Auto-ignition temperature: Not applicable: not self-heating
Decomposition temperature: Not applicable: melting point >300°C
Viscosity: Not applicable: solid substance
Explosive properties: Not explosive: does not contain chemical groups associated with explosive properties
Flammability: Non-flammable: does not contain chemical groups associated with oxidising properties

Section 10 Stability and reactivity

10.1 Reactivity:
None known.

10.2 Chemical stability: Under normal ambient temperatures (-40°C to +40°C), the product is stable. When heated it loses water, eventually forming anhydrous borax (Na₂B₄O₇).

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: None.

Section 11 Toxicological Information

11.1 Information on toxicological effects

(a) Acute toxicity
Method: Acute Oral Toxicity Study – U.S. EPA FIFRA Guidelines Species: Rat
Dose: 5,150 – 6,000 mg/kg of body weight Routes of Exposure: Oral
Results: Low acute oral toxicity. LD_{50} in rats is 5,560 mg/kg of body weight. Based on the available data, the classification criteria are not met.

Method: Acute Dermal Toxicity Study – U.S. EPA FIFRA Guidelines Species: Rabbit
Dose: 2,000 mg/kg bw Routes of Exposure: Dermal
Results: Low acute dermal toxicity; LD$_{50}$ in rabbits is > 2,000 mg/kg of body weight. Poorly absorbed through intact skin. Based on the available data, the classification criteria are not met.

Method: Acute Inhalation Toxicity Study – OECD Guideline 403 Species: Rat
Dose: 2.03 mg/L
Routes of Exposure: Inhalation
Results: Low acute inhalation toxicity; LC$_{50}$ in rats is > 2.0 mg/l (or g/m$^3$). Based on the available data, the classification criteria are not met.

(b) Skin corrosion / irritation:
Method: Primary Dermal Irritation Study – U.S. EPA FIFRA Guidelines
Species: New Zealand White Rabbit
Dose: 0.5 g moistened with saline
Routes of Exposure: Dermal
Results: No skin irritation. Mean Primary Irritation Score: 0. Based on the available data, the classification criteria are not met.

(c) Serious eye damage / irritation:
Method: Eye Irritation Study – similar to OECD Guideline 405
Species: New Zealand White Rabbit
Dose: 0.077 g
Routes of Exposure: Eye
Results: Irritating, fully reversible in 14 days.
Classification: Eye Irritation Category 2 (Hazard statement: H319: Causes serious eye irritation.) Many years of occupational exposure indicate no adverse effects on human eye.

(d) Respiratory or skin sensitisation:
Method: Buehler Test – OECD Guideline 406 Species: Guinea Pig
Dose: 0.4 g
Routes of Exposure: Dermal
Results: Not a skin sensitisier. 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.

(e) Germ cell mutagenicity:
Method: Several in vitro mutagenicity studies have been carried out on boric acid including gene mutation in mammalian cells, unscheduled DNA synthesis, chromosomal aberration and sister chromatid exchange in mammalian cells. Species: L5178Y mouse lymphoma, V79 Chinese hamster cells, C3H/10T1/2 cells, hepatocytes, Chinese hamster ovary (CHO cells).
Dose: 1.0 - 10.0 mg/ml (1000 -10000 ppm) boric acid
Routes of Exposure: in vitro
Results: Not mutagenic (based on boric acid). Based on the available data, the classification criteria are not met.

(f) Carcinogenicity:
Method: OECD 451 equivalent.
Species: B6C3F1 mice
Dose: 446 ; 1150 mg boric acid/kg bw/day
Routes of Exposure: Oral feeding study
Results: No evidence of carcinogenicity (based on boric acid). Based on the available data, the classification criteria are not met.

(g) Reproductive toxicity:
Method: Three-generation feeding study – similar to OECD 416 Two-Generation Study
Species: Rat
Dose: 0; 34 (5.9); 100 (17.5); and 336 (58.5) mg boric acid (mg B)/kg bw/day; and 0; 50 (5.9); 155 (17.5); and 518 (58.5) mg borax (mg B)/kg bw/day
Routes of Exposure: Oral feeding study
Results: NOAEL in rats for effects on fertility in males is 100 mg boric acid /kg bw and 155 mg sodium tetraborate decahydrate/kg bw; equivalent to 17.5 mg B/kg bw.

Method: Prenatal Developmental Toxicity Study - OECD Guideline 414
Species: Rat
Dose: 0; 19 (3.3); 36 (6.3); 55 (9.6); 76 (13.3) and 143 (25) mg boric acid (mg B)/kg bw.
Routes of Exposure: Oral feeding study
Results: NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is 55 mg boric acid/kg bw or 9.6 mg B/kg; equivalent to 85 mg disodium tetraborate decahydrate/kg bw.

Classification: Reproductive Toxicity Category 1B (Hazard statement: H360FD: May damage fertility or the unborn child.)

Method: Occupational studies of evaluating sensitive sperm parameters in highly exposed borate workers. Epidemiological studies evaluating high environmental exposures to boron and developmental effects in humans have been conducted.
Species: Human
Dose: A subset of workers was exposed to 125 mg B/day.
Routes of Exposure: Combined oral ingestion and inhalation
Results: 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.

Summary of evaluation of the CMR properties:
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) No. 1272/2008. 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.

(h) STOT-single exposure:
Dose: 186 – 1704 mg/m$^3$
Routes of Exposure: Inhalation
Results: The maximum exposure of 1704 mg/m$^3$ resulted in a reduced respiratory rate of 33%, graded as moderate irritation. The lowest exposure tested of 186 mg/m$^3$ sodium tetraborate pentahydrate resulted in a reduced respiration rate of 11%, graded as no irritation. Based on the available data, the classification criteria are not met.

Method: Sensory irritation in human volunteers
Species: Human
Dose: 5 - 40 mg/m$^3$
Routes of Exposure: Inhalation
Results: A NOAEL for irritation from sodium tetraborate pentahydrate of 10 mg/m$^3$ among male and female human volunteers under controlled laboratory conditions. At 10 mg/m$^3$ increased nasal secretion was observed, but occurred in the absence of other irritating effects at a concentration below that considered irritating by volunteers and was not seen in a subsequent study.

(i) STOT-repeated exposure:
Method: Chronic toxicity study of boric acid and disodium tetraborate decahydrate, similar to OECD 452 Species: Rat
Dose: 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) Routes of Exposure: Oral feeding study
Results: 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 (kidney, haemopoietic system) are regarded only at even higher dose levels. Based on the available data, the classification criteria are not met.

(j) Aspiration hazard: Physical form of solid powder indicates no aspiration hazard potential.

Toxicokinetics
In the blood boric acid is the main species present and is not further metabolised. Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues. 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. 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 %.

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.
Symptoms related to the physical, and chemical and toxicological characteristics:
At high concentrations irritation of nose, throat and eye may be observed. Products are not intended for ingestion. Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects. 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:
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.

Section 12 Ecological information

12.1 Toxicity
Note that the data values are expressed as boron equivalents. To convert to this product divide the boron equivalent by 0.113. Studies judged to be unreliable or with insufficient information to evaluate are not included.

Freshwater
Chronic studies

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric NOEC/EC10)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algal</td>
<td>4</td>
<td>10 mg B/L (Chlorella pyrenoidosa) to 50 mg B/L (Anacystis nidulans)</td>
<td>3, 4</td>
</tr>
<tr>
<td>Higher plants</td>
<td>3</td>
<td>4.0 mg B/L (Phragmites australis) to 60 mg B/L (Lemna minor)</td>
<td>5, 6</td>
</tr>
<tr>
<td>Invertebrate and protozoan</td>
<td>7</td>
<td>5.7 mg B/L (Daphnia magna) to 32 mg B/L (Chironomus riparius)</td>
<td>7, 8</td>
</tr>
<tr>
<td>Fish</td>
<td>6</td>
<td>2.9 mg B/L (Micropterus salmoides) to 17 mg B/L (Carassius auratus)</td>
<td>9</td>
</tr>
<tr>
<td>Amphibian</td>
<td>2</td>
<td>29 mg B/L (Rana pipiens) to 41 mg B/L (Bufo fowleri)</td>
<td>9</td>
</tr>
</tbody>
</table>

Results: Based on the complete data set of 22 species, the HC₅₀ value of the species sensitivity distribution is 4.05 mg B/L.

Acute studies

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric EC/LC50)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algal</td>
<td>2</td>
<td>10 mg B/L (Chlorella pyrenoidosa) to 28 mg B/L (Seleniumstrum capricornutum)</td>
<td>3, 10</td>
</tr>
<tr>
<td>Invertebrate and protozoan</td>
<td>9</td>
<td>113 mg B/L (Ceriodaphnia dubia) to 1376 mg B/L (Chironomus decorus)</td>
<td>11, 12</td>
</tr>
<tr>
<td>Fish</td>
<td>7</td>
<td>80 mg B/L (Pimephales promelas) to 627 mg B/L (Onchorhynchus tschawytscha)</td>
<td>11, 13</td>
</tr>
<tr>
<td>Amphibian</td>
<td>2</td>
<td>86 mg B/L (Rana pipiens) to 104 mg B/L (Bufo fowleri)</td>
<td>9</td>
</tr>
</tbody>
</table>

Results: Based on the complete data set from 46 studies with 20 species, the HC₅₀ value of the species sensitivity distribution is 27.3 mg B/L.

Classification: Based on the acute data for freshwater species, this substance is not classified as hazardous to the environment.

Marine and Estuarine Data Chronic studies

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric NOEC/EC10)</th>
<th>References</th>
</tr>
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</table>
Algal

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric EC/LC50)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invertebrate</td>
<td>3</td>
<td>45 mg B/L (Litopenaeus vannamei) to 83 mg B/L (Americamysis bahia)</td>
<td>14, 15</td>
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<tr>
<td>Fish</td>
<td>2</td>
<td>74 mg B/L (Limanda limanda) to 600 mg B/L (Oncorhynchus tschawytscha)</td>
<td>13, 16</td>
</tr>
</tbody>
</table>

No data are available for algal species.

Sediment

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric EC/LC50)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invertebrate</td>
<td>1</td>
<td>82.4 mg B/kg sediment dw (Chironomus riparius)</td>
<td>17, 18</td>
</tr>
</tbody>
</table>

Results: Although limited, the data suggest that sediment organisms are within range of toxicity of aquatic organisms. In addition, the substance will not partition to the sediment, so a sediment/water partitioning approach is justified.

Sewage Treatment Plants (STP)

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric NOEC/EC10)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated sludge</td>
<td>NA</td>
<td>&gt;17.5 mg B/L to 100 mg B/L</td>
<td>19</td>
</tr>
<tr>
<td>Microbes</td>
<td>3</td>
<td>10 mg B/L (Opercularia bimarginata) to 20 mg B/L (Paramecium caudatum)</td>
<td>20</td>
</tr>
</tbody>
</table>

Terrestrial Data

Chronic studies

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>Number of Taxa Tested</th>
<th>Range of Endpoint Values (geometric NOEC/EC10)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant</td>
<td>28</td>
<td>7.2 mg B/kg dw (Zea mays) to 56 mg B/kg dw (Allium cepa)</td>
<td>21, 22</td>
</tr>
<tr>
<td>Invertebrates</td>
<td>9</td>
<td>15.4 mg B/kg dw (Folsomia candida) to 87 mg B/kg dw (Caenorhabditis elegans)</td>
<td>23, 24</td>
</tr>
<tr>
<td>Soil micro</td>
<td>3</td>
<td>12 mg B/kg dw (nitrogen mineralization and nitrification test) to 420 mg B/kg dw (soil nitrogen transformation test)</td>
<td>25, 26</td>
</tr>
</tbody>
</table>

Results: Based on the complete data set, the HC₅ value of the species sensitivity distribution is 10.8 mg B/kg dw.

**Phytotoxicity:** Boron is an essential micronutrient for healthy growth of plants. It can be harmful to boron sensitive plants in higher quantities. Care should be taken to minimise the amount of borate product released to the environment.

**12.2 Persistence and Degradability**

Biodegradation is not an applicable endpoint since the product is an inorganic substance.

**12.3 Bioaccumulative potential**

This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the food chain. Octanol/Water partition coefficient: Log $P_{ow} = -0.7570 @ 25^°C$ (based on boric acid).
12.4 **Mobility in soil**
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**
According to Annex XIII of REACH, criteria for the assessment of PBT and vPvB properties do not apply to inorganic substances.

12.6 **Other adverse effects**
None

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**Section 13** Disposal considerations

13.1 **Waste treatment methods**
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.
Product packaging should be recycled where possible.
Local authorities should be consulted about any specific local requirements.

Such product should, if possible, be used for an appropriate application.

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**Section 14** Transport information

**Transport Classification for Road (ADR) / Rail (RID); Inland waterways (ADN); Sea (IMDG); Air (ICAO/IATA)**

<table>
<thead>
<tr>
<th>14.1 UN Number:</th>
<th>Not Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2 UN Proper Shipping Name:</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.3 Transport hazard class(es):</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.4 Packing Group:</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.5 Environmental Hazards</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.6 Special precautions for user:</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>14.7 Transport in bulk according to Annex II of Marpol 73/78 and the IBC code:</td>
<td>Not Regulated</td>
</tr>
</tbody>
</table>

---

**Section 15** Regulatory information

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

**Regulation (EC) No 2037/2000 - Substances that deplete the ozone layer:** Not manufactured with and does not contain any Group I or Group II ozone depleting substances.

**Clean Air Act (Montreal Protocol) - Substances that deplete the ozone layer:** Not manufactured with and does not contain any Class I or Class II ozone depleting substances.

**Regulation (EC) No 689/2008 - Export and Import of Dangerous Chemicals:** Not listed.

**Regulation (EU) No 109/2012 – REACH Annex XVII:** Restricted to professional users. The product is permitted for use in consumer products where it is below the specific concentration limit.


**National Regulations:** Ensure all national/local regulations are observed.

**Chemical inventory listing:** The listing is sometimes under the Inventory number of the anhydrous form of this inorganic salt.
15.2 Chemical safety assessment
A Chemical Safety Assessment has been carried out.

Section 16 Other information

Revision Details:
Section 1: Supplier address; Emergency telephone number.

Abbreviations and acronyms:
ATP: Adaption to Technical Progress
CLP: Classification, Labelling and Packaging Regulation (EC) No. 1272/2008
CMR: Carcinogen, Mutagen, Reproductive Toxin
EC: Effect concentration
HC: Hazard Concentration
LC: Lethal Concentration
LD: Lethal Dose
STOT: Specific Target Organ Toxicity
DNEL: Derived No Effect Level
LOEC: Lowest Observed Effect Concentration
NA: Not applicable
NOAEL: No observed adverse effect level
NOEC: No Observed Effect Concentration
PNEC: Predicted No Effect Concentration
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent, very Bioaccumulative
TWA: Time Weighted Average
STEL: Short-term exposure limit
STP: Sewage Treatment Plant

References:
   Data
   (Buenos Aires) 44: 125-133.
   Limited.


Full text of Hazard statements mentioned in sections 2 and 3:
H319: Causes serious eye irritation.
H360FD: May damage fertility. May damage the unborn child.

Full text of Risk Phrases mentioned in sections 2 and 3:
R36 Irritating to eyes.
R60 May impair fertility.
R61 May cause harm to the unborn child.

Precautionary statements:
P202: Do not handle until all safety precautions have been read and understood.
P281: Use personal protective equipment as required.
P308+P313: IF exposed or concerned: Get medical advice.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501: Dispose of contents/container in accordance with local regulation.

Precautionary Phrases:
Restricted to professional users.
Do not ingest.
Keep out of reach of children.
Refer to safety data sheet.
Not for use in food or drugs.

The table in Annex – Exposure Scenarios lists the uses identified and registered for this substance with the indication of the Exposure Scenario(s) that is relevant to each identified use.

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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
<table>
<thead>
<tr>
<th>Sector</th>
<th>Identified Use</th>
<th>Life cycle stage</th>
<th>Sector of use category (SU)</th>
<th>Chemical Product Category (PC)</th>
<th>Process category (PROC)</th>
<th>Article category (AC)</th>
<th>Environmental release category (ERC)</th>
<th>Exposure Scenario</th>
<th>Environment</th>
<th>Human Health</th>
</tr>
</thead>
</table>
| Construction materials | Formulation/use of borates in construction materials (plaster board, wood) | X                | 3, 13                       | K35000, 8                      | 4, 5, 8b, 14, 24, 26   | 4, 11                | 2, 3, 5                             | E4 - Generic formulation of borates into mixtures  
E9 - Generic formulation of borates into materials  
E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix |             |             |
| Construction materials | Professional use of construction materials                                    | X                | 22, 19                      | K35000, 8                      | 21                      | 4                    | 10a, 11a, 12a                       | E21 - Generic industrial processing of articles with low abrasive techniques  
E27 - Generic wide dispersive use of articles containing borates with low release  
ES37 - Professional installation of plasterboard, board and other products |             |             |

**Note:** The IU number as well as the Exposure Scenarios numbering is correct. Even if the numbering might be inconsistent in some cases, this is not a mistake. There are no documents missing.