SAFETY DATA SHEET

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

1.1 Product identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>Ammonium Pentaborate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name</td>
<td>Diammonium decaborate octahydrate</td>
</tr>
<tr>
<td>EC number</td>
<td>234-521-1</td>
</tr>
<tr>
<td>REACH Registration number</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Registration number</th>
<th>Legal entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-2119970312-43-0001</td>
<td>Borax Français S.A.S.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS number</th>
<th>12046-04-7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Product type</th>
<th>Solid.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Other means of identification</th>
<th>Ammonium pentaborate</th>
</tr>
</thead>
</table>

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

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

<table>
<thead>
<tr>
<th>Identified uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial manufacturing</td>
</tr>
<tr>
<td>Flame retardants</td>
</tr>
<tr>
<td>A complete list of uses is provided in the introduction to Annex - Exposure Scenarios</td>
</tr>
</tbody>
</table>

1.3 Details of the supplier of the safety data sheet

Borax Europe Limited
6 St. James’s Square
London, SW1Y 4AD
United Kingdom

+44 (0)20 7781 2000
rtb.sds@riotinto.com

1.4 Emergency telephone number

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]
Repr. 2, H361d (Unborn child)

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: Warning

Hazard statements: Suspected of damaging the unborn child.

Precautionary statements

General: Do not handle until all safety precautions have been read and understood.
Prevention: Use personal protective equipment as required.
Response: IF exposed or concerned: Get medical attention.
Storage: Not applicable.
Disposal: Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazardous ingredients: Diammonium decaborate octahydrate

Supplemental label elements: Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles: Not applicable.

Special packaging requirements

Containers to be fitted with child-resistant fastenings: Not applicable.
Tactile warning of danger: Not applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII: Not applicable.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII: Not applicable.

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:

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Identifiers</th>
<th>%</th>
<th>Regulation (EC) No. 1272/2008 [CLP]</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>REACH #: 01-2119970312-43 EC: 234-521-1 CAS: 12046-04-7</td>
<td>&gt;99</td>
<td>Repr. 2, H361d (Unborn child)</td>
<td>[A]</td>
</tr>
</tbody>
</table>

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.

Type
[A] Constituent
[B] Impurity
[C] Stabilising additive

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: No known significant effects or critical hazards.

Inhalation: No known significant effects or critical hazards.

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.

Date of issue/Date of revision: 30/07/2018
Version: 1
SECTION 4: First aid measures

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. Ammonia gas may be released at high temperatures.

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 goggles and gloves are not required for normal industrial exposures, but eye protection according to CEN 166:2001, Respirators (CEN 149:2001) should be considered if environment is excessively dusty.

For emergency responders: Eye goggles and gloves are not required for normal industrial exposures, but eye protection according to CEN 166:2001, Respirators (CEN 149:2001) should be considered if environment is excessively dusty.

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.
SECTION 6: Accidental release measures

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

SECTION 7: Handling and storage

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

7.1 Precautions for safe handling

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

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

7.2 Conditions for safe storage, including any incompatibilities

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

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

7.3 Specific end use(s)

Recommendations: Refer to Annex - Exposure Scenarios

Industrial sector specific solutions: Not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

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).

No exposure limit value 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/m³. To convert product into equivalent boron (B) content, multiply by 0.199

DNELs/DMELs

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Type</th>
<th>Exposure</th>
<th>Value</th>
<th>Population</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>DNEL</td>
<td>Long term Oral</td>
<td>0.63 mg/kg bw/day</td>
<td>Consumers</td>
<td>Systemic</td>
</tr>
<tr>
<td></td>
<td>DNEL</td>
<td>Short term Oral</td>
<td>0.63 mg/kg bw/day</td>
<td>Consumers</td>
<td>Systemic</td>
</tr>
<tr>
<td></td>
<td>DNEL</td>
<td>Long term Dermal</td>
<td>127 mg/kg bw/day</td>
<td>Consumers</td>
<td>Systemic</td>
</tr>
<tr>
<td></td>
<td>DNEL</td>
<td>Long term Dermal</td>
<td>252 mg/kg bw/day</td>
<td>Workers</td>
<td>Systemic</td>
</tr>
<tr>
<td></td>
<td>DNEL</td>
<td>Short term Inhalation</td>
<td>17.04 mg/m³</td>
<td>Workers</td>
<td>Local</td>
</tr>
</tbody>
</table>
Ammonium Pentaborate

SECTION 8: Exposure controls/personal protection

<table>
<thead>
<tr>
<th>DNEL</th>
<th>Component</th>
<th>Value</th>
<th>Method Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term</td>
<td>Inhalation</td>
<td>7.1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Workers</td>
<td></td>
<td>Local</td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td>Inhalation</td>
<td>5.4 mg/m³</td>
<td>Workers</td>
</tr>
<tr>
<td>Systemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td>Inhalation</td>
<td>5.4 mg/m³</td>
<td>Workers</td>
</tr>
<tr>
<td>Systemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td>Inhalation</td>
<td>17.04 mg/m³</td>
<td>Consumers</td>
</tr>
<tr>
<td>Local</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td>Inhalation</td>
<td>2.69 mg/m³</td>
<td>Consumers</td>
</tr>
<tr>
<td>Systemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td>Inhalation</td>
<td>2.69 mg/m³</td>
<td>Consumers</td>
</tr>
<tr>
<td>Systemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td>Inhalation</td>
<td>9.3 mg/m³</td>
<td>Consumers</td>
</tr>
<tr>
<td>Local</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PNECs

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Compartment Detail</th>
<th>Value</th>
<th>Method Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>Fresh water</td>
<td>2.02 mg B/L</td>
<td></td>
</tr>
<tr>
<td>Marine water</td>
<td>2.02 mg B/L</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Water - intermittent</td>
<td>13.7 mg B/L</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Air</td>
<td>No exposure expected</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Soil</td>
<td>5.4 mg B/kg dry soil</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sediment</td>
<td>Waived due to lack of partitioning to sediment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sewage Treatment Plant</td>
<td>10 mg B/L</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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: safety glasses with side-shields. Eye protection according to CEN 166:2001 may be warranted if environment is excessively dusty.

Skin protection

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

Body protection: No special protective clothing is required.

Other skin protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
SECTION 8: Exposure controls/personal protection

Respiratory protection: Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. 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

9.1 Information on basic physical and chemical properties

Appearance

Physical state: Solid. [Crystalline solid.]

Colour: White.

Odour: Ammonia.

Odour threshold: Not available.

pH: 8.35 (1.0% solution); 7.32 (10.0% solution)

Melting point/freezing point: >1000°C

Initial boiling point and boiling range: Not applicable.

Flash point: Not applicable.

Evaporation rate: Not applicable.

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

Upper/lower flammability or explosive limits: Not available.

Vapour pressure: Not applicable.

Vapour density: Not available.

Bulk density: Not available.

Granulometry: Not available.

Relative density: 1.574

Solubility(ies): Water: 9.62% @ 20°C; 41.2% @ 90°C

Partition coefficient: n-octanol/water: Not applicable.

Auto-ignition temperature: Not applicable.

Decomposition temperature: Not applicable.
SECTION 9: Physical and chemical properties

Viscosity : Not applicable.
Explosive properties : Not explosive.
Oxidising properties : Not oxidising.

9.2 Other information
Solubility in water : 9.62 g/l

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 normal ambient temperatures (−40°C to +40°C), the product is stable. The product slowly breaks down to release ammonia.

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. Reaction with strong bases such as NaOH will generate ammonia (NH3)

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 and strong bases

10.6 Hazardous decomposition products : Ammonia.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result type</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>LD50 Oral</td>
<td>Mouse</td>
<td>&gt;4200 mg/kg body weight</td>
<td>-</td>
</tr>
</tbody>
</table>

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

Irritation/Corrosion

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>Skin - No irritation.</td>
<td>Rabbit</td>
<td>-</td>
<td>0.5 grams applied to intact and abraded skin. Based on similar substance Ammonium Biborate 0.1 g</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Eyes - No irritation.</td>
<td>Rabbit</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Conclusion/Summary

Skin : Based on the lack of dermal irritation responses in the rabbit from dermal application of ammonium biborate, no dermal irritation would be expected from ammonium pentaborate.

Eyes : Slight initial reaction was observed subsiding after 30 minutes, Based on the results of the primary eye irritation study, the classification criteria are not met.

Sensitisation

Date of issue/Date of revision : 30/07/2018
Version : 1
## SECTION 11: Toxicological information

### Carcinogenicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>Mouse</td>
<td>446 to 1150 mg/kg Boric acid / body weight</td>
<td>-</td>
<td>Negative</td>
</tr>
</tbody>
</table>

#### Conclusion/Summary
- No data available on the product itself. No evidence of carcinogenicity (based on boric acid).

### Mutagenicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Experiment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>(based on boric acid)</td>
<td>Experiment: In vitro Subject: Mammalian-Animal Cell: Germ</td>
<td>Negative</td>
</tr>
</tbody>
</table>

#### Conclusion/Summary
- No data available on the product itself. Not mutagenic (based on boric acid)

### Reproductive toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Maternal toxicity</th>
<th>Fertility effects</th>
<th>Developmental effects</th>
<th>Species</th>
<th>Effects</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>Negative</td>
<td>Positive</td>
<td>-</td>
<td>Rat</td>
<td>NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight. 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. 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.</td>
<td>Oral feeding study</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>-</td>
<td>Positive</td>
<td>Human</td>
<td>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</td>
<td>Combined oral ingestion and inhalation.</td>
</tr>
</tbody>
</table>

#### Conclusion/Summary
- No data available on the product itself. No evidence of carcinogenicity (based on boric acid).
SECTION 11: Toxicological information

**Potential acute health effects**

**Eye contact**
No known significant effects or critical hazards.

**Inhalation**
No known significant effects or critical hazards.

**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**
No known significant effects or critical hazards.

**Inhalation**
No known significant effects or critical hazards.

**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.

**Teratogenicity**
Conclusion/Summary: See Reproductive toxicity.

**Specific target organ toxicity (single exposure)**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data available on the product itself.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Specific target organ toxicity (repeated exposure)**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data available on the product itself.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Aspiration hazard**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diammonium decaborate octahydrate</td>
<td>Physical form of solid powder indicates no aspiration hazard potential.</td>
</tr>
</tbody>
</table>

**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. **This product is not intended for ingestion.**
### SECTION 11: Toxicological information

#### 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

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>Chronic NOAEL Oral</td>
<td>Rat</td>
<td>17.5 mg/kg; 0; 33 (5.9); 100 (17.5); 334 (58.5) mg boric acid (B)/kg bw per day (nominal in diet); and 0; 52 (5.9); 155 (17.5); 516 (58.5) mg borax (B)/kg/day (nominal in diet)</td>
<td>Oral feeding study</td>
</tr>
</tbody>
</table>

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

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

- **General**: No known significant effects or critical hazards.
- **Carcinogenicity**: No known significant effects or critical hazards.
- **Mutagenicity**: No known significant effects or critical hazards.
- **Teratogenicity**: May damage the unborn child.
- **Developmental effects**: May damage the unborn child.
- **Fertility effects**: No known significant effects or critical hazards.

#### Toxicokinetics

- **Absorption**: Absorption of borates via the oral route is nearly 100 %. For the inhalation route also 100 % absorption is assumed as worst case scenario. Dermal absorption through intact skin is very low with a percent dose absorbed of < 0.5 %.
- **Distribution**: Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues.
- **Metabolism**: In the blood boric acid is the main species present and is not further metabolised.
- **Elimination**: Boric acid is excreted rapidly, with elimination half-lives of 1 h in the mouse, 3 h in the rat and < 27.8 h in humans, and has low potential for accumulation. Boric acid is mainly excreted in the urine.

#### Other information
Not available.
Ammonium Pentaborate

SECTION 11: Toxicological information

12.1 Toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>Algae</td>
<td>EC50 52.4 mg/l (as Boron)</td>
<td>Pseudokirchneriella subcapitata</td>
<td>Fresh water - Acute</td>
</tr>
<tr>
<td></td>
<td>Invertebrate</td>
<td>LC50 91 mg/l (as Boron)</td>
<td>Ceriodaphnia dubia</td>
<td>Fresh water - Acute</td>
</tr>
<tr>
<td></td>
<td>Fish</td>
<td>LC50 79.7 mg/l (as Boron)</td>
<td>Pimephales promelas</td>
<td>Fresh water - Acute</td>
</tr>
<tr>
<td></td>
<td>Invertebrate</td>
<td>NOEC 6.4 mg/l (as Boron)</td>
<td>Brachydanio rerio</td>
<td>Fresh water - Chronic</td>
</tr>
<tr>
<td></td>
<td>Algae</td>
<td>NOEC 14.2 mg/l (as Boron)</td>
<td>Daphnia magna</td>
<td>Fresh water - Chronic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOEC 17.5 mg/l (as Boron)</td>
<td>Pseudokirchneriella subcapitata</td>
<td>Fresh water - Chronic</td>
</tr>
</tbody>
</table>

Conclusion/Summary: Note that the data values are expressed as boron equivalents. To convert product into equivalent boron (B) content, multiply by 0.1986

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

12.2 Persistence and degradability

Conclusion/Summary: Not applicable. Inorganic substance

12.3 Bioaccumulative potential

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP_ow</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>boric acid</td>
<td>-0.757</td>
<td>-</td>
<td>low</td>
</tr>
</tbody>
</table>

12.4 Mobility in soil

Soil/water partition coefficient (Koc) : Not available.

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

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

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

SECTION 12: Ecological information

12.4 Mobility in soil

Soil/water partition coefficient (Koc) : Not available.

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

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

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

SECTION 13: Disposal considerations

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

13.1 Waste treatment methods

Product

Date of issue/Date of revision: 30/07/2018
Version: 1

12/15
Ammonium Pentaborate

SECTION 13: Disposal considerations

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. 2) and falls within scope of Directive 2008/98/EC as hazardous waste (H10).

Packaging

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

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

SECTION 14: Transport information

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>ADR/RID</th>
<th>ADN</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
</table>

| 14.2 UN proper shipping name | - | - | - | - |

| 14.3 Transport hazard class(es) | - | - | - | - |

| 14.4 Packing group | - | - | - | - |

| 14.5 Environmental hazards | No. | No. | No. | No. |

| 14.6 Special precautions for user | Not applicable. |

| 14.7 Transport in bulk according to Annex II of Marpol and the IBC Code | 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

None of the components are listed.
Ammonium Pentaborate

SECTION 15: Regulatory information

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

Other EU regulations

Industrial emissions (integrated pollution prevention and control) - Air

Industrial emissions (integrated pollution prevention and control) - Water

Ozone depleting substances (1005/2009/EU)

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

Seveso Directive

This product is not controlled under the Seveso Directive.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Montreal Protocol (Annexes A, B, C, E)

Stockholm Convention on Persistent Organic Pollutants

Rotterdam Convention on Prior Informed Consent (PIC)

UNECE Aarhus Protocol on POPs and Heavy Metals

Inventory list

Australia: All components are listed or exempted.
Canada: All components are listed or exempted.
China: All components are listed or exempted.
Europe: All components are listed or exempted.
Japan: Japan inventory (ENCS): Not determined. Japan inventory (ISHL): All components are listed or exempted.
Malaysia: Not determined.
New Zealand: All components are listed or exempted.
Philippines: All components are listed or exempted.
Republic of Korea: All components are listed or exempted.
Taiwan: All components are listed or exempted.
Thailand: Not determined.
Turkey: Not determined.
United States: All components are listed or exempted.

Date of issue/Date of revision: 30/07/2018
Version: 1
SECTION 15: Regulatory information

Viet Nam

15.2 Chemical safety assessment

Not yet complete.

SECTION 16: Other information

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
IMSBC = International Maritime Solid Bulk Cargoes Code
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
vPvB = Very Persistent and Very Bioaccumulative

Key literature references and sources for data


Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repr. 2, H361d (Unborn child)</td>
<td>Expert judgment</td>
</tr>
</tbody>
</table>

Full text of abbreviated H statements

H361d

Suspected of damaging the unborn child.

Full text of classifications [CLP/GHS]

Repr. 2, H361d

REPRODUCTIVE TOXICITY (Unborn child) - Category 2

Additional information

Do not ingest.
Keep out of reach of children.
Refer to safety data sheet.
Not for use in food, drugs or biocides

Date of issue/Date of revision

30/07/2018

Date of previous issue

31/03/2017

Version

1

Europe  /  4.9  /  EN-GB

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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>IU number</th>
<th>Identified Use</th>
<th>Setting (industrial/professional worker / consumer)</th>
<th>Life cycle stage</th>
<th>Sector of use category (SU)</th>
<th>Process category (PROC)</th>
<th>Environment release category (ERC)</th>
<th>Exposure Scenario Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacture of ammonium borate</td>
<td>Industrial</td>
<td>X</td>
<td>8</td>
<td>1, 9</td>
<td>1</td>
<td>ES1 Manufacture; Manufacture of substance</td>
</tr>
<tr>
<td>2</td>
<td>Industrial use in electrolytic capacitors</td>
<td>Industrial</td>
<td>X</td>
<td>9, 10, 16</td>
<td>2, 3, 5, 9</td>
<td>4</td>
<td>ES2 Use at industrial site; Industrial use in electrolytic capacitors</td>
</tr>
</tbody>
</table>