Safety Data Sheet

REVISION: May 2016
Supersedes: July 2012version

Dehybor® Anhydrous Borax

Section 1 Identification of the substance/mixture and of the Company/undertaking

1.1 Product Identifier

Chemical name:	Sodium tetraborate
CAS No:	1330-43-4
REACH Registration Number:	01-2119490790-32-0000
EC No:	215-540-4
Synonyms:	Disodium tetraborate, anhydrous borax
Product Name:	Dehybor
Grades:	Technical

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

Identified Uses:

Binding agent
Chemical production
Complexing agent
Corrosion inhibitors and anti-scaling agents
Fertilisers
Flame retardants
Flux agents for casting
Intermediate
Laboratory chemicals
Lubricants and lubricant additives
Oxidising agents
Photosensitive agents and other photo-chemicals
pH-regulating agents
Plating agents and metal surface treating agents
Process regulator (other than polymerisation or vulcanization processes)
Process regulator (used in polymerisation or vulcanization processes)
Processing aid not otherwise listed
Stabilisers
Surface active agents
Viscosity modifiers
A complete list of uses is provided in the introduction to Annex – Exposure Scenarios

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

Section 2 Hazards identification

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 has a specific concentration limit of ≥ 4.5% 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 has a specific concentration limit of ≥ 4.5% 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

Chemical Name	CAS#	EC#	% content	Classification (1272/2008/EC)	Classification (67/548/EEC)
Sodium tetraborate anhydrous	1330-43-4	215-540-4	>99.0	Repr. 1B; H360FD Eye Irrit. 2; H319	Repr. Cat 2; R60-61 Xi; R36

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[1].

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: Note that the data values are expressed as boron equivalents. To convert to disodium tetraborate anhydrous divide the boron equivalent by 0.215. Studies judged to be unreliable or with insufficient information to evaluate are not included.

OELs of Member States of the EEA
Substance: Disodium tetraborate, CAS#: 1330-43-4

Country	8-hr TWA OEL (mg/m^3)	15 min STEL (mg/m^3)	Legal basis
Belgium	2	6	Moniteur Belge no. 187, 30 June 2011
Denmark	1	-	Work Environment Authority. Exposure Limits for Substances & Materials (Arbejdstilsynet. Grænseværdier for stoffer og materialer), An 2 & 3, Exec. Order No. 1134, 1-12-2011
France	1	-	Valeurs limites d'exposition professionnelle aux agents chimiques en France, INRS, 10-01-2008
Germany	2.1	4.2	TRGS 900 Arbeitsplatzgrenzwerte, 12-01-2012
Greece	10	-	Decree No. 339/2001, 9-10-2001
Ireland	1	-	2011 Code of Practice for the Safety, Health and Welfare at Work [Chemical Agents] Regulations 2001, (S.I. No. 619 of 2001)
Italy	2	6	Decree n. 106, 3-08-2009
Norway	1	-	Administrative normer for forurensning i arbeidsatmosfære 2003] No. 361, as amended through December 2011
Portugal	2	6	NP 1796-2004, Valores limite de exposicao (VLEs) profissional a agentes quimicos, 4th edition, September 2007
Spain	2	6	Valores Límites Ambientales (VLAs), Table 1, Límites de Exposición Profesional para Agentes Químicos 2012
Switzerland	1	-	Limit Values at the Workplace 2011, as per SUVA
UK	1	-	Health and Safety Executive, EH40/2005. Occupational Exposure Limits 2nd Edition, 2011.

DNELs

	Workers				Consumers			
Route of exposure	Acute effects local	Acute effects systemic	Chronic effects local	Chronic effects systemic	Acute effects local	Acute effects systemic	Chronic effects local	Chronic effects systemic
Oral	Not Required				*	0.79 mg/kg/day	*	0.79 mg/kg/day
Inhalation	11.72 mg/m³	*	11.72 mg/m³	6.74 mg/m³	11.72 mg/m³	*	11.72 mg/m³	3.4 mg/m³
Dermal	*	*	*	316.4 mg/kg/day	*	*	*	159.5 mg/kg/day

* No hazard identified
Monitoring procedure: *BS EN 14042:2003 Title identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.*

PNECs

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

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℃:	9.23 (2.48% solution)
Melting point/ Freezing point:	>1000℃
Initial boiling point and boiling range:	Not applicable: melting point >300℃
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:	2.35 @ 23°C
Solubility(ies):	Water**:** 49.74 g/L @ 20°C (based on decahydrate)
Partition coefficient; n-octanol/water:	Log P_{ow} = -1.53 @ 22°C (based on decahydrate)
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
Oxidising properties:	Not oxidising: does not contain chemical groups associated with oxidising properties

9.2 Other information

Molecular weight:	201.27
Formula:	$Na_2B_4O_7$

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.

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: 1600; 2500 mg/kg of body weight
Routes of Exposure: Oral
Results: Low acute oral toxicity. LD_{50} in rats is >2,500 mg/kg of body weight males. 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 for the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate
Routes of Exposure: Dermal
Results: Low acute dermal toxicity; LD_{50} in rabbits is > 2,000 mg/kg of body weight for disodium tetraborate pentahydrate and disodium tetraborate decahydrate. 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 mg/L for the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate
Routes of Exposure: Inhalation
Results: Low acute inhalation toxicity. LC_{50} in rats is > 2.0 mg/l (or g/m^3) based on results for the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate. 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 for Disodium tetraborate pentahydrate and Disodium tetraborate decahydrate. Based on the available data for the hydrated forms of sodium tetraborate, 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: 0.08g for the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate
Routes of Exposure: Eye
Results: Irritating based on scores for hydrated forms Disodium tetraborate pentahydrate and Disodium tetraborate decahydrate, reversible in 14 - 21 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 for the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate
Routes of Exposure: Dermal
Results: Not a skin sensitiser based on results of the hydrated forms disodium tetraborate pentahydrate and disodium tetraborate decahydrate. 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 44.7 mg disodium tetraborate anhydrous/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:
Method: Standard Test Method for Estimating Sensory Irritancy of Airborne Chemicals - ASTM E981-04 (2004)
Species: Mouse
Dose: 186 – 1704 mg sodium tetraborate pentahydrate/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/m3 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 0.215. Studies judged to be unreliable or with insufficient information to evaluate are not included.

Freshwater

Chronic studies

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

Results[2]: Based on the complete data set of 22 species, the HC_5 value of the species sensitivity distribution is 4.05 mg B/L.

Acute studies

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

Results[2]: Based on the complete data set from 46 studies with 20 species, the HC_5 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

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Algal	19	5 mg B/L (*Emiliana huxleyi*) to >100 mg B/L (*Agmenellum quadruplicatum, Anacystis marina, Thallassiorsira pseudonana*)	4

Results: No data are available for invertebrate or vertebrate species. The results from the freshwater data set are recommended as applicable to marine and estuarine species.

Acute studies

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

No data are available for algal species.

Sediment

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric EC/LC50)	References
Invertebrate	1	82.4 mg B/kg sediment dw (*Chironomus riparius*)	17, 18

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)

Taxonomic Group	Number of Taxa Tested	Range of Endpoint Values (geometric NOEC/EC10)	References
Activated sludge	NA	>17.5 mg B/L to 100 mg B/L	19
Microbes	3	10 mg B/L (*Opercularia bimarginata*) to 20 mg B/L (*Paramecium caudatum*)	20

Terrestrial Data
Chronic studies

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

Results[2]: Based on the complete data set, the HC_5 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 Bioaccummulative potential
This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the foodchain. Octanol/Water partition coefficient: Log P_{ow} = -0.7570 @ 25°C (based on boric acid)[27].

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

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.

Section 14 Transport information

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

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

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.

U.S. EPA TSCA Inventory:	1330-43-4
Canada DSL:	1330-43-4
EINECS:	215-540-4
South Korea KECI:	KE-12384
Japan METI & ISHL:	(1)-69
China IECSC:	1330-43-4

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 Conentration
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:

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For general information on the toxicology of borates see ECETOC Technical Report No. 63 (1995); Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'. Culver, BD & Hubbard SA (1995) Inorganic Boron Health Effects in Humans: An Aid to Risk Assessment and Clinical Judgment. Trace Elements in Experimental Medicine 9(4):175-184.

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, drugs or pesticides.

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

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
1	Production and Import	Production and Import	X					3,8,9	1,7,8,9a,9b,12,14,15, 17,18,19, 20,21,23, 24,25,26, 29,30,32, 37,38,39	1, 2, 3, 4, 8a, 8b, 9, 14, 15	-	1, 6a	**E1** - Importing, manufacture, refining and packaging of borates	**ES3** - Refining and processing of borates **ES14** - Loading of road tankers **ES15** - Off-loading borates from ships **ES19** - Packaging into bags (25-50kg) **ES20** - Packaging into big bags (750-1500kg) **ES21** - General maintenance activities **ES32** - Working in a laboratory **ES41** - Working in a warehouse
2	Abrasives	Formulation of borates in abrasives		X				3	UCN S351000	3, 4, 5, 8b, 9	4	3	**E8** - Generic formulation of borates into materials	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750-1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
3	Abrasives	Industrial use of abrasives			X			3, 15, 17	UCN S351000	24	4	4	**E9** - Generic industrial use of borates as processing aids in processes and products	**ES39** - Industrial and professional use of abrasives
4	Abrasives	Professional use of abrasives			X		X	22	UCN S351000	24	4	10b, 11b	**E28** - Generic wide dispersive use of articles containing borates with high release	**ES39** - Industrial and professional use of abrasives
5	Abrasives	Consumer use of abrasives				X	X	21	UCN S351000	-	4	10b, 11b	**E28** - Generic wide dispersive use of articles containing borates with high release	**ESC5** - Consumer exposure for the use of cutting wheels

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
6	Adhesives	Formulation of borates in adhesives		X				6a, 6b, 9, 11	1	3, 4, 5, 8a, 8b, 9, 14	-	2	**E7** - Formulation into of borates into adhesives	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
7	Adhesives	Industrial use of adhesives			X		X	3, 6a, 6b, 16, 17, 18, 19	1	2, 4, 5, 7, 8b, 9, 10, 13, 14	-	5	**E12** - Industrial use of adhesives containing borate compounds	**ES6** - Industrial application of adhesive **ES18** - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities **ES26** - Professional application of adhesives
8	Adhesives	Consumer use of articles containing adhesives				X	X	21	-	-	8	10a, 11a	**E27** - Generic wide dispersive use of articles containing borates with low release	**ESC2** - Consumer mouthing of cardboard and oral contact with boron-containing adhesives

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
9	Agriculture	Formulation of borates in fertilizers		X				1, 3	12	2, 3, 4, 5, 8b, 9, 14	-	2	**E4** - Generic formulation of borates into mixtures	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
10	Agriculture	Professional use of fertilizers			X			1, 22	12	2, 3, 4, 5, 8a, 8b, 9, 11, 13	-	8a, 8c, 8d, 8f	**E24** - Wide dispersive use of fertilizers containing borates	**ES5** - Fertigation using boron-containing liquid fertiliser **ES10** - Transfer of boron-containing granular fertiliser **ES23** - Transfer of boron-containing liquid foliar fertiliser **ES27** - Spreading of boron-containing granular fertiliser **ES28** - Application of boron-containing liquid foliar fertiliser
11	Agriculture	Consumer use of fertilizers				X		21	19	-	-	8a, 8c, 8d, 8f	**E24** - Wide dispersive use of fertilizers containing borates	**ESC3** - Consumer use of boron-containing fertiliser

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
12	Analytical reagent	Formulation into analytical reagents		X				3	21	2, 3, 4, 5, 8b, 9, 15, 19	-	2	**E4** - Generic formulation of borates into mixtures	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES32** - Working in a laboratory
13	Analytical reagent	Laboratory use of analytical reagent			X			3,22	21	15	-	8a, b, d, e	**E22** - Generic environmental exposure scenario for use of borates in laboratories as analytical reagent	**ES32** - Working in a laboratory
14	Autocausticing	Processing aid						3, 6b	20	8b, 9	-	4	**E10** - Industrial use of borates for autocausticizing	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
15	Catalysts	Manufacture of catalysts	X	X				3, 8, 9	UCN P15500	3, 4, 5, 8b	-	1, 3, 6a, 6b	**E3** - Industrial use of borates in the production of diboron trioxide-containing catalysts	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
16	Catalysts	Polymer production		X				3, 8	32	2	-	1, 6a, 6b	**E2** - Generic industrial use of borates resulting in the manufacture of another substance	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities
17	Cellulose insulation	Formulation of cellulose insulation		X				5, 6a, 6b, 19	UCN I15600	1, 2, 3, 4, 8b	4	3	**E8** - Generic formulation of borates into materials	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities ES32 - Working in a laboratory
18	Cellulose insulation	Professional use of cellulose insulation			X			19,22	I15600	21	4	8c, 8f	**E26** - Wide dispersive use of cellulose insulation	**ES36** - Professional installation of cellulose insulation

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
19	Cellulose insulation	Service life of cellulose insulation					X	-	-		4	10a, 11a	**E27** - Generic wide dispersive use of articles containing borates with low release	-
20	Ceramics	Production of frits	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	**E17** - Industrial use of borates during the manufacture of frits	**ES2** - Closed or largely closed production at high temperatures **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
21	Chemical synthesis	Manufacture of new chemicals using borates	X					3, 8, 9	19	2, 3, 4, 5, 8b, 9, 13, 15, 19, 21	-	1, 6a	**E2** - Generic industrial use of borates resulting in the manufacture of another substance	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
22	Coatings	Formulation of paints and coatings		X				3, 7, 8, 10	9a, 18	1,2, 3, 4, 8a, 8b, 9, 15	--	2	**E6** - Formulation of borates into paints and coatings	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
23	Coatings	Industrial use of paints and coatings			X			3, 7	9a, 18	7, 8b, 9, 10, 13	-	5	**E13** - Industrial use of paints and coatings containing borate compounds	**ES11** - Industrial use of paints and coatings.
24	Coatings	Professional use of paints and coatings			X			22	9a, 18	5, 8a, 8b, 9, 10, 11, 13, 19		8c, 8f	**E25** - Wide dispersive use of paints and coatings containing borates	**ES25** - Professional use of paints and coatings

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
26	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 **E8** - Generic formulation of borates into materials **E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
27	Construction materials	Professional use of construction materials			X		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
28	Construction materials	Consumer use of construction materials				X	X	21	0	-	4	10a, 11a	**E27** - Generic wide dispersive use of articles containing borates with low release	**ESC4** - Consumer use of boron-containing construction materials (other than insulation)
29	Construction materials	Service life of construction materials					X		-	-	4	10a, 11a	**E27** - Generic wide dispersive use of articles containing borates with low release	-

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
30	Detergents	Formulation into detergents		X				3, 10	35	2, 3, 4, 5, 8b, 9, 15	-	2	**E5** - Formulation of borates into detergents	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production activities at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
31	Detergents	Professional use of detergents			X			22	35	1, 2, 3, 11, 10, 13, 19	-	8a, 8c, 8d, 8f	**E23** - Generic wide dispersive use of borates with 100% release to water	**ES4** - Use of fabric detergents in industrial or professional settings
32	Detergents	Consumer use of detergents				X		21	35	-	-	8a, 8c, 8d, 8f	**E23** - Generic wide dispersive use of borates with 100% release to water	**ESC1** - Consumer use of boron-containing detergents
33	Glass	Production of glass wool	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	**E14** - Industrial use of borates during the manufacture of glass wool	**ES2** - Closed or largely closed production at high temperatures **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
34	Glass	Production of high alkali glass	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	**E15** - Industrial use of borates during the manufacture of high alkali glass	**ES2** - Closed or largely closed production at high temperatures **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
35	Glass	Production of low alkali glass	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	**E16** - Industrial use of borates during the manufacture of low alkali glass	**ES2** - Closed or largely closed production at high temperatures **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
36	Industrial fluids	Formulation of borates into industrial fluids		X				3, 8, 9, 10,15	20, 24, 25	3, 4, 5, 8b, 9		2	**E4** - Generic formulation of borates into mixtures	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES32** - Working in a laboratory

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
37	Industrial fluids	Industrial use of industrial fluids		X	X			3, 15, 17	19, 20, 24, 25	1, 2, 6, 8a, 8b, 9, 10, 13, 16,17, 18, 19, 20 21, 22, 23, 24, 26	-	2, 4, 5, 7	**E4** - Generic formulation of borates into mixtures **E9** - Generic industrial use of borates as processing aids in processes and products **E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix **E18** - Generic industrial use of borates in closed systems	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES9** - Diluting metal working fluid concentrate with water **ES12** - Use of cleaners in industrial or professional settings **ES16** - Closed production at ambient temperatures **ES17** - Make up of treatment baths for galvanising, plating and other surface treatments **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES29** - Galvanising, plating and other surface treatments of metal articles **ES32** - Working in a laboratory **ES33** - Use of metal working fluids in machining **ES34** - Greasing at high energy conditions
38	Industrial fluids	Consumer use of automotive fluids				x		21	4, 16, 24	-	-	9a, 9b	**E27** - Generic wide dispersive use of articles containing borates with low release	**ESC8** - Consumer exposure for the use of automotive fluids

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
39	Metallurgy	Formulation into alloys	X	X				3, 14	7, 19	8b,22,23, 24	7	1, 2	**E2** - Generic industrial use of borates resulting in the manufacture of another substance	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
40	Metallurgy	Manufacture of flux mixtures and pastes	X	X				3, 10, 13	38	3, 4, 5, 8b, 9, 14	-	2	**E4** - Generic formulation of borates into mixtures	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production activities at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES32** - Working in a laboratory

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
41	Metallurgy	Industrial use of fluxes for (Precious) Metal smelting			X			3, 14	7, 19	22	7	6b	**E2** - Generic industrial use of borates resulting in the manufacture of another substance	**ES2** - Closed or largely closed production at high temperatures **ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
42	Metallurgy	Industrial use of flux pastes for coating brazing and welding rods			X			3,10	38	14	7	5	**E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES24** - Industrial use of flux pastes to coat welding/brazing rods
43	Metallurgy	Industrial/Professional Use of welding, brazing or soldering rods			X			3, 14, 15, 17, 19	38	13, 25, 26	-	4	**E9** - Generic industrial use of borates as processing aids in processes and products	**ES40** - Industrial and professional use of fluxes in welding/brazing
44	Metallurgy	Use of borates in metal treatment (plating, passivation, galvanising etc)			X			3, 15, 17	14	3,4,5, 8a, 8b	-	4	**E9** - Generic industrial use of borates as processing aids in processes and products	**ES17** - Make up of treatment baths for galvanising, plating and other surface treatments **ES29** - Galvanising, plating and other surface treatments of metal articles
45	Non Oxide Ceramics	Intermediate use in the production of non oxide ceramic powders		X				8,9,13	19	3,4 8b 22,23,24	4	1, 2, 5, 6a, 6b	**E2** - Generic industrial use of borates resulting in the manufacture of another substance **E4** - Generic formulation of borates into mixtures **E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES2** - Closed or largely closed production at high temperatures **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES38** - Crushing grinding borate-containing powders

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
46	Nuclear applications	Industrial use of borates in closed nuclear system			X			23	37	1, 2, 8b	-	7	**E19** - Industrial use of borates in nuclear power plants with release to water **E20** - Industrial use of borates in nuclear power plants without release to water	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES32** - Working in a laboratory
47	Oil industry	Formulation into cement		X				2b	K35100	2, 3, 8b	-	2	**E4** - Generic formulation of borates into mixtures	**ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES32** - Working in a laboratory
48	Oil industry	Industrial use of cement			X			2b	K35100	8b, 4	-	5	**E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES32** - Working in a laboratory
49	Photography	Formulation into photographic solutions		X				3, 10	20 30	4, 5, 8b, 9	-	2	**E4** - Generic formulation of borates into mixtures	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES22** - Transfer of substances into small containers
50	Photography	Industrial use of photographic solutions			X			3	30	19	-	4	**E9** - Generic industrial use of borates as processing aids in processes and products	**ES35** - Make up of stock solution for photographic applications

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
51	Photography	Professional use of photographic solutions			X			22	30	13, 19	-	8a	**E23** - Generic wide dispersive use of borates with 100% release to water	**ES30** - Use of developer and fixer solutions **ES35** - Make up of stock solution for photographic applications
53	Printing paper	Formulation of borate PVA solutions		X				3, 10	20	4, 5, 8b	-	1, 6a, 6b	**E2** - Generic industrial use of borates resulting in the manufacture of another substance	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels
54	Refractories	Formulation in refractory mixtures		X				3, 15, 10	0	1, 2, 3,4, 5, 8a, 9, 21, 22, 23, 24,	4	2,3	**E4** - Generic formulation of borates into mixtures **E8** - Generic formulation of borates into materials	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES13** - Preparing and applying refractory mixes **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES31** - Compaction and tabletting of borate-containing powders **ES22** - Transfer of substances into small containers **ES32** - Working in a laboratory
55	Refractories	Industrial use of refractories mixtures			X		X	3, 14	15	7,14,19		5	**E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES13** - Preparing and applying refractory mixes

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
56	Tablet Production and Use	Swimming pool tablets production		X				3	37	2, 3, 4, 5, 8b, 9, 15, 19	-	5	**E11** - Generic industrial use of borates resulting in inclusion into or onto a matrix	**ES7** - Discharging bags (25 -50 kg) into mixing vessels **ES8** - Discharging big bags (750 – 1500kg) into mixing vessels **ES16** - Closed production at ambient temperatures **ES18** - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities **ES21** - General maintenance activities **ES22** - Transfer of substances into small containers **ES31** - Compaction and tabletting of borate-containing powders **ES32** - Working in a laboratory
57	Tablet Production and Use	Swimming pool tablet use			X			22	-	0	-	8a, 8d	**E23** - Generic wide dispersive use of borates with 100% release to water	**ES1** - Professional use of swimming pool tablets.
58	Toys	Consumer use of modelling clays				x		21	9b	-	-	11a	**E27-** Generic wide dispersive use of articles containing borates with low release	**ESC7 -** Consumer use of modelling clays