Material Safety Data Sheet
BORIC ACID

CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Boric Acid
Chemical Formula:	H_3BO_3
Chemical Name/Synonyms:	Orthoboric Acid
Chemical Family:	Inorganic Borates
CAS Registry Number:	10043-35-3
TSCA Inventory Number:	Not listed

MANUFACTURER: InCide® Technologies, Inc.
50 N. 41st Avenue
Phoenix, AZ 85009

EMERGENCY PHONE NUMBERS:

CHEMTREC:	**800-424-9300**
InCide® Technologies, Inc.	**602-233-0756**

COMPOSITION/INFORMATION ON INGREDIENTS OSHA HAZARDS

This product contains less than 99 percent (%) boric acid (H_3BO_3) CAS No. 10043-35-3. Boric acid is hazardous under the OSHA Hazard Communication Standard based on animal chronic toxicity studies of similar inorganic borate chemicals.

HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

Boric Acid is a white, odorless, powdered substance that is not flammable, combustible, or explosive, and it presents no unusual hazard if involved in a fire. Boric Acid presents little or no hazard (to humans) and has low acute oral and even lower dermal toxicity. Care should be taken to minimize the amount of Boric Acid released to the environment to avoid ecological effects.

POTENTIAL ECOLOGICAL EFFECTS:

Large amounts of Boric Acid can be harmful to boron-sensitive plants and other ecological systems.

POTENTIAL HEALTH EFFECTS:

Routes of Exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because Boric Acid is not absorbed through intact skin.

Inhalation: Occasional mild irritation of nose and throat may occur from inhalation of Boric Acid dusts at levels greater than 10 mg/m^3.

Eye Contact: Boric Acid is non-irritating to eyes in normal industrial use.

Skin Contact: Boric Acid does not cause irritation to intact skin

Ingestion: Products containing Boric Acid are not intended for ingestion. Boric Acid has a relatively low acute toxicity. Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms.

Cancer: Boric Acid is not considered a carcinogen.

Reproductive: Long-term, high dose animal ingestion studies of similar inorganic borate chemicals have demonstrated reproductive effects in male animals. A human study of occupational exposure to borate dust showed no adverse effect to reproduction.

Developmental: Multiple high dose animal ingestion studies of similar inorganic borate chemicals have demonstrated developmental effects in fetuses of pregnant animals, including fetal weight loss.

Target Organs: No target organ has been identified in humans. Multiple high dose animal ingestion studies of similar inorganic borate chemicals indicate the testes are the target organs in male animals.

Signs and Symptoms of Exposure: Symptoms of accidental over-exposure to borate products have been associated with ingestion or by absorption through large areas of damaged skin. These may include nausea, vomiting, and diarrhea, with delayed effects of skin redness and peeling. Refer to Toxicology Section for details.

FIRST AID MEASURES

Inhalation: No specific treatment is necessary since Boric Acid is not likely to be hazardous by inhalation. Prolonged exposure to dust levels in excess of regulatory limits should always be avoided.

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 because non-irritating.

Ingestion: Swallowing less than 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.

NOTE TO PHYSICIANS: Observation only is required for adult ingestion of a few grams of Boric Acid. For ingestion in excess of larger amounts, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Hemodialysis should be reserved for massive acute ingestion or patients with renal failure. Boron analyses of urine or blood are only useful for documenting exposure and should not be used to evaluate severity of poisoning or to guide treatment.

FIRE FIGHTING MEASURES

General Hazard: None, because Boric Acid is not flammable, combustible or explosive. The product itself is a flame retardant.

Extinguishing Media: Any fire extinguishing media may be used on nearby fires.
Flammability Classification (29 CFR 1910, 1200): Non-flammable solid.

ACCIDENTAL RELEASE MEASURES

General: Boric Acid is a water-soluble white powder that may cause damage to trees or vegetation by root absorption. (Refer to Ecological information for specific information)
Land Spill: Vacuum, shovel or sweep up Boric Acid and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. No personal protective equipment is needed to clean up land spills
Water Spill: Boric Acid will cause localized contamination of surrounding waters depending on the quantity dissolved in these waters. At high concentrations some damage to local vegetation, fish and other aquatic life may be expected.
Boric Acid is a non-hazardous waste when spilled or disposed of, as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). (Refer to Regulatory Information for additional references and information regarding EPA and California regulations.)

HANDLING AND STORAGE

Storage Temperature: Ambient
Storage Pressure: Atmospheric
Special Sensitivity: Moisture (Caking)
General: No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimize caking of the product, bags should be handed on a "first-in first-out" basis. Good housekeeping procedures should be followed to minimize dust generation and accumulation.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use local exhaust ventilation to keep airborne concentrations of Boric Acid dust below permissible exposure levels.
Personal Protection: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators must be used. Eye goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.
Occupational Exposure Limits: Boric Acid is listed/regulated by OSHA, Cal OSHA and ACGIH as "Particulate Not Otherwise Classified" or "Nuisance Dust".

OSHA: PEL*	15 mg/m^3 total dust and 5 mg/m^3 respirable dust
ACGIH: TLV**	10 mg/m^3
Cal OSHA: PEL*	10 mg/m^3

*PEL="Permissible Exposure Limit"
**TLV-"Threshold Limit Value"

PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White, odorless powder	**Melting Point:**	171º C
Boiling Point:	Not Applicable	**Flash Point:**	None
Vapor Pressure:	Negligible @ 20ºC	**Specific Gravity:**	1.51
pH:	4.8 (2.0% solution) @ 25º C	**Water Soluble:**	Yes

STABILITY AND REACTIVITY

General: Boric Acid is a stable product, but when heated it loses water, first forming Metaboric Acid (HBO_2), and on further heating it is converted into Boric Oxide (B_2O_3)
Incompatible Materials and Conditions to Avoid: Boric Acid reacts as a weak acid which may cause corrosion of base metals. Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.
Hazardous Decomposition: None

TOXICOLOGICAL INFORMATION

INGESTION (ACUTE ORAL TOXICITY): Low acute oral toxicity; LD_{50} of Boric Acid in rats is 3500 mg/kg of body weight.
SKIN:(ACUTE DERMAL TOXICITY): Low acute dermal toxicity; LD_{50} of Boric Acid in rabbits is greater than 2000 mg/kg of body weight. Boric Acid is not absorbed through intact skin.
PRIMARY SKIN IRRITATION INDEX: 0 (Zero), Boric Acid is non-corrosive
EYE: Draize test in rabbits produced mild eye irritation effects. Many years of occupational exposure history reflects no indication of human eye injury from exposure to Boric Acid.
INHALATION: Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to Boric Acid dust and Sodium Borate dust.

CARCINOGENICITY: A Technical Report issued by the National Toxicology Program showed "no evidence of carcinogenicity" from a full 2-year bioassay on Boric Acid in mice at feed doses of 2500 and 5000 ppm in the diet. No mutagenic activity was observed for Boric Acid in a recent battery of four short-term mutagenicity assays.

REPRODUCTIVE/DEVELOPMENTAL TOXICITY: Animal studies indicate Boric Acid reduces or inhibits sperm production, causes testicular atrophy, and, when given to pregnant animals during gestation, may cause developmental changes. These feed studies were conducted under chronic exposure conditions leading to doses many times in excess of those that could occur through inhalation of dust in occupational settings.

Reproductive Toxicity (Fertility): Dietary Boric Acid levels of 6,700 ppm in chronic feeding studies in rats and dogs produced testicular atrophy, while dogs and rats receiving 2000 ppm did not develop testicular changes ([1]Weir, Fisher, 1972). In chronic feeding studies of mice on diets containing 5000 ppm (550 mg/kg/d) Boric Acid testicular atrophy was present while mice fed 2500 ppm (275 mg/kg/d) Boric Acid showed no significant increase in testicular atrophy ([2]NTP, 1987). In another Boric Acid chronic study, in mice given 4500 ppm (636 mg/kg/d), degeneration of seminiferous tubules was present together with a reduction of germ cells, while at 1000 ppm (152 mg/kg/d) no effect was seen ([3]Fail et al., 1991). In a reproduction study on rats, 2000 ppm of dietary Boric Acid had no adverse effect on lactation, litter size, weight and appearance ([1]Weir, Fisher, 1972). In a continuous breeding study in mice there was reduction in fertility rates for males receiving 4500 ppm (636 mg/kg/d) Boric Acid but not for females receiving 4500 ppm Boric Acid([3]Fail et al., 1991)

Developmental Toxicity: Boric Acid at dietary levels of 1000 ppm (78 mg/kg/d) administered to pregnant female rats throughout gestation caused a slight reduction in fetal weight, but was considered to be close to the LOAEL. Doses of 2000 ppm (163 mg/kg/d) and above caused fetal malformations and maternal toxicity. In mice the no effect level for fetal weight reduction and maternal toxicity was 1000 ppm (248 mg/kg/d) Boric Acid Fetal weight loss was noted at dietary Boric Acid levels of 2000 ppm (452 mg/kg/d) and above. Malformations (agenesis or shortening of the thirteenth rib) were seen at 4000 ppm (1003 mg/kg/d), ([4]Heindel et al., 1992).

1 (Weir, R.J. and Fisher, R.S., Toxicol. Appl. Pharmacol., 23:351-364 (1974))
2 (National Toxicology Program (NTP)-Technical Report Series No. TR324, NIH Publication NO. 88-2580 (1987),PB88-213475/XAB)
3 (Fail et al., Fund. Appl. Toxicol. 17, 225-239 (1991))
4 (Heindel et al., Fund Appl. Toxicol. 18, 266-277 (1992))

ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

Phytotoxicity: Although boron is an essential micronutrient for healthy growth of boron-sensitive plants, it can be harmful to plants in higher quantities. Plants and trees can easily be exposed by root absorption to toxic levels of boron in the form of water-soluble borate leached into nearby soil or waters. Care should be taken to minimize the amount of borate product released to the environment.

Fish Toxicity: Boron naturally occurs in sea water at an average concentration of 5 mg B/liter. In laboratory studies the acute toxicity (96-hr LC_{50}) for under-yearling Coho salmon (Opchorhynchus kisutch) in sea water was determined as 40 mg B/L (added as sodium metaborate). Boron concentrations in fresh surface waters are generally less than 1 mg B/L. Laboratory studies on the toxicity of freshwater fish were determined using early life (embryo-larval) stages in natural water and Boric Acid as a test substance. The results were:

Rainbow Trout (S. gairdneri)
- 24-day LC_{50}=150.0 mb B/L
- 36-day NOEC•LOEC=0.75-1 mg B/L

Goldfish (Carassius auratus)
- 7-day NOEC•LOEC=26.50 mg B/L
- 3-day LC_{50}=178 mg B/L

Invertebrate Toxicity: The acute toxicity (48-hour LC_{50}) to Daphnids (Daphnia magna Straus) in natural water is reported to be 133 mg B/L (added as Boric Acid. Estimated chronic toxicity (21-day NOEC•LOEC) values of 6-13 mg B/L (added as Boric Acid have also

ENVIRONMENTAL FATE DATA:

Persistence/Degradation: Boron and boron containing compounds, such as boric acid are naturally occurring and ubiquitous in the environment. In the presence of water, boric acid disassociate into boron and natural borates.

Soil Mobility: The product is soluble in water and is leachable through normal soil.

NOTE: Boron (B) is the element in Boric Acid which is used to characterize borate product ecological effects. To convert Boric Acid data to Boron (B), multiply by 0.1748.

DISPOSAL CONSIDERATIONS

Disposal Guidance: Small quantities of Boric Acid can usually be disposed of at Municipal Landfill sites. No special disposal treatment is required, but refer to state and local regulations for applicable site-specific requirements. Tonnage quantities of product are not recommended to be sent to landfills. Such product should, if possible, be re-used for an appropriate application.

RCRA (40 CFR 261): Boric Acid is not listed under any sections of the Federal Resource Conservation and Recovery Act (RCRA).

California Hazardous Waste Designation: California identifies substances with acute LD_{50}'s less than 5000 mg/kg as "hazardous wastes". Boric Acid is therefore a "hazardous waste" if spilled in California, and should be handled in accordance with applicable state regulations. Refer to Regulatory Information for additional information

TRANSPORT INFORMATION

DOT Hazardous Material Classification: Boric Acid is not a U.S. Department of Transportation (DOT) Hazardous Material.
DOT Hazardous Substance Classification: Boric Acid is not a DOT Hazardous Substance.
International Transportation: Boric Acid has no U.N. Number , and is not regulated under international rail, highway, water, or air transport regulations.

REGULATORY INFORMATION

TSCA No.: Boric Acid does not appear on the EPA TSCA inventory list. Boric acid does appear on the EPA TSCA inventory list (10043-35-3).
RCRA: Boric Acid is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40) CFR 261 et seq.).
Superfund: CERCLA/SARA. Boric Acid is not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA, (the Superfund Amendments and Reqauthorization Act), including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65; Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355; or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.
Safe Drinking Water Act: Boric Acid is not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 et seq. Consult state and local regulations for possible water quality advisories regarding boron.
Clean Water Act (Federal Water Pollution Control Act): 33 USC 1251 et seq.

a.) Boric Acid is not itself a discharge covered by any water quality criteria of Section 304 of the CWA, 33USC1314
b.) It is not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129
c.) It is not on the Section 311 List of Hazardous Substances, 33 USC 1321, 40 CFR 116.

OSHA/Cal OSHA: This MSDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194(g)) hazard communication standards. Refer to Exposure Control/Personal Protection for regulatory exposure limits.
IARC: The International Agency for Research on Cancer (of the World Health Organization) does not list or categorize Boric Acid as a carcinogen.
NTP Annual Report on Carcinogens: Boric Acid is not listed.
OSHA Carcinogen: Boric Acid is not listed.
California Proposition 65: Boric Acid is not listed on any Proposition 65 lists of carcinogens or reproductive toxicants.

OTHER INFORMATION

Product Label Text Hazard Information: Refer to EPA approved product label for additional product Hazard and Precautionary information.
National Fire Protection Association (NFPA) Classification:
Health - 0, Flammability - 0, Reactivity 0
Hazardous Materials Information Systems (HMIS):
Red: (Flammability) - 0, Yellow: (Reactivity) - 0, Blue: (Acute Health) - 1*

*Chronic Effects

May 14, 2007

Replaces: January 1, 2007