sodium tetraborate decahydrate

Review Date: 7/20/2009

Type	Insecticide
Controls	Ants
Mode of Action	Stomach poison for insects.

Thurston County Review Summary:

Sodium tetraborate decahydrate (also known as boric oxide or boric acid anhydride) toxicity is based on its boron content. Boron is generally considered low in toxicity due to its prevalence in the environment and people's ingestion of boron daily. However, like most pesticide ingredients, it can be used in applications that can create an exposure of concern. The risks associated with the use of borate products are related to the potential exposure the application can have.

The insect control products containing boric oxide are to be used in bait stations or are a gel (paste) that is put out in small quantities. These products limit the amount of exposure a child could have and therefore pass the County's review criteria.

MOBILITY

Property	Value	Reference	Rating
Solubility (mg/L)	47,000	1	High
Soil Sorption (Kd=mL/g)	<1	5	High
Organic Sorption (Koc=mL/g)	Not found		

Mobility Summary:

Sodium tetraborate decahydrate is very soluble in water and adheres poorly to soil. The mobility hazard of sodium tetraborate decahydrate and other sodium borate salts is considered high.

PERSISTENCE

Property	Value	Reference	Rating
Vapor Pressure (mm Hg)	0.000001	2	Moderate
Biotic or Aerobic Half-life (days)	Not found		
Abiotic Half-life (days)	Not found		
Terrestrial Field Test Half-life (days)	Not found		
Hydrolysis Half-life (days)	Not found		
Anaerobic Half-life (days)	Not found		
Aquatic Field Test Half-life (days)	Not found		

Persistence Summary:

"Borates do not degrade but complex with organic matter and sod mineral surfaces and can be altered by water leaching and pH changes" (Reference 6). Sodium tetraborate decahydrate and its breakdown chemicals are considered persistent but have not been identified as a concern for groundwater contamination.

BIOACCUMULATION

Property	Value	Reference	Rating
Bioaccumulation Factor	"low potential"	2	Low
Bioconcentration Factor	Not found		
Octanol/Water Partition Coefficient	log Kow = 0.175	5	Low

Bioaccumulation Summary:

Sodium tetraborate decahydrate has a much greater attraction to water than it does to oils and fat, therefore the risk for bioaccumulation is considered low in hazard.

ACUTE TOXICITY

Test Subject	Value	Reference	Rating
Mammalian (LD50)	>631 mg/kg	1	Moderate
Avian (LD50)	>2,510 mg/kg	2	Low
Honey bee or insect (LD50)	>362 ppm	2	Low
Annelida -worms (LC50)	Not found		
Fish (LC50)	>1,021ppm	2	Low
Crustacean (LC50)	133 ppm	2	Low
Mollusk (LC50)	Not found		
Amphibian (LD50 or LC50)	Not found		

Acute Toxicity Summary:

Single dose toxicity testing indicates that sodium tetraborate decahydrate is moderately toxic to mammals and low in toxicity to birds, bees, fish, and other aquatic organisms.

ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Handling baited products was not evaluated						
Eating bait products was not evaluated						
Exposure to baited products was not evaluated						
Combined exposures were not evaluated						

Acute Toxicity Risk Assessment Summary

The risk of toxicity from the labelled use of bait station insecticide products containing sodium tetraborate decahydrate is considered low in hazard.

CHRONIC TOXICITY

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	E	Evidence of non-carcinogenicity for humans	3	Low
Mutagenicity	Negative	- -	4	Low
Neurotoxicity - (NOAEL)	>8.8 mg/kg/day	None	1	Low
Endocrine Disruption	Not listed			
Developmental Toxicity (NOAEL)	78 mg/kg/day	Enlarged brain ventricles	2	Check risk
Reproductive Toxicity (NOAEL)	8.8 mg/kg/day	Testicular toxicity	1	Check risk
Chronic Toxicity (NOAEL)	8.8 mg/kg/day	Testicular toxicity	1	Check risk

Chronic Toxicity Summary:

Long-term toxicity testing of sodium borate salts and boric acid produced neurotoxicity in test animals at concentrations above levels that caused other toxicity (Reference 1). The USEPA believes that endocrine disruption is addressed by assessing the potential for testicular atrophy with a "no observable adverse effect level" of 8.8 mg/kg/day. Further endocrine disruption testing may be required when the agency's Endocrine Disruption Screening Program is developed (Reference 1).

CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Exposures longer than 6 months were not evaluated						
Combined exposures were not evaluated						
Drinking water exposure not evaluated	- -	Not evaluated	- -	Ingestion	1	Waived
Dietary exposure was not evaluated	- -	Not able to be calculated	- -	ingestion	1	Waived

Chronic Toxicity Risk Assessment Summary:

Exposures to insecticidal use of sodium borate salts (or boric acid) for longer than six months were not calculated because there are so many other sources of boron that an exposure assessment would be unrealistic (Reference 1). All dietary and drinking water risk assessment scenarios were waived for boric acid and sodium borate salts (Reference 1).

Long-term exposures to sodium tetraborate decahydrate from insect bait stations is considered low in hazard.

DegradationProducts:

Boron

Comments:

The ant control products containing sodium tetraborate decahydrate are potential eye and/or skin irritants, but not skin sensitizers.

"References to the terms boric acid and sodium borate salts, and or boric acid/sodium borate salts in this document refer to boric acid and several borate salts including sodium tetraborate decahydrate, sodium tetraborate pentahydrate, sodium tetraborate anhydrous, disodium octaborate tetrahydrate, disodium octaborate anhydrous, and sodium metaborate. Risks summarized in this document are from boric acid and these sodium borate salts only." (Reference 1).

References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. Report of the Food Quality Protection Act (FQPA) Tolerance Reassessment Eligibility Decision (TRED) for Boric Acid/Sodium Borate Salts. July 2006.
2. USEPA. Office of Prevention, Pesticides and Toxic Substances. Reregistration Eligibility Decision (RED) Boric Acid and its Sodium Salts. September 1993.
3. USEPA. Science Information Management Branch, Health Effects Division, Office of Pesticide Programs. Chemicals Evaluated for Carcinogenic Potential. July 19, 2004.
4. Swirskey Gold, L., Slone, T. II, Manley, N.B., Garfinkel, G.B., Ames, B.N. Carcinogenic Potency Project. http://potency.berkeley.edu/chempages/BORIC%20ACID.html
5. USEPA. Office of Prevention, Pesticides and Toxic Substances. Boric Acid: residential Exposure Assessment for the Tolerance Reassessment Eligibility Decision Document. August 31, 2005.
6. World Health Organization (WHO). Environmental Health Criteria 204: Boron. International Programme on Chemical Safety. Prepared by: Ms. C. Smallwood, USEPA. 1998.