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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

010515

APR 25 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: The HED Chapter of the Reregistration Eligibility Document (RED) for Boric Acid, Case #0024

FROM: Jane Smith, Chemist
Chemical Coordination Branch
Health Effects Division (H7509C)

THRU: Esther Saito, Branch Chief
Chemical Coordination Branch
Health Effects Division (H7509C)
and
Penelope Fenner-Crisp, Ph.D, Director
Health Effects Division (H7509C)

TO: Walt Waldrop, Acting Chief
Reregistration Branch
Special Review and Reregistration Branch (H7508W)

The Human Health Assessment for the Reregistration Eligibility Document for the Boric Acid and its salts case is attached. This chapter includes the Hazard Assessment from Melba Morrow in Tox. Branch I, the Occupational/Residential Exposure Assessment from Judy Smith in OREB, and the Dietary Exposure from R. B. Perfetti in CBRS.

This Human Health Assessment includes boric acid, borax (sodium borate decahydrate), disodium octaborate tetrahydrate and boric oxide (also known as boric anhydride which had not been addressed previously in any case). Sodium metaborate is also addressed by this assessment. The decision to move sodium metaborate to the boric acid case from the barium metaborate case was made at the SRRD Team Meeting (3/30/93) since sodium metaborate is the sodium salt of boric acid.

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In case there is any confusion, Registration Division is performing the Product Chemistry review of these chemicals for the RED.

Boric acid and its salts are insecticides, herbicides, and fungicides registered for various non-food, agricultural and food handling establishment applications. Tolerances for residues of boron resulting from the use of boric acid and its salts have been established (40 CFR 180.271) on cottonseed (30 ppm) and citrus fruits (8 ppm, postharvest). (A new application of boric acid as a bait for the control of fire ants at agricultural sites has been submitted recently and is under consideration in Registration Division.) The Registrant has requested that an exemption from the requirements of a tolerance be granted to cover residues of boron in raw agricultural commodities as a result of this use.

The HED Metabolism Committee has concluded that it is appropriate to exempt boric acid and its salts from the requirements of a tolerance under Section 408 (racs) and to establish a food additive regulation for boric acid and its salts at food/feed handling sites under Section 409 of the FFD&CA. Therefore there are no Residue Chemistry data requirements remaining for these chemicals. HED considered the exemption a reassessment of the tolerances for boric acid; therefore, these details were not included in the Human Health Assessment by HED and should appear under IV Risk Management, B. Regulatory Position of the RED (compiled by SRRD) according to the format provided by D. Campt (memo dated 3/18/92). The detailed reassessment is in the attached CBRS boric acid and salts chapter by R. Perfetti, memo dated 2/11/93.

The human risks associated with boric acid and its salts are known i.e. ingestion of boric acid (>5g) is fatal. There are no direct food application uses for boric acid and its salts; therefore, there are no dietary concerns based on their current label use. There is no expectation that reasonable pesticidal or biocidal uses may constitute a hazard or risk to people involved in handling or application activities. Proper care and appropriate adherence to label precautions and directions should allay any exposure concerns. No additional hazard or exposure data are required for reregistration eligibility for boric acid and its salts (as listed above).

cc: Karl Baetcke
Larry Dorsey
Bill Burnam
Ed Zager
Tom Ellwanger

Attachments

Human Health Assessment

1. Toxicology Assessment

a. Acute Toxicity

ACUTE TOXICITY VALUES -BORIC ACID

TEST	RESULT (mg/kg)	CATEGORY
Oral LD_{50}	3.45 g/kg	III
Dermal LD_{50}	> 2 g/kg	III
Inhalation LC_{50}	> 0.16 mg/L	II
Eye irritation	no corneal opacity, conjunctivitis cleared by day 4	III
Skin irritation	erythema present in 1/6 animals at 72 hours	III

ACUTE TOXICITY VALUES - BORAX

TEST	RESULT (mg/kg)	CATEGORY
Oral LD_{50}	4.6 g/kg(M)	III
Dermal LD_{50}	> 2 g/kg	III
Inhalation LC_{50}	not conducted w/technical	NA
Eye irritation	irritation and corneal opacity evident at day 14	I
Skin irritation	no skin irritation	IV

b. Subchronic Toxicity

In a subchronic (3 month) feeding study in dogs, Borax was tested at doses of 0, 3, 35 or 268 mg/kg/day for males and 0, 2, 22 or 192 mg/kg/day for females. The systemic NOEL was 35 mg/kg/day for males and 22 mg/kg/day for females, and the LOEL was 268 mg/kg/day and 192 mg/kg/day based on clinical pathology (decreased hematocrit and hemoglobin); hemosiderin in the spleen, liver and kidneys; testicular pathology and widening of the adrenal cortex in the area of the zona reticularis. Lipid accumulation was also present in the zona reticularis, and in high dose females, there was an increase in brain weight. In males, there were decreases in the testes:brain, testes:body, thyroid:body and thyroid:brain ratios. Although this study was classified as supplementary, the information provided therein was considered adequate for use in risk assessment and an additional study is not required.

c. Metabolism

No metabolism studies were conducted using boric acid or borax. No studies are required.

d. Chronic Toxicity, Carcinogenicity

BORIC ACID

A two year chronic feeding/oncogenicity study was conducted in B6C3F1 mice. The compound was administered in the diet at levels of 0, 2500 or 5000 ppm (approximately 0, 450, or 1150 mg/kg/day). No clinical signs of toxicity were observed during the course of the study. Testicular pathology was present at the highest dose tested and consisted of testicular atrophy and interstitial cell hyperplasia. Other pathological findings included a dose related increase in the incidence of splenic lymphoid depletion in male mice that was believed to be associated with stress and a dose related increase in the incidence of pulmonary hemorrhage that was of unknown biological significance. The compound was not found to be carcinogenic at the levels tested. A NOEL for systemic toxicity was not determined; the LOEL for systemic toxicity was 2500 ppm (approximately 450 mg/kg/day) based on the pathological findings.

BORAX

A two-year chronic oncogenicity/feeding study was conducted in Sprague Dawley rats. Animals received doses of 0, 65, 154 or 515 mg/kg/day during the course of the study. The chronic NOEL was

determined to be 154 mg/kg/day and the LOEL was 515 mg/kg/day based on reported decreases in body weight, possible anemia and testicular tubular atrophy. The test material was not found to be carcinogenic.

In another study, beagle dogs received borax at doses of 0, 13, 26 or 77 mg/kg/day in the feed for a duration of two-years. The NOEL was 77 mg/kg/day (HDT). An additional study was conducted for 38 weeks in which beagles received the test material in the feed at doses of 0 or 359 mg/kg/day. At 359 mg/kg/day, weight decreases were reported for both sexes, and in males, testicular atrophy, decreased testicular weight and decreased testes:body weight ratios were reported. Both of these studies were classified as supplementary; however, it was determined that the information was sufficient for conducting a risk assessment; therefore, an additional study is not required.

e. Reproduction and Developmental Toxicity

BORIC ACID

Pregnant Sprague Dawley rats were administered boric acid in the diet at dose levels of 0.1%, 0.2%, 0.4%, or 0.8% (approximately 0, 78, 163, 330, or 539 mg/kg/day). The test material was administered from day 0 through day 20 of gestation for the three lower dose levels. At 0.8%, the compound was administered on gestation days 6 through 20. The rationale for providing the test substance for a period that was greater than the period of organogenesis was to allow for the dams to reach a steady state with regard to boric acid concentrations. At the highest dose level, exposure to the test material was initiated at a later period in order to minimize preimplantation loss and early embryo lethality. The maternal NOEL was determined to be 0.1% (78 mg/kg/day) and the maternal LOEL was determined to be 0.2% (163 mg/kg/day) based on increased liver and kidney weights. The developmental NOEL was 0.1% (78 mg/kg/day) and the developmental LOEL was 0.2% (163 mg/kg/day) based on decreased fetal body weight and the increase in the incidence of fetuses/litter with variations (short rib XIII).

Dose levels of 0, 0.1%, 0.2% or 0.4% (0, 248, 452, or 1003 mg/kg/day) boric acid were administered to pregnant CD-1 mice in the diet from gestation days 0-17. A maternal NOEL was not established; the LOEL for maternal toxicity was 0.1% (248 mg/kg/day) based on the increased incidence of dilated renal tubules. The developmental NOEL was 0.1% (248 mg/kg/day) and the developmental LOEL was 0.2% (452 mg/kg/day) based on decreased average fetal body weights.

Doses of 0, 62.5, 125 or 250 mg/kg/day were administered by gavage to pregnant New Zealand white rabbits on gestation days 6 through 19, inclusive. The maternal NOEL was 125 mg/kg/day and the maternal LOEL was 250 mg/kg/day based on the presence of vaginal bleeding, decreased weight gain during the treatment period, and decreased gravid uterine weights that were secondary to prenatal mortality. The developmental NOEL was 125 mg/kg/day and the developmental LOEL was 250 mg/kg/day based on prenatal mortality as characterized by the increase in the total number of resorptions and increased pre-implantation loss. At this dose level, there was also an increase in the incidence of fetuses with enlarged aortas, intraventricular septal defects and great vessels arising from the right ventricle.

In a two generation reproduction study conducted in mice, boric acid was administered throughout the study in the diet at levels of 0, 1000, 4500, or 9000 ppm (0, 150, 675 or 1350 mg/kg). The NOEL for parental and reproductive toxicity was 1000 ppm (150 mg/kg). The parental LOEL was 4500 ppm based on decreases in organ weights in both sexes. The reproductive LOEL was also 4500 ppm based on decreased fertility and decreased pup weight. At this dose, the average number of days between litters increased after the second litter and the number of dams producing litters decreased significantly. At the highest dose tested, no litters were produced and the males in this group had a decrease in sperm concentration and motility when compared to controls.

BORAX

In a reproduction study conducted in Sprague Dawley rats, borax was administered in the feed at doses of 0, 65, 154 or 515 mg/kg/day for three generations. The systemic and reproductive NOELs were 154 mg/kg/day and the systemic and reproductive LOELs were 515 mg/kg/day. At this dose level, there was a reported decrease in weight gain during the pre-mating period in both sexes and food efficiency was lower in females. The testes in males were atrophied and there was a reported decrease in the number of corpora lutea in females at the highest dose tested. Additionally, no litters were produced when high dose males were mated to high dose females. When high dose females were mated to control males, there was a reported decrease in the number of litters and pup survival was adversely affected. This study was classified as supplementary, but can be used for risk assessment because the reported deficiencies were not serious enough to discount the data. No new or additional studies are required.

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f. Mutagenicity

Boric acid has not shown evidence of genetic toxicity. The compound was negative for gene mutations, and when administered to male and female Swiss mice, did not result in a significant increase in the frequency of micronucleated polychromatic erythrocytes in bone marrow cells.

g. Other Toxicity Information

The reference dose for boric acid/borax was set at 0.09 mg/kg/day based on the results of a subchronic and chronic feeding study in dogs. The chemical was classified as a "Group E" carcinogen, evidence of non-carcinogenicity for humans.

The information above for borax and boric acid also supports the reregistration of disodium octaborate tetrahydrate, sodium metaborate and boric oxide based on structural activity similarities. Therefore, all of these chemicals are eligible for reregistration and no additional toxicological data are required.

2. Exposure Assessment

a. Dietary Exposure

The HED Metabolism Committee has concluded that it is appropriate to exempt boric acid and its salts (boric oxide, sodium metaborate, disodium octaborate tetrahydrate, sodium borate decahydrate, and sodium borate) from the requirements of a tolerance under Section 408 (racs) and to establish a food additive regulation for boric acid and its salts at food/feed handling sites under Section 409 of the FFD&CA. There are no dietary exposure concerns associated with these chemicals.

b. Occupational and Residential Exposure

Boric acid may be formulated as dusts, granules, pellets, wettable powders, impregnated materials, soluble concentrated liquids, and solid and liquid baits. Formulation concentrations may range from 2 to 100 percent active ingredients, and are used as acaracides, algicides, herbicides, and insecticides.

Borax may be formulated as dusts, granules, pellets, crystals, impregnated materials, emulsifiable concentrates, soluble liquid concentrates, ready-to-use liquids, and solid and liquid baits.

Disodium octaborate tetrahydrate may be formulated as soluble liquid concentrates or soluble solid formulations. Concentrations of registered products range between 8.0 and 99.4 percent active ingredient, and the products are used as fungicides, herbicides, and insecticides. Disodium octaborate tetrahydrate is prepared by spray-drying mixtures of borax and boric acid, or by cooling a solution containing borax and sodium hydroxide. Boric anhydride, in the presence of water, is converted to boric acid.

Sodium metaborate, formulated in granular, pellet, wettable powders, and liquid soluble concentrates, is utilized as a fungicide and herbicide, it is also used in adhesives, detergents, photography and for textile finishing.

The products registered for use which contain boric acid as the active ingredient are applied in aquatic, outdoor and indoor sites (i.e., commercial, industrial, domestic dwellings, food handling establishments, sewage systems, wood protection treatment to buildings, etc). Depending on the use site, boric acid may be applied using a spreader, aircraft, knife/spatula, airblower, power duster, squeeze applicator, or aerosol can. Based on the use patterns, the potential for dermal and inhalation exposure exists, (i.e., exposure to persons applying the products, exposure to humans reentering the treated areas, etc.).

With regards to toxicity, boric acid, borax, disodium octaborate tetrahydrate, boric oxide and sodium metaborate are human poisons by ingestion. For boric acid, death has resulted from ingestion of less than 5 grams in infants; adults have died after ingestion of 5 to 20 grams. Technical grade boric acid is classified as an oral toxicity category III chemical, an acute dermal toxicity category III chemical and has been classified as an acute inhalation toxicity category II material. Contact involving concentrated solutions or nearly pure solid formulations of boric acid may also produce primary eye irritation; additionally, dermal irritation may also occur if accidental contact occurs (i.e. considered toxicity category IV for primary dermal irritation). Product labels should reflect any potential for eye, skin, or inhalation hazard and recommend appropriate protective equipment.

Although the potential for dermal and inhalation exposure exists, significant human exposure should be minimal if the products are used in accordance with label instructions. Therefore, based on the lack of toxicological concern, exposure data are not required for the reregistration of boric acid, borax, disodium octaborate tetrahydrate, boric oxide and sodium metaborate.

3. Risk Characterization

The human risks associated with boric acid and its salts are known. Ingestion of boric acid (>5 grams) by (adult) humans is fatal. There are no direct food application uses for boric acid and its salts; therefore, there are no dietary concerns based on their current label uses. There is no expectation that reasonable pesticidal or biocidal uses may constitute a hazard or risk to people involved in handling or application activities. Proper care and appropriate adherence to label precautions and directions should allay any exposure concerns. No additional hazard or exposure data are required for reregistration eligibility.

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BIBLIOGRAPHY

Boric Acid

81-1 Acc/MRID #246338
81-2 Acc/MRID #247814
81-3 No MRID#, Toxicology Data Evaluation Record (DER)# 005381
81-4 MRID # 246338
81-5 Acc/MRID #247814

81-6 No Study. Not Required.
82-1 None/Not Required.
82-2 MRID# 41861301, DER# 9834
82-3 None/Not Required.
82-4 None/Not Required.
83-1 None/Not Required.
83-2 None/Not Required.
83-3 MRID# 417254, 42377101, 41861301, 42164201, 42164202, DER# 8719
83-4 MRID# 41589101, DER# 8333
84-2 MRID# 42038901, 42038902, DER# 9661
84-4 MRID# 42038904, DER# 9661
85-1 None/Not Required.

Borax

81-1 MRID #406923-03
81-2 No MRID, Toxicology document #009301
81-3 No Study. Not Required.
81-4 No MRID. Toxicology document # 009301
81-5 No MRID. Toxicology document #009301
81-6 No study. Not Required.
82-1 MRID# 40692307, DER# 9301
82-2 MRID# 40692309, 40692308, 40692310, DER# 9301
82-3 None/Not Required.
82-4 None/Not Required.
83-1 None/Not Required.
83-2 None/Not Required.
83-3 None/Not Required.
83-4 MRID# 40692311, DER# 9301
84-2 None/Not Required.
85-1 None/Not Required.

010515

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

1993

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

Subject: Toxicology Review for the Reregistration Eligibility Document for Boric acid/Borax D184995

To: Flora Chow /Jane Smith
Chemical Coordination Branch, HED

From: Melba S. Morrow, D.V.M. MSM 3/1/93
Toxicology I Branch, HED

Thru: Karl Baetcke, Ph.D., Chief Karl Baetcke 3/1/93
Toxicology I Branch, HED

Chemicals: Boric acid/ Borax/ Disodium octaborate tetrahydrate/ Boric oxide
Case/chemical number: 011001, 011102 and 011103

Considerations: Boric acid and its salts are herbicides, fungicides and insecticides for use on a variety of agricultural, non-agricultural (medical, residential, commercial and industrial) and food/feed handling sites. In food/feed handling areas, the compound is generally used as a crack and crevice treatment.

Tolerance for residues of boric acid in or on citrus is 8 ppm; tolerance for residues in or on cottonseed is 30 ppm.

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1. Toxicology Data Base

a. Acute Toxicity

ACUTE TOXICITY VALUES -BORIC ACID

TEST	RESULT (mg/kg)	CATEGORY
Oral LD50	3.45 g/kg(M), 4.08 g/kg(F)	3
Inhalation LC50	> 0.16 mg/L	2
Dermal LD50	> 2 g/kg	3
Eye effects	no corneal opacity, conjunctivitis cleared by day 4	3
Skin effects	erythema present in 1/6 animals at 72 hours	3

ACUTE TOXICITY VALUES - BORAX

TEST	RESULT (mg/kg)	CATEGORY
Oral LD50	4.6 g/kg(M), 5.0 g/kg(F)	3
Inhalation LC50	not conducted w/technical	
Dermal LD50	> 2 g/kg	3
Eye effects	irritation and corneal opacity evident at day 14	1
Skin effects	no skin irritation	4

b. Subchronic Toxicity

In a subchronic (3 month) feeding study in dogs, Borax was tested at doses of 0, 3, 35 and 268 mg/kg for males and at 0, 2, 22 and 192 mg/kg for females. The systemic NOEL was 35 mg/kg for males and 22 mg/kg for females and the LOEL was 268 mg/kg and 192 mg/kg based on clinical pathology (decreased hematocrit and hemoglobin); hemosiderin in the spleen, liver and kidneys;

testicular pathology and widening of the adrenal cortex in the area of the zona reticularis. Lipid accumulation was also present in the zona reticularis and, in high dose females, there was an increase in brain weight. In males, there were decreases in the testes:brain, testes:body, thyroid:body and thyroid:brain ratios. Although this study was classified as supplementary, the information provided therein was considered adequate for use in risk assessment. (MRID # 406923-07)

c. Metabolism

No metabolism studies were conducted for either of these compounds.

d. Chronic Toxicity, Oncogenicity

BORIC ACID

A two year chronic feeding/oncogenicity study was conducted in B6C3F1 mice. The compound was administered in the diet at levels of 0, 2500 and 5000 ppm. No clinical signs of toxicity were observed during the course of the study. Testicular pathology was present at the highest dose tested and consisted of testicular atrophy and interstitial cell hyperplasia. Other pathological findings included a dose related increase in the incidence of splenic lymphoid depletion in male mice that was believed to be associated with stress and a dose related increase in the incidence of pulmonary hemorrhage that was of unknown biological significance. The compound was not found to be carcinogenic at the levels tested. A NOEL for systemic toxicity was not determined; the LOEL for systemic toxicity was 2500 ppm based on the pathological findings. (MRID # 418613-01).

The developmental NOEL was 125 mg/kg and the developmental LOEL was 250 mg/kg based on prenatal mortality as characterized by the increase in the total number of resorptionsand increased pre-implantation loss. At this dose level, there was also an increase in the incidence of fetuses with enlarged aortas, intraventricular septal defects and great vessels arising from the right ventricle. (MRID # 421642-01, 421642-02).

4. In a two generation reproduction study conducted in mice, boric acid was administered throughout the study in the diet at levels of 0, 1000, 4500, and 9000 ppm (0, 150, 675 and 1350 mg/kg). The NOEL for parental and reproductive toxicity was 1000 ppm (150 mg/kg). The parental LEL was 4500 ppm based on decreases in organ weights in both sexes. The reproductive LEL was also 4500 ppm based on decreased fertility and decreased pup weight. At this dose, the average number of days between litters increased after the second litter and the number of dams producing litters decreased significantly. At the highest dose tested, no litters were produced and the males in this group had a decrease in sperm concentration and motility when compared to controls. (MRID 415891-01)

BORAX

1. In a reproduction study conducted in Sprague Dawley rats, borax was administered in the feed at doses of 0, 65, 154 and 515 mg/kg/day for three generations. The systemic and reproductive NOELs were 154 mg/kg/day and the systemic and reproductive LOELs were 515 mg/kg/day. At this dose level, there was a reported decrease in weight gain during the pre-mating

period in both sexes and food efficiency was lower in females. The testes in males were atrophied and there was a reported decrease in the number of corpora lutea in females at the highest dose tested. Additionally, no litters were produced when high dose males were mated to high dose females. When high dose females were mated to control males, there was a reported decrease in the number of litters and pup survival was adversely affected. This study was classified as supplementary, but can be used for risk assessment because the reported deficiencies were not serious enough to discount the data. (MRID #: 406923-11).

f. Mutagenicity

Boric acid has not shown genetic toxicity. The compound was negative for gene mutations (MRID 420389-01, 420389-02) and when administered to male and female Swiss mice it did not result in a significant increase in the frequency of micronucleated polychromatic erythrocytes in bone marrow cells.

g. Other Toxicity Information

The reference dose for boric acid/borax was set at 0.09 mg/kg/day based on the results from a two year feeding study in dogs. The chemical was classified as a group E carcinogen and is not a developmental toxicant.

The information in the Tox Chapter for borax and boric acid also supports the reregistration of disodium octaborate tetrahydrate, sodium metaborate and boric oxide based on similarities in chemical structure and activity. Therefore, all of these chemicals are eligible for reregistration.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

011051

MAR 15 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: Review of potential Occupational and Residential Exposure to Boric Acid for the Reregistration Eligibility Document (RED).

TO: Ester Saito, Chief
Chemical Coordination Branch
Health Effects Division (H7509C)

FROM: Judy Smith, PhD, Chemist 3/12/93

THRU: Alan Nielsen, Chief
Reregistration Section II

Larry Dorsey, Acting Chief
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

Chemical: Boric Acid DP Barcode: D184989

Case#: 818579

Chemical#: 011001 - Boric Acid,
011102 - Borax,
011103 - Disodium octaborate tetrahydrate

Defer to:
_____ Biological Analysis Branch/BEAD
_____ Accelerated Reregistration Branch/SRRD
_____ TB-Insecticide/Rodenticide Support Section
_____ TB-Herbicide/Fungicide/Antimicrobial

I. INTRODUCTION

Boric acid may be formulated as dusts, granules, pellets, wettable powders, impregnated materials, soluble concentrated liquids, and solid and liquid baits. Formulation concentrations may range from 2 to 100 percent active ingredient, and are used as acaracide, algaecides, herbicides, and insecticides.[1]

Borax may be formulated as dusts, granules, pellets, crystals, impregnated materials, emulsifiable concentrates, soluble liquid concentrates, ready-to-use liquids, and solid and liquid baits.

Disodium octaborate tetrahydrate may be formulated as soluble liquid concentrates or soluble solid formulations. Concentrations of registered products range between 8 and 99.4 percent active ingredient, and the products are used as fungicides, herbicides, and insecticides.[2]

Borax, disodium octaborate tetrahydrate, and boric anhydride are treated and evaluated as boric acid. Disodium octaborate tetrahydrate is prepared by spray-drying mixtures of borax and boric acid, or by cooling a solution containing borax and sodium hydroxide. Boric anhydride, in the presence of water, is converted to boric acid.

Sodium metaborate, formulated in granular, pellet, wettable powders, and liquid soluble concentrates, is utilized as a fungicide and herbicide. Sodium metaborate is manufactured from the refinement or concentration of borax decahydrate and borax pentahydrate. In addition to being utilized as a fungicide and herbicide, it is also used in adhesives, detergents, photography and for textile finishing. Sodium metaborate is treated and evaluated as boric acid.

[1] Use information is based on the LUIS report dated 6/23/92 from Phyllis Johnson of BEAD.

[2] Tox information was retrieved from the tox one-liner dated 1/26/93 (acute inhalation (rat)/tox II-0.16 mg/l; primary eye irritation (rabbit)-tox I; acute dermal LD50 (rabbit)/tox III-over 2g/kg.

[3] Data extracted from Sax and Lewis (1989); p. 544.

A. Occupational and Residential Exposure

Boric acid, borax, and disodium octaborate tetrayhydrate are human poisons by ingestion. For boric acid, death has resulted from ingestion of less than 5 grams in infants; adults have died after ingestion of 5 to 20 grams.[3] Technical grade boric acid is classified as a oral toxicity category 3 chemical, and has been classified as an acute inhalation toxicity category 2 material.[2] With respect to skin contact with boric acid, the material is moderately toxic by contact, is a mild skin irritant (considered toxicity category 4 for primary dermal irritation), and is an acute dermal toxicity category 3 chemical.[2] Contact involving concentrated solutions or nearly pure solid formulations of boric acid may also produce primary eye irritation; additionally, dermal irritation may also occur if accidental contact occurs with concentrated formulations of boric acid. Product labels should reflect any potential eye, skin, or inhalation hazard and recommend appropriate protective equipment. The existing toxicological data base on boric acid will support reregistration and no additional exposure data is necessary.

B. Human Risk Assessment

The toxicological data available in published literature are adequate to conduct an assessment of exposure risks posed to humans by boric acid. There is no reason to expect that reasonable pesticidal or biocidal uses may constitute a unreasonable hazard to workers involved in handling or application activities. Exposure concerns must be addressed by appropriate label precautions for eye, dermal, and respiratory protection as necessary. Product labels must consistently reflect any potential exposure hazards by appropriate use of signal words and bear proper protective equipment requirements for handling activities.

[1] Use information is based on the LUIS report dated 6/23/92 from Phyllis Johnson of BEAD.

[2] Tox information was retrieved from the tox one-liner dated 1/26/93 (acute inhalation (rat)/tox II-0.16 mg/l; primary eye irritation (rabbit)-tox I: acute dermal LD50 (rabbit)/tox III-over 2g/kg.

[3] Data extracted from Sax and Lewis (1989); p. 544.

010515

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 11 1993

MEMORANDUM

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

SUBJECT: Boric Acid and Salts. List A Reregistration Case No. 0577., CBRS Input to the Reregistration Eligibility Document (RED). CBRS No. 11072, DP Barcode No. D184992.

FROM: R. B. Perfetti, Ph.D., Chemist
Reregistration Section I
Chemistry Branch II: Reregistration Support
Health Effects Division (H7509C)

THRU: Edward Zager, Chief
Chemistry Branch II: Reregistration Support
Health Effects Division (H7509C)

TO: Jane Smith
Science Analysis and Coordination Branch
Health Effects Division (H7509C)

BACKGROUND

Boric acid and its salts are insecticides, herbicides, and fungicides registered for various non-food, agricultural and food handling establishment applications. Tolerances for residues of boron resulting from the use of boric acid and its salts have been established (40 CFR 180.271) on cottonseed (30 ppm) and citrus fruits (8 ppm, postharvest). A new application of boric acid as a bait for the control of fire ants at agricultural sites has been submitted recently and is under consideration in Registration Division. The Registrant has requested that an exemption from the requirements of a tolerance be granted to cover residues of boron in rac as a result of this use.

The Guidance Document for products containing boric acid and its salts as the active ingredient was issued 11/85. That Document addressed boric acid, borax (sodium borate decahydrate), disodium octaborate tetrahydrate and sodium borate. The present RED will involve these chemicals as well as boric oxide (boric anhydride) in order that this case will be complete.

PRODUCT CHEMISTRY

Registration Division is performing the Product Chemistry review of these chemicals. They should be contacted for their chapter and

input into the Product Chemistry portion of the RED.

RESIDUE CHEMISTRY

As indicated above, Registration Division is considering a request to grant an exemption from the requirements of a tolerance in racs as a result of the use of boric acid as a fire ant control bait (PP# 2F4132). With respect to the reregistration of boric acid and its salts, the HED Metabolism Committee has concluded that it is appropriate to exempt boric acid and its salts from the requirements of a tolerance under Section 408 (racs) and to establish a food additive regulation for boric acid and its salts at food/feed handling sites under Section 409 of the FFD&CA. Therefore there are no Residue Chemistry data requirements remaining for these chemicals. The tolerances for residues of boron under 40 CFR 180.271 should be revoked and the following exemption and food and feed additive regulations should be established under 40 CFR 180, 185 and 186 respectively.

CFR 40 180:

An exemption from the requirements of a tolerance for residues of boric acid, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide and sodium borate is established in raw agricultural commodities when used as insecticides, herbicides or fungicides pre- or postharvest in accordance with good agricultural practices.

CFR 40 185:

A food additive regulation is established permitting the use of boric acid, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide and sodium borate in food handling establishments in accordance with the following prescribed condition:

Application shall be limited solely to careful treatment in food handling establishments where food and food products are held, processed, prepared or served wsuch that contamination of food or food contact surfaces shall be avoided.

CFR 40 186:

A feed additive regulation is established permitting the use of boric acid, borax (sodium borate decahydrate), disodium octaborate tetrahydrate, boric oxide and sodium borate in animal feed handling establishments in accordance with the following prescribed condition:

Application shall be limited solely to careful treatment in animal feed handling establishments where feed and feed products are held, processed. prepared or sold such that contamination of feed or feed

contact surfaces shall be avoided.

The exemption in 40 CFR 180 will also cover the fire ant control use of boric acid in agricultural areas. For the sake of expediency, CBRS has recommended that the tolerances revocations and establishment of the exemption and food/feed additive regulations be performed by Registration Division in conjunction with PP#2F4132.

cc: RBP; SF; RF; Boric Acid Reg. Std. File; Circulation.

10515

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 23 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: PP#2F4132 Boric Acid Exemption Request **Amendment.** Evaluation of Residue Chemistry Requirements. CBRS Nos. 10,907 and 11,160, DP Barcode Nos. D184976 and D186771.

FROM: R. B. Perfetti, Ph.D., Chemist
Reregistration Section I
Chemistry Branch II: Reregistration Support
Health Effects Division (H7509C)

THRU: Edward Zager, Chief
Chemistry Branch II: Reregistration Support
Health Effects Division (H7509C)

TO: R. Forrest, PM# 14
Insecticide/Rodenticide Branch
Registration Division (H7505C)

The following is the list of chemicals to be included in the three exemptions (CFR 40 180, 185, and 186):

boric acid
borax (sodium borate decahydrate)
disodium octaborate tetrahydrate
boric oxide (boric anhydride)
sodium borate
sodium metaborate

Disodium borate is not to be included in this list.

22

cc: RBP; SF; RF; L. Rossi RB/SRRD; Jane Smith (CCB/HED); Boric Acid Reg. Std. File; Petition File; and Circulation.

Esther

010515

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Subject: To Be Presented To The Metabolism Committee At The Meeting Of February 3, 1993: Tolerance Exemptions For Boric Acid and Salts.

To: The Metabolism Committee

From: R. B. Perfetti, Ph.D., Chemist
Reregistration Section I
Chemistry Branch Reregistration Support
Health Effects Division (H-7509C)

Thru: E. Zager, Chief
Chemistry Branch Reregistration Support
Health Effects Division (H7509C)

INTRODUCTION

Boric acid and its salts are herbicides, fungicides and insecticides registered for use on a variety of agricultural and food/feed handling sites. The food/feed handling uses are generally crack and crevice, mop or spot treatments or treatments to manure piles. The agricultural sites include treatment of orchards, cotton, crops in general and a new conditionally registered use for control of fire ants utilizing a boric acid bait. A pesticide petition is pending to extend this fire ant use to agricultural areas.

Tolerances for residues of boron in or on citrus (8 ppm) and cottonseed (30 ppm) as a result of application of boric acid or its salts are listed in 40 CFR §180.271.

Names and empirical formulas for boric acid and the four other compounds involved in this discussion are given on the attached sheet.

The November, 1985 Guidance Document for boric acid and its salts indicated that the Agency would consider revoking the existing tolerances and replace them with an exemption as well as establish

a food additive regulation to cover the food/feed handling uses at such time as the required TOX studies were submitted and reviewed. Also attached please find the tolerance reassessment summary which was published in the Guidance Document cited above.

CBRS has indicated in the past and reiterates at this time that little if any residues of boron above endogenous levels would be expected to result in foods/feeds as a result of any of the uses (Including the fire ant control use.) described above.

Question To The Committee

Is it appropriate to exempt boric acid and its salts for the requirements of a tolerance under Section 408 and to establish a food additive regulation for boric acid and its salts at food handling sites under Section 409 of the FFD&CA at this time?

AIs include boric acid, borax, disodium octaborate tetrahydrate and boric oxide (orphan issue).

Boric acid (aka boracic acid and orthoboric acid) H_3BO_3
CAS # 10043-35-3; EPA chemical # 011001
...white powder, stable in air, density 1.435 (15°), mp is indeterminate since it losses water in stages through metaboric acid (HBO_2), pyroboric acid ($H_2B_4O_7$), and boric oxide (B_2O_3). Soluble in boiling water, alcohol, and glycerol.

Borax, anhydrous (aka sodium borate)
CAS # 001344907; EPA chemical #011102
...white free flowing crystals (hygroscopic) mp 741°C, density 2.367, slightly soluble in cold water.

Borax (sodium borate pentahydrate ($Na_2B_4O_7$ $5H_2O$), sodium borate decahydrate ($Na_2B_4O_7$ $5H_2O$))

Disodium octaborate tetrahydrate ($Na_2B_8O_{13}$ $4H_2O$)
No CAS #; EPA Chemical # 011103

Boric Oxide (aka boric anhydride) B_2O_3
forms boric acid in water.

G. Tolerance Reassessment Summary

Tolerances currently exist for residues of boron resulting from the fungicidal use of boric acid on citrus and on cottonseed (3 ppm in or on citrus; 30 ppm in or on cottonseed) as listed in 40 CFR 180.271. Codex maximum residue limits (MRL's) have not been recommended for boron. Tolerances have not been established in Canada or Mexico for residues of boron in any food or feed commodity. The Agency may replace these tolerances with exemptions pending the outcome of the oncogenicity study conducted by the National Toxicology Program (NTP), and review of the required toxicology studies. The reasons are cited below:

Boron occurs naturally in water, fruits, vegetables, and forage crops, and is an essential nutrient for plants. In pears and strawberries the levels may reach 160 ppm, and in red cabbage occasionally as high as 200 to 300 ppm. The increment of added boron residues resulting from pesticide use of boric acid and the boron-containing salts is insignificant compared to levels of naturally occurring boron in citrus and cottonseed. For example, lemons average 1 ppm incremental boron due to treatment, compared with the 2.5 ppm boron which is endogenous. If no toxicological problems of concern are raised by the required data, the Agency may replace the current tolerances of boron in or on raw agricultural commodities with an exemption from the requirement of a tolerance.

Crack and Crevice Treatment

Boric acid and borax are approved for careful crack and crevice use in food areas of food handling establishments

(38 FR 21685, August 10, 1973). The Agency has determined that this use should continue to be allowed, since residues of boric acid and borax are expected to be toxicologically insignificant when used in accordance with label directions prescribed in PR Notices 73-4 and 74-6. The Agency may establish a food additive regulation for boric acid, borax and disodium octaborate decahydrate in accordance with Parts 193 and 561 of Title 21 of the Code of Federal Regulations pending the results of the required toxicology data. This regulation would state that boric acid borax, and disodium octaborate decaydrate may safely be used in accordance with the following condition:

> Application shall be limited solely to careful treatment in food handling establishments where food and food products are held, processed, prepared or served. Contamination of food or food contact surfaces shall be avoided.

FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

010515

FEB 3 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: The Metabolism Committee Meeting For Boric Acid Held on February 3, 1993.

FROM: R. Perfetti, Ph.D., Chemist
Reregistration Section I
Chemistry Branch II - Reregistration Support
Health Effects Division (H7509C)

THRU: Edward Zager, Chief
Chemistry Branch II - Reregistration Support
Health Effects Division (H7509C)

TO: The Metabolism Committee
Health Effects Division (H7509C)

A. Individuals in Attendance:

1. Metabolism Committee: (Signatures indicate concurrence unless otherwise stated)

G. Ghali
Richard Schmitt
Richard Loranger
Michael Metzger
Alberto Protzel
R. Engler

2. Scientists: (Non-committee members responsible for data presentation; signatures indicate concurrence with conclusion.)

R. Perfetti

M. Morrow

3. Metabolism Committee Members in Absentia: (Committee members who were unable to attend the discussion; signatures indicate concurrence with the overall conclusions of the Committee)

K. Baetcke Roger Gardner for KB

B. Material Reviewed:

The Committee concluded that it is appropriate to exempt boric acid and its salts from the requirements of a tolerance under Section 408 and to establish a food additive regulation for boric acid and its salts at food handling sites under Section 409 of the FFD&CA.

cc: Boric Acid Reregistration File, Boric Acid Subject File, Metabolism Committee File, Circ., RF and RBP,

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

0105

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: RfD/Peer Review Report of Boric Acid/Borax
EPA Chem Code: Boric Acid 011001, Borax 011102
CAS No. Boric Acid 10043-35-3, Borax 1303-96-3
Reg. Group: List A

FROM: George Z. Ghali, Ph.D. G. Ghali 1.15.93
Manager, RfD/Quality Assurance Peer Review
Health Effects Division (H7509C)

TO: James Kariya
Science Analysis Branch
Health Effects Division (H7509)

The Health Effects Division RfD/Peer Review Committee met on January 14, 1993 to evaluate the existing data base in support of Boric Acid/Borax re-registration.

The Committee determined that an RfD should be established on the basis of a no observable effect level of 8.8 mg/kg/day for testicular atrophy observed at 29 mg/kg/day in combined sub-chronic (38 weeks) and chronic (two-years) studies in dogs, using an Uncertainty Factor of 100 to account for inter-species extrapolation and intra-species variability. **On this basis the RfD was calculated to be 0.09 mg/kg/day.** This value is based on the **boron equivalents** of Boric Acid and Borax. It should be emphasized that this value has been verified earlier by the Agency RfD Work Group and is currently on the Agency Integrated Risk Information System (IRIS).

The chemical was classified as a **"Group E"** carcinogen. **No referral to other Committees** was recommended, and there was **no acute toxicity concern.**

Please note that this memorandum is confined to the RfD and the carcinogenicity classification issues and a full RfD/Peer Review Committee report will follow soon.

CC: William Burnam
Kerry Dearfield
Esther Saito
Flora Chow

Micro fiche Caswell

010515

MEMORANDUM

SUBJECT: PP#2F4132 Boric Acid Exemption Request **Amendment.** Evaluation of Residue Chemistry Requirements. CBRS Nos. 10,907 and 11,160, DP Barcode Nos. D184976 and D186771.

FROM: R. B. Perfetti, Ph.D., Chemist
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THRU: Edward Zager, Chief
Chemistry Branch II: Reregistration Support
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TO: R. Forrest, PM# 14
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cc: RBP; SF; RF; L. Rossi RB/SRRD; Boric Acid Reg. Std. File; Petition File; and Circulation.