SCREENING-LEVEL HAZARD CHARACTERIZATION OF HIGH PRODUCTION VOLUME CHEMICALS

SPONSORED CHEMICAL

Triisopropylborate (CAS No. 5419-55-6)
[9th CI Name: Boric acid (H_3BO_3), tris(1-methylethyl) ester]

SUPPORTING CHEMICAL(S)

Isopropanol (CAS No. 67-63-0)
[9th CI Name: 2-Propanol]

Boric acid (CAS No. 10043-35-3)
[9th CI Name: Boric acid (H_3BO_3)]

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INTERIM

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SCREENING-LEVEL HAZARD CHARACTERIZATION OF HIGH PRODUCTION VOLUME CHEMICALS

The High Production Volume (HPV) Challenge Program[1] is a voluntary initiative aimed at developing and making publicly available screening-level health and environmental effects information on chemicals manufactured in or imported into the United States in quantities greater than one million pounds per year. In the Challenge Program, producers and importers of HPV chemicals voluntarily sponsor chemicals; sponsorship entails the identification and initial assessment of the adequacy of existing toxicity data/information, conducting new testing if adequate data do not exist, and making both new and existing data and information available to the public. Each complete data submission contains data on 18 internationally agreed to "SIDS" (Screening Information Data Set[1,2]) endpoints that are screening-level indicators of potential hazards (toxicity) for humans or the environment.

The Environmental Protection Agency's Office of Pollution Prevention and Toxics (OPPT) is evaluating the data submitted in the HPV Challenge Program on approximately 1400 sponsored chemicals. OPPT is using a hazard-based screening process to prioritize review of the submissions. The hazard-based screening process consists of two tiers described below briefly and in more detail on the Hazard Characterization website[3].

Tier 1 is a computerized sorting process whereby key elements of a submitted data set are compared to established criteria to "bin" chemicals/categories for OPPT review. This is an automated process performed on the data as submitted by the sponsor. It does not include evaluation of the quality or completeness of the data.

In Tier 2, a screening-level hazard characterization is developed by EPA that consists of an objective evaluation of the quality and completeness of the data set provided in the Challenge Program submissions. The evaluation is performed according to established EPA guidance[2,4] and is based primarily on hazard data provided by sponsors. EPA may also include additional or updated hazard information of which EPA, sponsors or other parties have become aware. The hazard characterization may also identify data gaps that will become the basis for a subsequent data needs assessment where deemed necessary. Under the HPV Challenge Program, chemicals that have similar chemical structures, properties and biological activities may be grouped together and their data shared across the resulting category. This approach often significantly reduces the need for conducting tests for all endpoints for all category members. As part of Tier 2, evaluation of chemical category rationale and composition and data extrapolation(s) among category members is performed in accord with established EPA[2] and OECD[5] guidance.

The screening-level hazard characterizations that emerge from Tier 2 are important contributors to OPPT's existing chemicals review process. These hazard characterizations are technical documents intended to support subsequent decisions and actions by OPPT. Accordingly, the documents are not written with the goal of informing the general public. However, they do provide a vehicle for public access to a concise assessment of the raw technical data on HPV chemicals and provide information previously not readily available to the public. The public, including sponsors, may offer comments on the hazard characterization documents.

The screening-level hazard characterizations, as the name indicates, do not evaluate the potential risks of a chemical or a chemical category, but will serve as a starting point for such reviews. In 2007, EPA received data on uses of and exposures to high-volume TSCA existing chemicals, submitted in accordance with the requirements of the Inventory Update Reporting (IUR) rule. For the chemicals in the HPV Challenge Program, EPA will review the IUR data to evaluate exposure potential. The resulting exposure information will then be combined with the screening-level hazard characterizations to develop screening-level risk characterizations[4,6]. The screening-level risk characterizations will inform EPA on the need for further work on individual chemicals or categories. Efforts are currently underway to consider how best to utilize these screening-level risk characterizations as part of a risk-based decision-making process on HPV chemicals which applies the results of the successful U.S. High Production Volume Challenge Program and the IUR to support judgments concerning the need, if any, for further action.

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[1] U.S. EPA. High Production Volume (HPV) Challenge Program; http://www.epa.gov/chemrtk/index.htm.
[2] U.S. EPA. HPV Challenge Program – Information Sources; http://www.epa.gov/chemrtk/pubs/general/guidocs.htm.
[3] U.S. EPA. HPV Chemicals Hazard Characterization website (http://www.epa.gov/hpvis/abouthc.html).
[4] U.S. EPA. Risk Assessment Guidelines; http://cfpub.epa.gov/ncea/raf/rafguid.cfm.
[5] OECD. Guidance on the Development and Use of Chemical Categories; http://www.oecd.org/dataoecd/60/47/1947509.pdf.
[6] U.S. EPA. Risk Characterization Program; http://www.epa.gov/osa/spc/2riskchr.htm.

SCREENING-LEVEL HAZARD CHARACTERIZATION
Triisopropylborate (CAS No. 5419-55-6)

Introduction

The sponsor, E.I. du Pont de Nemours & Company, Inc., submitted a Test Plan and Robust Summaries to EPA for triisopropylborate (CAS No. 5419-55-6; 9th CI name: boric acid (H_3BO_3), tris (1-methylethyl)) ester on November 10, 2003. EPA posted the submission on the ChemRTK HPV Challenge website on December 17, 2003 (http://www.epa.gov/oppt/chemrtk/pubs/summaries/triprobt/c14841tc.htm). EPA comments on the original submission were posted to the website on April 26, 2004. Public comments were also received and posted to the website.

This screening level hazard characterization is based primarily on the review of the test plan and robust summaries of studies submitted by the sponsor(s) under the HPV Challenge Program. In preparing the hazard characterization, EPA considered its own comments and public comments on the original submission as well as the sponsor's responses to comments and revisions made to the submission. A summary table of SIDS endpoint data with the structure(s) of the sponsored chemical(s) is included in the appendix. The screening-level hazard characterization for environmental and human health effects is based largely on SIDS endpoints and is described according to established EPA or OECD effect level definitions and hazard assessment practices.

Justification for Supporting Chemical

Triisopropylborate hydrolyzes rapidly to isopropanol (CAS No. 67-63-0) and boric acid (CAS No. 10043-35-3). Isopropanol has been assessed under the OECD High Production Volume Chemicals Programme and the evaluations published by the United Nations Environmental Programme (UNEP) (http://cs3-hq.oecd.org/scripts/hpv/). In it test plan comments, EPA reserved judgment on the adequacy of the aquatic toxicity data submitted for isopropanol and boric acid pending the results of the hydrolytic stability in water test proposed in the test plan. The sponsor has not yet submitted the results of proposed testing. However, triisopropylborate is expected to hydrolyze at a rate such that it is not expected to persist in the environment. Therefore, EPA has used data for the hydrolysis products to address aquatic toxicity of triisopropylborate. Based on the assumption that triisopropylborate hydrolyzes rapidly at the physiological pH, EPA suggested that data for isopropanol and boric acid could be used to address repeated-dose, developmental and reproductive toxicity.

Summary-Conclusion

The log K_{ow} of triisopropylborate indicates that its potential to bioaccumulate is expected to be low. Triisopropylborate is expected to hydrolyze rapidly, indicating that it is not expected to persist in the environment.

The evaluation of available aquatic toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of triisopropylborate, based on toxicity of hydrolysis products isopropanol and boric acid, to aquatic organisms is low.

Acute oral toxicity of triisopropylborate is low. The test substance did not produce dermal irritation or sensitization reactions in guinea pigs or eye irritation in rabbits. No adequate data were provided for the repeated-dose, reproductive and developmental toxicity endpoints. Triisopropylborate was not mutagenic in bacteria. No data on chromosomal aberrations were submitted.

The potential health hazard of triisopropylborate cannot be determined due to data gaps. The genotoxic potential of triisopropylborate cannot be determined due to data gaps.

Repeated-dose, reproductive and developmental toxicity and chromosomal aberrations tests were identified as data gaps under the HPV Challenge Program.

1. Physical-Chemical Properties and Environmental Fate

A summary of physical-chemical and environmental fate data submitted is provided in the Appendix. For the purpose of the screening-level hazard characterization, the review and summary of these data were limited to the octanol-water partition coefficient and biodegradation endpoints as indicators of bioaccumulation and persistence, respectively.

Octanol-Water Partition Coefficient

Log K_{ow}: 0.83 (estimated)

Biodegradation

Triisopropylborate (CAS No. 5419-55-6)
Triisopropylborate is expected to hydrolyze readily to isopropanol and boric acid; therefore, data for the hydrolysis products are used to assess biodegradation.

Isopropanol (CAS No. 67-63-0, supporting chemical)
In a MITI test using unspecified inoculum, 86% of isopropanol had degraded after 14 days.
Isopropanol is readily biodegradable.

Boric acid (CAS No. 10043-35-3, supporting chemical)
Boric acid is not subject to biodegradation.

Conclusion: The log K_{ow} of triisopropylborate indicates that its potential to bioaccumulate is expected to be low. Triisopropylborate is expected to hydrolyze rapidly, indicating that it is not expected to persist in the environment.

2. Environmental Effects – Aquatic Toxicity

Triisopropylborate is expected to hydrolyze rapidly; therefore, data for hydrolysis products are used to assess aquatic toxicity.

Acute Toxicity to Fish

Isopropanol (CAS No. 67-63-0, supporting chemical)
Fathead minnows (*Pimephales promelas*) were exposed to isopropanol at five unspecified nominal concentrations under flow-through conditions for 96 hours. No other details were provided.
96-h LC_{50} = 9640 – 10,400 mg/L

(2) Coho salmon (*Oncorhynchus kisutch*) were exposed to boric acid at five unspecified nominal concentrations under static conditions for 96 hours. Two life stages were compared in one test; swim-up fry (8 – 12 weeks post-hatch) were tested in freshwater and advanced fry (8 – 12 weeks post-hatch) were tested in brackish water. Young Coho salmon tested in freshwater were less tolerant than older fish tested in brackish water.
96-h LC_{50} (freshwater) = 447 mg/L
96-h LC_{50} (brackish water) = 600 mg/L

Acute Toxicity to Aquatic Invertebrates

Isopropanol (CAS No. 67-63-0, supporting chemical)
(1) Mysid shrimp (*Mysidopsis bahia*) were exposed to isopropanol at nominal concentrations of 0, 625, 1250, 2500, 5000, 10,000 or 20,000 mg/L under static conditions for 96 hours. Mortality was 100% at 10,000 and 20,000 mg/L after 96 hours.
96-h LC_{50} = 4050 mg/L

(2) Water fleas (*Daphnia magna*) were exposed to isopropanol at unspecified nominal concentrations under unspecified conditions for 24 hours. No other details were provided.
24-h EC_{50} = 29,906 mg/L

Boric acid (CAS No. 10043-35-3, supporting chemical)
Water fleas (*D. magna*) were exposed to boric acid at nominal concentrations of 0, 54, 91, 151, 252, 420 or 700 mg/L (as boron) under static conditions for 48 hours. At 420 mg/L after 48 hours, 100% mortality was observed.
48-h LC_{50} = 133 mg/L

Toxicity to Aquatic Plants

Isopropanol (CAS No. 67-63-0, supporting chemical)

Green algae (*Pseudokirchneriella subcapitata*) were exposed to isopropanol at nominal concentrations of 0, 3125, 6250, 12,500, 25,000 or 50,000 mg/L under static conditions for 5 days followed by a 9-day recovery period. The 5-day algistatic concentration was 54,294 mg/L. This study was conducted to determine algistatic concentration of isopropanol and is not a standard protocol considered for the purposes of the HPV Challenge Program. However, EPA corroborated the low toxicity of isopropanol to algae with a 96-hour EC_{50} for algae estimated by ECOSAR (993 mg/L).
96-h EC_{50} = 993 mg/L (estimated)

Chronic Toxicity to Fish

Boric acid (CAS No. 10043-35-3, supporting chemical)
(1) Fertilized eggs from rainbow trout (*Salmo gairdneri*) were exposed to boric acid at nominal concentrations of 0.001, 0.01, 0.1, 0.5, 1, 5, 10, 25, 50, 100 or 200 mg/L under flow-through conditions through 4 days post-hatching (total exposure time of 28 days). Measured concentrations reported for nominal concentrations ≥ 0.1 mg/L were 0.11, not tested, 1.0, 4.74, 9.26, 23.5, 45.5, 94.0 or 190.0 mg/L in soft water and 0.1, 0.47, 0.98, 4.85, 9.40, 23.8, 48.3, 100.2 or 186.0 mg/L in hard water, respectively. A high incidence of teratogenesis was observed at boric acid concentrations between 1 and 200 mg/L.
LC_{50} (soft water, hatching) = 150 mg/L
LC_{50} (soft water, 4-d post hatching) = 100 mg/L
LC_{50} (hard water, hatching) = 100 mg/L
LC_{50} (hard water, 4-d post hatching) = 79 mg/L

(2) Fertilized eggs from channel catfish (*Ictalurus punctatus*) were exposed to boric acid at nominal concentrations of 0.01, 0.05, 0.1, 0.5, 0.75, 1, 2.5, 5, 7.5, 10, 25, 50, 75, 100, 150, 200 or 300 mg/L under flow-through conditions through 4 days post-hatching (total exposure time of 9 days). Measured concentrations reported for nominal concentrations ≥ 0.1 mg/L were 0.11, 0.49, not tested, 1.01, not tested, 5.42, 7.43, 10.0, 24.9, 51.4, not tested, 98.3, 151.0, 177.0 or 306.41 mg/L in soft water and not tested, 0.53, 0.77, 0.96, 2.33, 4.9, 7.4, 9.43, 25.1, 48.3, 77.7, not tested, 140, not tested or 302.0 mg/L in hard water.
LC_{50} (soft water, hatching) = 220 mg/L
LC_{50} (soft water, 4-d post hatching) = 155 mg/L
LC_{50} (hard water, hatching) = 102 mg/L
LC_{50} (hard water, 4-d post hatching) = 22 mg/L

(3) Fertilized eggs from goldfish (*Casrassius auratus*) were exposed to boric acid at nominal concentrations of 0.05, 0.1, 0.5, 1, 5, 7.5, 10, 25, 50, 100, 200 or 300 mg/L under flow-through conditions through 4 days post-hatching (total exposure time of 7 days). Measured concentrations reported for nominal concentrations ≥ 0.1 mg/L were 0.1, 0.49, 0.9, 5.2, 7.0, 9.2, 22.5, 48.7, 108, 188.7 or 288 mg/L for soft water and 0.12, 0.47, 0.9, 4.5, 6.8, 8.33, 32.0, 51.30, 96.7, 191 or 290 mg/L for hard water. Teratogenesis occurred only at concentrations ≥ 100 mg/L.
LC_{50} (soft water, hatching) = 178 mg/L
LC_{50} (soft water, 4-d post hatching) = 46 mg/L
LC_{50} (hard water, hatching) = 170 mg/L
LC_{50} (hard water, 4-d post hatching) = 75 mg/L

Chronic Toxicity to Aquatic Invertebrates

Isopropanol (CAS No. 67-63-0, supporting chemical)
Water fleas (*D. magna*) (15/concentration) were exposed to isopropanol at unspecified nominal concentrations under static renewal conditions for 16 days. Measured concentrations from samples taken before and after renewal of the test solutions were 80 – 110% of the nominal concentrations (specific values not reported). Growth was measured as the difference in daphnid length from the beginning to the end of the experiment 16 days later.
16-day NOEC (growth) = 0.63 mg/L
16-day EC_{50} (reproduction) = 0.89mg/L

Boric acid (CAS No. 10043-35-3, supporting chemical)
(1) Water fleas (*D. magna*) were exposed to boric acid at nominal concentrations 0, 7, 14, 28, 56 or 105 mg/L (as boron) under static renewal conditions for 21 days. Measured concentrations were 0, 6.4, 13.6, 29.4 or 59.3 mg/L, respectively. Mortality during the 21-day test was 0, 0, 10, 5, 40 and 100% at 0, 7, 14, 28, 56 and 105 mg/L concentration levels, respectively. The 21-day MATC, based on total young/replicate, mean brood size, and mean size, was estimated to be between 6.4 and 13.6 mg/L as boron.
21-d LC_{50} = 52.2 mg/L

(2) Water fleas (*Ceriodaphnia dubia*) were exposed to boric acid at nominal concentrations of 0, 6.25, 12.5, 25, 50 or 100 mg/L under static renewal conditions for 8 days. Measured concentrations were not reported. The number of surviving adults and offspring were counted and signs of toxicity were recorded (immobilization, loss of equilibrium, erratic swimming, loss of reflex, excitability, discoloration or changes in behavior). The percentage of surviving adults was not affected by treatment and signs of toxicity were not observed. The mean number of young per surviving adult was lower at concentrations ≥ 25 mg/L.
8-d LOEC = 25 mg/L
8-d NOEC = 12.5 mg/L
MATC = 17.7 mg/L
8-d EC_{50} > 100 mg/L

(3) Water fleas (*D. magna*) were exposed to boric acid at unspecified nominal concentrations under static renewal conditions for 14 days. Measured concentrations were not reported. Survival, reproduction and growth were reduced at 28 mg/L. No other toxic effects were observed. The reported MATC was between 13.8 and 28.1 mg/L and between 14.3 and 28.9 mg/L for two separate tests (geometric mean values of 19.7 and 20.3 mg/L, respectively).
14-d NOEL ~ 14 mg/L

Conclusion: The evaluation of available aquatic toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of triisopropylborate, based on toxicity of hydrolysis products isopropanol and boric acid, to aquatic organisms is low.

3. Human Health Effects

Acute Oral Toxicity

Triisopropylborate (CAS No. 5419-55-6)
ChR-CD rats (10 males/dose) were administered triisopropylborate via gavage at 0, 7000, 7500, 8000 or 9000 mg/kg-bw and observed for 14 days. Mortality was reported at 7500, 8000 and 9000 mg/kg-bw. All mortality occurred 1 – 3 days after dosing. Clinical signs of toxicity observed at doses of ≥ 7000 mg/kg-bw included chromodacryorrhea, diarrhea, piloerection and unkempt fur.
LD_{50} = 8126 mg/kg-bw

Repeated-Dose Toxicity

Triisopropylborate (CAS No. 5419-55-6)
No data were provided for this endpoint; the sponsor proposed testing. In comments on the original test plan, EPA (April 19, 2004) stated that if hydrolysis is sufficiently rapid, then data on the hydrolysis products (isopropanol and boric acid) could be used to address the endpoint.

Reproductive/Developmental Toxicity

Triisopropylborate (CAS No. 5419-55-6)
No data were provided for this endpoint; the sponsor proposed testing. In comments on the original test plan, EPA (April 19, 2004) stated that if hydrolysis is sufficiently rapid, then data on the hydrolysis products (isopropanol and boric acid) could be used to address the endpoint.

Genetic Toxicity – Gene Mutation

In vitro
Triisopropylborate (CAS No. 5419-55-6)
Salmonella typhimurium strains TA98, TA100, TA1535, TA1537 and TA1538 were exposed to triisopropylborate at 0, 1000, 3000, 5000, 7000, and 10,000 mg/plate in the presence and absence of metabolic activation. Cytotoxicity was not seen at the highest tested concentration. Triisopropylborate did not induce mutagenic response either in the presence or absence of metabolic activation. Positive and negative controls were included in the assay responded appropriately.
Triisopropylborate was not mutagenic in this assay.

Genetic Toxicity – Chromosomal Aberrations

In vitro
Triisopropylborate (CAS No. 5419-55-6)
No data were provided for this endpoint; the sponsor proposed testing.

Additional Information

Skin Irritation

Triisopropylborate (CAS No. 5419-55-6)
Albino guinea pigs (10 males/dose) were administered approximately 0.05 mL of triisopropylborate (purity not provided) dermally on shaved, intact skin at 25 or 100%. The test substance did not produce primary irritation in any guinea pig tested.
Triisopropylborate was not irritating to guinea pig skin in this study.

Eye Irritation

Triisopropylborate (CAS No. 5419-55-6)
Rabbits (2, strain and sex not stated) were administered 0.1 mL of undiluted triisopropylborate (purity not provided) into the right conjunctival sac of the eye. After 20 seconds, treated eye of one rabbit was washed with water for 1 minute and the treated eye of the other rabbit was not washed. Observations were made at 1 and 4 hours, and on days 1, 2 and 3 following instillation. The test substance produced no corneal, iritic or conjunctival effects in the rabbit eye. Both treated eyes were normal after 1 hour.
Triisopropylborate was not irritating to rabbit eyes in this study.

Skin Sensitization

Triisopropylborate (CAS No. 5419-55-6)
Guinea pigs (10 males/dose) were administered triisopropylborate (purity not provided) as a series of four sacral intradermal injections, one each week over a 3-week period, which consisted of 0.1 mL of a 1% solution in saline. After a 2-week rest period, the animals were challenged by applying 0.05 mL of triisopropylborate as originally received and as a 25% solution (v/v) in water on the shoulder.
Triisopropylborate was not a skin sensitizer in this study.

Conclusion: Acute oral toxicity of triisopropylborate is low. The test substance did not produce dermal irritation or sensitization reactions in guinea pigs or eye irritation in rabbits. No adequate data were provided for the repeated-dose, reproductive and developmental toxicity endpoints. Triisopropylborate was not mutagenic in bacteria. No data on chromosomal aberrations were submitted.

The potential health hazard of triisopropylborate cannot be determined due to data gaps. The genotoxic potential of triisopropylborate cannot be determined due to data gaps.

4. Hazard Characterization

The log K_{ow} of triisopropylborate indicates that its potential to bioaccumulate is expected to be low. Triisopropylborate is expected to hydrolyze rapidly, indicating that it is not expected to persist in the environment.

The evaluation of available aquatic toxicity data for fish, aquatic invertebrates and aquatic plants indicates that the potential acute hazard of triisopropylborate, based on toxicity of hydrolysis products isopropanol and boric acid, to aquatic organisms is low.

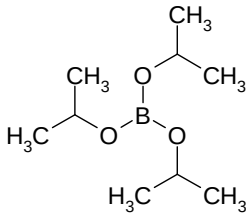
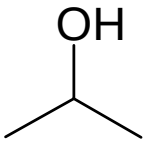
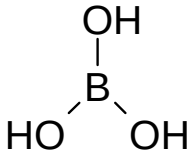
Acute oral toxicity of triisopropylborate is low. The test substance did not produce dermal irritation or sensitization reactions in guinea pigs or eye irritation in rabbits. No adequate data were provided for the repeated-dose, reproductive and developmental toxicity endpoints. Triisopropylborate was not mutagenic in bacteria. No data on chromosomal aberrations were submitted.

The potential health hazard of triisopropylborate cannot be determined due to data gaps. The genotoxic potential of triisopropylborate cannot be determined due to data gaps.

5. Data Gaps

Repeated-dose, reproductive and developmental toxicity and chromosomal aberrations tests were identified as data gaps under the HPV Challenge Program.

APPENDIX

Summary Table of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program			
Endpoints	**SPONSORED CHEMICAL Triisopropylborate (5419-55-6)**	**SUPPORTING CHEMICAL Isopropanol (67-63-0)**	**SUPPORTING CHEMICAL Boric acid (10043-35-3)**
Structure			
Summary of Physical-Chemical Properties and Environmental Fate Data			
Melting Point (°C)	-59	–	–
Boiling Point (°C)	140	–	–
Vapor Pressure (hPa at 25°C)	133	–	–
Log K_{ow}	0.83 (estimated)	0.28 (estimated)	-0.22 (estimated)
Water Solubility (mg/L at 25°C)	– Testing proposed	–**	–**
Direct Photodegradation	–	Not susceptible to direct photolysis	Not susceptible to direct photolysis
Indirect (OH^-) Photodegradation Half-life ($t_{1/2}$)	10.55 h (estimated)	–**	–**
Stability in Water (Hydrolysis) ($t_{1/2}$)	Unstable in water	–**	–**
Fugacity (Level III Model) **Air (%)** **Water (%)** **Soil (%)** **Sediment (%)**	 7.93 61.5 30.5 0.12	–**	–**
Biodegradation at 28 days (%)		86 (after 14 days)	Not subject to biodegradation
Summary of Environmental Effects – Aquatic Toxicity Data			
Fish 96-h LC_{50} (mg/L)	–	9640 – 10,400	447
Aquatic Invertebrates 48-h EC_{50} (mg/L)	–	4050 (96-h)	133
Aquatic Plants 72-h EC_{50} (mg/L) (growth) (biomass)	–	54,294 (5-d algistatic) **993 (estimate)**	–
Chronic Toxicity to Fish 21-day EC_{50} (mg/L)	–*	–	22 (9 d)
Chronic Toxicity to Invertebrates 21-day EC_{50} (mg/L)	–	0.89 (16-d, reproduction)	52.2

Summary Table of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program			
Endpoints	**SPONSORED CHEMICAL Triisopropylborate (5419-55-6)**	**SUPPORTING CHEMICAL Isopropanol (67-63-0)**	**SUPPORTING CHEMICAL Boric acid (10043-35-3)**
Summary of Human Health Data			
Acute Oral Toxicity LD_{50} (mg/kg-bw)	8126	–**	–**
Repeated-Dose Toxicity NOAEL/LOAEL (mg/kg-bw/day)	– Testing proposed.	–	–
Reproductive/Developmental Toxicity NOAEL/LOAEL (mg/kg-bw/day)	– Testing proposed.	–	–
Genetic Toxicity – Gene Mutation *In vitro*	Negative	–**	–**
Genetic Toxicity – Chromosomal Aberrations *In vitro*	– Testing proposed.	–	–
Additional Information – **Skin Irritation** **Eye Irritation** **Skin Sensitization**	 Not irritating Not irritating Negative	 – – –	 – – –

– indicates endpoint was not addressed for this chemical; * indicates endpoint is not included in the base data set under the HPV Challenge Program; ** indicates endpoint is not necessary for supporting chemical.