

US EPA ARCHIVE DOCUMENT



R.E.D. FACTS

Boric Acid

Pesticide Reregistration

All pesticides sold or used in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing undue hazards to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for boric acid and its sodium salts, which includes the seven active ingredients boric acid, sodium tetraborate decahydrate (borax decahydrate), sodium tetraborate pentahydrate (borax pentahydrate), sodium tetraborate (anhydrous borax), disodium octaborate tetrahydrate, disodium octaborate (anhydrous), and sodium metaborate.

Use Profile

Pesticide products containing boric acid and its sodium salts are registered in the U.S. for use as insecticides, fungicides and herbicides. As insecticides, some act as stomach poisons in ants, cockroaches, silverfish and termites, while others abrade the exoskeletons of insects. As herbicides, some cause desiccation or interrupt photosynthesis in plants, while others suppress algae in swimming pools and sewage systems. As fungicides, several are wood preservatives which control decay-producing fungi in lumber and timber products.

Boric acid and its sodium salts are used on several agricultural and many non-agricultural sites including residential, commercial, medical, veterinary, industrial, forestry and food/feed handling areas. They are marketed in many formulations including liquids, soluble and emulsifiable

The quantities of boric acid and its sodium salts applied as pesticides are modest compared to amounts used for other, non-pesticidal purposes. Further, boric acid, borax and boron-containing salts are ubiquitous in the environment. Boron occurs naturally in water, fruits, vegetables and forage crops, and is an essential nutrient for plants as well as an essential element for many organisms.

Regulatory History

Boric acid was first registered as a pesticide in the U.S. in 1948. Currently, 189 pesticide products are registered which contain boric acid or one of its sodium salts as an active ingredient.

In February 1986, EPA issued two related documents dated November 1985, the "Boric Acid and Boron Containing Salts Registration Standard" (NTIS #PB87-101903), and a General Registration Standard entitled, "Guidance for the Registration and Reregistration of End-Use Pesticide Products Containing the Insecticidal Uses of Boric Acid." About 43 boric acid products, used indoors for cockroach and silverfish control, were reregistered under the General Registration Standard. Producers of those products need only submit current labels and Confidential Statements of Formula for the products to remain reregistered.

EPA has determined that, because they are of low toxicity and occur naturally, boric acid and its sodium salts should be exempted from the requirement of a tolerance (maximum residue limit) for all raw agricultural commodities. The Agency has established such exemptions and removed the previously established tolerances for residues of boric acid and certain derivatives in cotton seed and citrus fruits (please see 58 FR 44282); two other derivatives will be similarly exempted soon. Because boric acid is registered for crack and crevice use in food and feed handling establishments, the potential exists, though unlikely, for residues to occur in food. EPA therefore is establishing food and feed additive tolerances for boric acid and its sodium salts.

In developing this RED, the active ingredient sodium metaborate was added from another reregistration case. Also, this RED originally was to have included boric oxide as an active ingredient. However, since no registered products currently contain that active ingredient, it is not included.

Human Health Assessment

Human Toxicity

The toxicity of boric acid and its six sodium salts are expected to be similar. Information on the effects of these boron-related compounds in humans, supplemented by data from laboratory animal studies, were used by EPA to evaluate their toxicity.

Boric acid generally is of moderate acute toxicity, and has been placed in Toxicity Category III for most acute effects including oral and

dermal toxicity, and eye and skin irritation. Sodium tetraborate (anhydrous borax) products have been placed in Toxicity Category I indicating a high degree of acute toxicity for eye irritation effects.

A subchronic borax feeding study using dogs resulted in blood and metabolism disorders as well as effects to the testes, endocrine system, brain weight, and size ratios among various organs and glands.

In chronic oncogenicity studies using mice, rats and beagle dogs, boric acid and borax were found not to be carcinogenic; however, testicular effects and decreases in body weight resulted at high dose levels. EPA has classified boric acid as a "Group E" carcinogen, indicating that it shows "evidence of noncarcinogenicity" for humans.

In reproductive and developmental toxicity studies using rats, mice and rabbits, maternal liver and kidney effects and decreased weight gain as well as decreased fetal body weights were observed. In two studies, at the highest dose levels, no litters were produced. Prenatal mortality occurred at the highest dose levels in the rabbit study. Boric acid does not cause mutagenicity.

Dietary Exposure

Tolerances were established for residues of boron resulting from the use of boric acid and its sodium salts on cottonseed (30 ppm) and citrus fruits, postharvest (8 ppm) (please see 40 CFR 180.271.) EPA's review of new toxicology studies raised no concerns. Further, boron occurs naturally in fruits and vegetables at much higher levels (200 to 300 ppm in red cabbage). Therefore, the Agency is exempting these compounds from the requirement of a tolerance and revoking the existing tolerances. EPA is establishing food/feed additive regulations to cover the use of boric acid salts for crack and crevice treatments at food and feed handling establishments (please see 58 FR 44282, and a soon-to-be-issued Federal Register notice).

Occupational and Residential Exposure

Boric acid and its sodium salts are applied both indoors and outdoors, in residential, commercial, medical, veterinary and industrial areas, in food handling establishments, in swimming pools and sewage systems, in lakes, ponds and reservoirs, and in treating wood. Depending on the use site, boric acid may be applied using aircraft, a spreader, airblower, power duster, squeeze applicator, aerosol can or knife/spatula. The potential for dermal and inhalation exposure exists among applicators and people reentering treated areas.

As a prudent measure to reduce any potential risks to handlers, EPA is requiring that all products containing boric acid and its sodium salts (except products for residential use) bear personal protective equipment (PPE) requirements. These must consist of at least the use of a long-sleeved shirt, long pants, shoes, socks and chemical-resistant gloves.

If end-use product labeling already bears PPE requirements that are more protective than these items, the more protective requirements must be retained.

The Worker Protection Standard (WPS) for Agricultural Pesticides (40 CFR 156 and 170) established an interim restricted-entry interval (REI) of 12 hours for boric acid and its sodium salts. EPA is retaining this REI for uses within the scope of the WPS, as a prudent risk mitigation measure to protect workers. During the REI, workers may enter treated areas only under the few narrow exceptions allowed in the WPS.

Human Risk Assessment

Dietary risk is not a concern with boric acid and its sodium salts since no direct food uses are registered and tolerances have been revoked. Applicators and others in treatment areas may be exposed to boric acid and its sodium salts during or after application. However, there is no reasonable expectation that these pesticide uses may constitute a hazard or risk to people involved in, or near to, handling or application activities. Proper care and adhering to label directions and precautions should reduce exposure and any associated risk.

Environmental Assessment

Environmental Fate

No new environmental fate data are required for reregistration of boric acid and its sodium salts because only relatively small amounts of boric acid are used as pesticides, and significant amounts of boron are present naturally in soil and water. Surface soil contains relatively high levels of boron. Boron salts occur naturally in low concentrations in most unpolluted waterways (both surface water and seawater). In some areas, boron occurs in surface waters in concentrations that have been shown to be toxic to commercially important plants.

Ecological Effects

Available studies indicate that technical boric acid is practically nontoxic to birds, fish and aquatic invertebrates, and relatively nontoxic to beneficial insects. The boric acid rights-of-way herbicide use pattern poses a potential risk to aquatic invertebrates, including some that are endangered. However, risk probably is mitigated by the practice of limiting treatment to small strips of land, thereby limiting the amount of contaminated runoff into adjacent aquatic environments.

Boric acid's noncrop herbicidal use also may harm endangered or threatened plants. EPA is requiring three phytotoxicity studies (seed germination, seedling emergence and vegetative vigor) to assess these risks. EPA is deferring endangered species labeling requirements until the Agency publishes the Endangered Species Protection Program plan and guidance for registrants. Labeling will refer users to county bulletins for area-specific use limitations.

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