United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508W) | EPA 738-F-99-019 November 1999

R.E.D. FACTS

O-Ethyl S-phenyl ethylphosphonodithiolate (Fonofos)

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA. Registration decisions are based on scientific studies showing that the pesticide 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 before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews studies from pesticide producers that are conducted to elucidate the human health and environmental effects of each pesticide. To implement provisions of the Food Quality Protection Act of 1996 (FQPA), EPA considers (a) the issues specific to infants and children, (b) the aggregate exposure of the public to residues of the pesticide from all sources, and (c) the cumulative effects of the pesticide and other compounds with a common mechanism of toxicity. The Agency develops mitigation measures or regulatory controls needed to reduce each pesticide's risks. EPA reregisters pesticides that meet the safety standard of FQPA and can be used without posing unreasonable risks to human health or the environment.

Fonofos (O-ethyl S-phenyl ethylphosphonodithiolate; case number 0105), an organophophate (OP) pesticide, was scheduled for a reregistration decision in 1999. However, the registrants that support fonofos requested voluntary cancellation, as proposed in the Federal Register on March 18, 1998, and announced as a final action on May 6, 1998. The public, given 180 days to comment on these impending voluntary cancellations, provided no objection. Registrants have been granted a one year existing stocks provision, as detailed in the final Federal Register cancellation notice.

The following information is based on an abbreviated review of the existing information on fonofos. As a result of the voluntary cancellation, a thorough review for reregistration was not completed.

Use Profile

Fonofos (O-ethyl- S-phenyl ethylphosphonodithioate) is a soil insecticide used to control pests such as corn rootworms, cutworms, symphylans (garden centipedes), wireworms. Agricultural crop uses include asparagus, beans, beets, corn, onions, peppers, tomatoes, cole crops, sweet potatoes, peanuts, peas, peppermint, plantains, sorghum, soybeans, spearmint, strawberries, sugarcane, and sugar beets, white (Irish) potatoes, and tobacco. Most of the product has been used on field corn in recent years. Fonofos is applied mainly with ground equipment. Aerial applications are made to hybrid seed corn. Application rates vary from 1-4 lbs./acre.

Regulatory History

Fonofos, the common name for O-ethyl S-phenyl ethylphosphonodithiolate, was developed and initially marketed by Stauffer Chemical Company in 1967 under the trade name Dyfonate (TM); it was most recently licensed to Zeneca Ag Products. In March 1984, EPA issued a Registration Standard on fonofos and identified additional data required to support its reregistration. On December 18, 1997, Zeneca Ag Products requested the voluntary cancellation of fonofos registrations.

Human Health Assessment

Toxicity

Although the human health assessment was not completed for fonofos, some preliminary conclusions were reached during the toxicology review. Fonofos is classified as a Group E carcinogen (that is, there was no evidence of carcinogenic potential in long-term studies in rats and mice). Acute oral toxicity studies in male and female rats indicated that oral exposure to fonofos, an OP pesticide, induces acethylcholinesterase inhibition. Although the database is not adequate to support the reregistration of fonofos, all of the acute studies were acceptable for regulatory purposes. Toxicity categories, which are classified as 1 (most toxic) through 4 (least toxic), ranged from Category I for acute oral, dermal and inhalation toxicity, Category III for acute eye irritation, and Category IV for acute dermal irritation.

Dietary Exposure

It was recommended that the chronic reference dose (RfD) for fonofos be established at 0.002 mg per kilogram of body weight per day (mg/kg/day). This value was based on the no observed adverse effect level (NOAEL) of 0.2 mg/kg/day in a one-year oral study in beagle dogs, in which the endpoint was acetylcholinesterase inhibition; additionally, an uncertainty factor of 100 was applied. The chemical was canceled before this RfD was officially confirmed by the Agency or a determination was made as to the applicability of a Food Quality Protection Act (FQPA) safety factor. The acute dietary endpoint, which was based on a developmental rabbit study, resulted in a NOAEL of 2.0 mg/kg/day. An acute RfD was not established before the reregistration process was canceled.

Occupational and Residential Exposure

For assessing the short-term occupational or residential risk (1-7 days), the Agency obtained a NOAEL of 1.5 mg/kg/day from the 98-day dog study. For the intermediate term occupational or residential exposure (1 week to several months) risk, a NOAEL of 0.75 mg/kg/day was obtained using the 90-day neurotoxicity study in rat. For the chronic occupational or residential exposure study, the Agency obtained a NOAEL of 0.2 mg/kg/day from the chronic feeding study in the dog.

Environmental Assessment

Fonofos is very highly toxic to highly toxic to most birds and freshwater and salt water organisms. Simulated avian field studies indicate granular treatments of fonofos may result in some mortality, as well as brain acetylcholinesterase inhibition in birds.

In general, fonofos does not appear to dissipate rapidly in the environment. Fonofos is stable to hydrolysis (half-lives of 128-435 days) and biodegrades slowly in aerobic and anaerobic soil (half-lives of 121-133 days). Fonofos is moderately mobile to essentially immobile in soil (Freundlich K_{ads} of 3-13 ml/g). The degradates fonofos oxon and methylphenyl sulfone were very mobile to moderately mobile in soil (Freundlich K_{ads} of 0.66-3.3 ml/g and 0.05-66 ml/g, respectively). In the laboratory volatility study, approximately 35% of the fonofos that was applied to soil volatilized after 24 hours; most of the remaining fonofos was extractable from soil. Fonofos does not accumulate significantly in fish, with bioaccumulation factors of 300 for whole fish, 140 for the edible tissues, and 90% depuration within 14 days. The Agency had initially recommended that a small scale prospective ground water monitoring study be conducted for fonofos, but later determined that a ground water advisory would be adequate.

Additional Data Required

There are several outstanding data requirements for fonofos. At a minimum, a 21-day dermal toxicity study in the rat, a multigeneration reproduction study, and a developmental neurotoxicity study would be required if this chemical were to continue with reregistration.

Conclusion

- All remaining fonofos products were canceled effective November 2, 1998;
- Registrants' sale and distribution of existing stocks was permitted until November 2, 1999;
- Existing stocks already in the hands of dealers and users can be distributed, sold, and used until these stocks are exhausted.

For More Information

For more information about EPA's pesticide reregistration program or the pesticide O-ethyl S-phenyl ethylphosphonodithioate, please contact Patricia Moe at the Special Review and Reregistration Division (7508C), OPPTS, U.S. EPA, Washington, DC 20460; telephone 703-308-8011.

Electronic copies of this fact sheet and other REDs are available on the Internet. Please see http://www.epa.gov/REDs.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 9:30 am and 7:30 pm Eastern Standard Time, seven days a week. The NPTN website is http://www.ace.orst.edu/info/nptn.