United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508W) | EPA-738-F-96-009 May 1996

R.E.D. FACTS

Furanone

Pesticide Reregistration

All pesticides sold or distributed 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 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 a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency develops any mitigation measures or regulatory controls needed to effectively reduce each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA explains the basis for its decision in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for reregistration case 3138, furanone.

Use Profile

Dihydro-5-pentyl-2(3H)-furanone and dihydro-5-heptyl-2(3H)-furanone (also known as gamma-nonalactone and gamma-undeccalactone, respectively) are also referred to by the common name furanone. Products containing furanones are registered for use as insecticides, insect and mammal repellents, and mosquito larvicides.

Pesticide products containing furanones may be used used as a dog and cat repellent; fly, cockroach and ant killer; insect repellent, insect repellent strip, and insect repellent tablecloth; and mosquito larvicide. Formulations include liquid ready-to-use solutions, emulsifiable concentrates, granulars and impregnated material.

Furanone is applied by the use of impregnated table cloths, premoistened applicator puffs, aersol sprayers, non-aerosol hand pump sprayer, knapsack sprayers, and granules which may be applied by hand.

Use practice limitations include a label statement prohibiting application directly to treated, finished drinking water reservoirs or drinking water receptacles. Users also must avoid application to man-made surfaces sensitive to mineral oils.

Regulatory History

Furanone was first registered as a pesticide in the U.S. in 1983 for use as a cat repellent. Currently, there are seven furanone products, which are registered as mixtures with the active ingredient, limonene (Case 3083). The Agency issued a Reregistered Eligibility Decision (RED) on limonene in September 1994. One of the seven products also contains a third active ingredient, Aliphatic Petroleum Hydrocarbons.

Human Health Assessment

Toxicity

Acute oral, dermal and inhalation toxicity studies indicate low acute toxicity (Category IV). Likewise, eye and dermal irritation studies also classified the formulated product in Category IV. The product is not a skin sensitizer. Data from the open literature on each of the two compounds considered the furanones to be of low toxicity.

An open literature study provided useful information in evaluating the potential hazard of the furanones, indicating that compounds making up the furanones did not demonstrate a hazard following subchronic and chronic oral administration.

The Agency usually would require a 90-day dermal toxicity study for a product that may result in prolonged human dermal exposure through repeated skin applications. The Agency has decided to waive this requirement for the furanones based on a combination of the following: low exposure to furanones in the product; comparable concentrations of tanols in this product to those already used in cosmetic products (lotions, detergents, perfumes); a naturally occurring compound; and absence of toxicity in the toxicology studies (notwithstanding limited data).

Dietary Exposure

Currently registered pesticide products containing furanones have no food uses so dietary exposure is not anticipated. Although it is not a chemical that is Generally Recognized as Safe (GRAS) by the Food and Drug Administration (FDA), furanone is approved by FDA as a food additive, and exposures to low concentrations are considered safe.

Occupational and Residential Exposure

For the following reasons, the Agency has no concerns regarding occupational or residential exposure to the furanones: (1) all acute studies for the furanones indicate that they have low acute toxicity (category IV); and (2) the furanones are only in pesticide products that also contain limonene, and the percentage of furanones in these formulations is very low--less than 1%.

Human Risk Assessment

The Agency does not anticipate occupational or residential risks of concern from exposure to the furanones. However, as the furanones are only in pesticide products that also contain limonene, the following concerns from the limonene RED apply to the furanones.

Human exposure to furanones/limonene may occur during application of animal repellent granules or insect spray, or use of impregnated tablecloths. Toxicological concerns for humans from exposure to limonene include dermal irritation and sensitization. Systemic toxicity is not anticipated to occur at doses below the threshold for dermal irritation. Ocular irritation also may occur if products are accidently placed in the eye and not washed away.

The tablecloth insect repellent product containing limonene was exempted from tolerance requirements and is not believed to cause exposure through food. Exposure to limonene would be discontinued by most users if dermal irritation occurred, and exposure therefore is believed to be self-limiting. Product labeling required by the limonene RED is intended to prevent risks of potential skin and eye irritation to users.

Environmental Assessment

Environmental Fate

Environmental fate data are not required to support the low-volume, outdoor, residential uses of the furanones. However, environmental fate data generally are required to support aquatic nonfood uses such as the mosquito larvicide use. A quantitative environmental fate assessment cannot be made for the furanones at this time because no environmental fate data have been submitted for review. The furanones are classified as lactones, and some open literature data are available on physiochemical properties of lactones and their possible effect on the environment. The reported data indicate lactones may not be stable in alkaline environments.

Ecological Effects

Acute toxicity data indicate that the formulated product is practically non-toxic on an acute oral and subacute dietary basis to birds, mammals, and freshwater fish. The product is slightly toxic to freshwater invertebrates.

Ecological Effects Risk Assessment

The furanones, when used as mosquito larvicides, are applied directly to water. The public health larvicidal use of furanones applied at 4.10 lbs/acre (A) to 6 inches of water results in exceedances of the level of concern (LOC) for freshwater invertebrates. The LOC for endangered species is exceeded when the product is applied at 1.64 lbs/A in water 6 inches deep or less, or when it is applied at 4.10 lbs/A in water 1 foot deep or less.

This assessment is based on testing done on a formulated product and tells little about the actual toxicity of the furanones as active ingredients. Chronic invertebrate toxicity data and basic environmental fata data would improve the Agency's understanding and assessment of the potential risk posed by the use of the furanones in mosquito larvicides.

The volume of products containing furanones that are used annually as mosquito larvicides is low, and the percentage of furanone in the products is also low. The low volume and low percent of furanone support the conclusion that widespread adverse impacts are not likely to result from the mosquito larvicide use if continued at the amounts currently produced and used.

It should be recognized that the risk posed to aquatic invertebrates is common to most, if not all, products registered for mosquito larvicide use. It is the nature of these products to be harmful to aquatic invertebrates because the target species is itself an aquatic invertebrate. The mosquito larvicide product containing furanones would cause less harm to aquatic ecosystems than many other products because its risk is limited to aquatic invertebrates, whereas others pose a risk to fish and birds, as well.

Risk Mitigation

To lessen the risks to aquatic invertebrates posed by furanones used as mosquito larvicides, EPA is imposing a production limit on furanone for use in mosquito larvicides of 150 gallons per year. Should the volume produced and used and/or the percent of furanone in the product significantly increase, the Agency would impose the following additional data requirements to understand and assess potential risks:

161-1, Hydrolysis
161-2, Photodegradation in Water
162-3, Anaerobic Aquatic Metabolism
162-4, Aerobic Aquatic Metabolism
163-1, Leaching/Adsorption-Desorption
164-2, Aquatic Field Dissipation

Additional Data Required

EPA is requiring the following additional generic study for furanone to confirm its regulatory assessments and conclusions:

72-4(b), Life Cycle Invertebrate

The Agency also is requiring product-specific data including product chemistry and acute toxicity studies, revised Confidential Statements of Formula (CSFs), and revised labeling for reregistration.

Product Labeling Changes Required

All furanone end-use products must comply with EPA's current pesticide product labeling requirements and with the following. For a comprehensive list of labeling requirements, please see the furanone RED document.

The manufacturing use product (MP) labeling must be revised to comply will all current EPA regulations, PR Notices and applicable policies. The MP labeling must bear the following statement under Direction For Use:

> "Only for formulation into an [fill blank with Insecticide, Herbicide or the applicable term which describes the type of pesticide use(s)] for the following use(s)[fill blank only with those uses that are being supported by the MP registrant."

An MP registrant may, at his/her discretion, add one of the following statements to an MP label under

> "Directions for Use" to permit the reformulation of the product for a specific use or all additional uses supported by a formulation or user group:

(a) "This product may be used to formulate products for specific use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)."

(b) "This product may be used to formulate products for any additional use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)."

End-use products without the mosquito larvicide use must bear the following statement:

> "Do not apply directly to water, or to areas where surface water is present or to interidal areas below the mean high-water mark. Do not contaminate water when disposing of equipment washwater or rinsate."

Regulatory Conclusion

The use of currently registered products containing furanone in accordance with approved labeling will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all furanone products for all uses are eligible for reregistration.

These products will be reregistered once the required product-specific data, revised Confidential Statements of Formula, and revised labeling are received and accepted by EPA. Products that contain active ingredients in

addition to furanone and limonene will be reregistered when their other active ingredients also are eligible for reregistration.

Environmental fate and chronic invertebrate toxicity data are not available and are needed to complete the assessment of risks posed by the use of the furanones as mosquito larvicides. However, EPA is not requiring additional data as long as the production of furanone for this use does not exceed 150 gallons per year. Should the volume produced and used and/or the percent of active ingredient in the product significantly increase, the Agency may impose additional data requirements in order to develop a more complete data base regarding these uses of furanone.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for furanone during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Electronic copies of the RED and this fact sheet can be downloaded from the Pesticide Special Review and Reregistration Information System at 703-308-7224. They also are available on the Internet on EPA's gopher server, *GOPHER.EPA.GOV*, or using ftp on *FTP.EPA.GOV*, or using WWW (World Wide Web) on *WWW.EPA.GOV*.

Printed copies of the RED and fact sheet can be obtained from EPA's National Center for Environmental Publications and Information (EPA/NCEPI), PO Box 42419, Cincinnati, OH 45242-0419, telephone 513-489-8190, fax 513-489-8695.

Following the comment period, the furanone RED document also will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about EPA's pesticide reregistration program, the furanone RED, or reregistration of individual products containing furanone, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

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, Monday through Friday.