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Erin M. Crotty
Commissioner

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Ms. Sheryl Kay Reilly
Chief, Biochemical Pesticides Branch
Biopesticides and Pollution Prevention Division (7511C)
USEPA Headquarters
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Ms Reilly:

The purpose of this letter is to petition the United States Environmental Protection Agency (USEPA) to reconsider the requirement for a full fish life cycle toxicity test for methoprene; or alternatively to consider requiring a modified early life stage (ELS) fish toxicity test that would better evaluate the potential risk of teratogenic effects to aquatic organisms.

Background

On June 22, 1999, the New York State Department of Environmental Conservation (Department) received an application from Wellmark International proposing to remove the fish habitat restriction from the label of the following three sustained release or extended residual methoprene products:

Zoecon Altosid® Briquets (EPA Reg. No. 2724-375)
Zoecon Altosid® XR Extended Residual Briquets (EPA Reg. No. 2724-421)
Zoecon Altosid® Pellets (EPA Reg. No. 2724-448)

The USEPA had approved the removal of the statement "Do not apply to known fish habitats" from the federal label for these products in October 1996. Since this proposal represented a major change in labeled use pattern for methoprene in New York State, the application was forwarded to the Department's Division of Fish, Wildlife & Marine Resources (DFWMR) for an ecological effects risk assessment.

Based on the DFWMR risk assessment, the Department denied the application to remove the fish habitat restriction. To date, the statement "Do not apply to known fish habitats" remains on the labeling accepted for use in New York State.

Basis for Petition

The Department's DFWMR objects to the removal of the fish habitat restriction based on concerns for potential effects to fish reproduction. The objection is based on the following three points:

1. Methoprene or methoprene degradates were identified as potential causes of amphibian developmental deformities based on their chemical similarity to retinoids. Given the similar exposures fish would experience at sensitive life stages, methoprene might function as a teratogen in fish as well:

2. The water concentrations of methoprene and its degradates resulting from labeled use of sustained release methoprene formulations was inadequately described in materials submitted to the Department, as were the chemical characteristics of the primary metabolites;

3. The fish ELS toxicity test was a flow-through parent compound only test that would not take into account the potential effects of degradation products, or bioaccumulation prior to the onset of fish reproduction. Adult gonadal tissue, gametes, and embryos in pre-water hardened eggs would not be exposed to either the parent compound or the degradates.

In 1995 when the USEPA originally reviewed the request to remove the fish habitat restriction, the studies that potentially linked methoprene to developmental deformities in amphibians were only just being completed and results appearing in the literature. Had the Department received and reviewed the request to drop the fish habitat restriction at that same time, it probably would have come to the same conclusion as the USEPA reviewers. However, in 1999 a number of studies came to the attention of the Department's fish and wildlife reviewers which suggested methoprene may be associated with the phenomena of amphibian deformities [1-6].

Similar published studies with fish are very limited. A literature search yielded one fish paper of interest; Holder and Hill exposed zebrafish eggs to concentrations of retinoic acid (RA) ranging from 10^{-9} to 10^{-6} M, roughly 0.31 ppb to 310 ppb, at 4.3, 5.2, and 8.5 hours post fertilization. The exposures were limited to one hour. Malformations of the brain and cranial ganglia were observed at concentrations as low as 3 ppb [7]. The response following such short exposures suggests a high degree of sensitivity to RA during early developmental stages. The sensitivity to the retinoid analogue methoprene and its degradation products at comparable stages is unestablished.

The Fathead minnow early life-stage study (MRID No. 42811201) reviewed by USEPA Environmental Fate and Effects Division in January 1995 may not be the appropriate test for detecting teratogenic effects. The study was a flow-through design conducted with parent methoprene only. Continuous renewal of the test solution would simultaneously insure that only parent compound methoprene was present in the test vessels and that degradates were continuously removed. By the time the fish ELS study begins, eggs are already water-hardened, and the developing embryo is not likely to be exposed to either the methoprene or any of its degradates.

Methoprene is highly bioaccumulable, and the ELS test would not have identified effects resulting from adult fish accumulating methoprene and degradates prior to spawning. Bluegill sunfish accumulation study results (MRID No. 00010390 or 05008622; the results are not attributed to a specific study in the text) reported in the March 1991 Methoprene Reregistration Eligibility Document (RED) stated that the non-edible tissues accumulated methoprene levels 6600 times the ambient water concentration of 0.005 ppm before reaching a plateau. The protocol of the fish ELS study does not allow for the bioaccumulation of a contaminant prior to spawning, or for the assessment of the exposure of adult gonadal tissue to the contaminant.

The concentration of methoprene that can be bioaccumulated is obviously related to the concentration present in the water. However, the water concentrations of methoprene, and particularly degradates resulting from labeled use of sustained release methoprene formulations,

characteristics of primary degradates. Photolysis is the primary environmental fate process for methoprene in water. A degradation study conducted by the manufacturer was conducted in May and June of 2001 utilizing methoprene spiked pond water exposed to natural sunlight in beakers on a Dallas, Texas roof. It produced results similar to studies cited in the 1991 Methoprene RED. This type of study is unlikely to accurately represent the environmental fate of methoprene and methoprene degradates and the rate of degradation in aquatic habitats that are cooler and vegetation shaded, such as those areas where slow-release methoprene products are likely to be used in the field.

To summarize, the Department's DFWMR is concerned that the potential for teratogenic impacts to fish from slow release methoprene products has not been adequately investigated. Use of the sustained release methoprene formulations in fish bearing waters may expose fish to methoprene and degradates over their entire reproductive cycle. Amphibian and at least one fish study have suggested the possibility that methoprene and/or its degradates may be teratogenic to aquatic organisms. Accumulation prior to spawning and continued exposure through development may prove deleterious to fish reproduction.

The most efficient means of determining whether reproduction will be affected short of a full life-cycle toxicity test may be to conduct an extended ELS study under natural or semi-natural conditions where pre-spawning accumulation is allowed to occur. Fish should be exposed for at least 30 days before the onset of spawning. This test would give fish a similar opportunity to bioaccumulate methoprene as fish exposed in the field. When spawning occurs, eggs would similarly be exposed to methoprene and methoprene degradates before they are water-hardened and resistant to the accumulation of contaminants.

During a conference call between Biopesticides and Pollution Prevention Division (BPPD) staff and the Department on September 11, 2002, BPPD suggested that the Department describe in writing the rationale for its objection to removal of the fish habitat restriction and the waiver of additional chronic fish toxicity testing. BPPD would consider the argument and possibly revisit the need for a fish exposure study that would examine the impacts of bioaccumulation and more closely approximate field conditions. With this letter, the Department petitions the USEPA to consider requiring additional fish toxicity testing to insure the environmental safety of methoprene. We would be glad to discuss this request either in person or via teleconference and provide additional details regarding our ecological review process and findings.

If you have any questions, please contact me at (518) 402-8788.

Sincerely,

Maureen P. Serafini

Maureen P. Serafini
Director, Bureau of Pesticides Management
Division of Solid & Hazardous Materials

cc: Steven R. Spaulding, Wellmark International
T. Martin, DFW&MR

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