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Zebra Mussel Research Technical Notes

Section 1 — Environmental Testing Technical Note ZMR-1-15

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A Summary of Federal Regulations Related to Use of FIFRA-Registered Biocides and Region 5, USEPA, Use of These Biocides for Zebra Mussel Control

Background

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, requires registration by the U.S. Environmental Protection Agency (EPA) of pesticides sold or used in the United States. Under FIFRA, the EPA must register new pesticides and re-register all existing pesticides to ensure that, when used according to the label directions, they will not cause unreasonable risks to the environment or human health. Thus, FIFRA regulations apply to people who manufacture, formulate, market, distribute, use, or dispose of pesticide products.

In addition to FIFRA Section 3 registration (the primary registration mechanism), FIFRA authorizes the conditional use of pesticides through Special Local Needs (Section 24(c)), Emergency Exemptions (Section 18), and Experimental Use Permit (Section 5) provisions.

Purpose

The purpose of this technical note is to provide information on Federal regulations pertaining to the use of chemicals for zebra mussel control.

Additional information

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FIFRA regulations

The product label of a registered pesticide has the effect of being a legal document. Use of a pesticide that is inconsistent with its label instructions constitutes a violation of FIFRA and can result in a warning letter, civil administrative action, or criminal action brought against the user. Consequently, aquatic biocide use inconsistent with label instructions may result in enforcement action by EPA under FIFRA or by states having pesticide use enforcement primacy under FIFRA.

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One of the label requirements for many aquatic biocides entails obtaining a National Pollutant Discharge Elimination System (NPDES) permit from the appropriate State/Tribal agency or EPA Regional Office. Failure to follow this label requirement, that is, use of such a pesticide without having acquired the requisite NPDES permit, could result in enforcement action under both FIFRA and the Clean Water Act. Multimedia enforcement action of this nature is being strongly encouraged in Region 5.

Section 2(ee) of FIFRA allows for the use of registered pesticide on a pest not listed on its label as long as application is to a site stated on the label. Section 2(ee) requirements will be discussed in detail.

Clean Water Act regulations

Use of FIFRA-registered biocides that are discharged to waters of the United States from a point source must be regulated such that water quality-based effluent limits (WQBELs) for that biocide are established in an NPDES permit. The "Final Rules of 2 June 1989," related to control of toxics and NPDES permits, are discussed. Specifically, regulations at 40 CFR 122.44(d)(10)(i) require that the effluent concentration meet State water quality standards, including the State's narrative criteria. Essentially, this means that the effluent concentration of a biocide must be limited to ensure compliance with the State's acute and chronic water quality standards. In addition, the effluent must be limited to prevent deposition of objectionable deposits in the mixing zone as required by most State water quality standards. Finally, there must be compliance with the Antidegradation Policy of each State.

Data needed to establish WQBELs

The types of toxicity and environmental data needed to establish WQBELs for biocides are discussed. Acute and chronic toxicity data are needed, as well as environmental fate data. It is emphasized that analytical methods for each biocide are needed, which can be used to document compliance with the WQBELs for that biocide.

Currently, environmental data generated as part of the FIFRA registration process are considered confidential. This creates uncertainties, and Region 5 will not concur with use of a biocide unless these data or alternative data are made available to document compliance with all State water quality standards.

Two biocides that exemplify Region 5 concerns

Two biocides are discussed in detail: bromine (a FIFRA-registered biocide) and octylphenolpolyethoxalate. There is no intent in this paper to discriminate against either. The intent of this review is to provide the reader with two case histories which demonstrate the procedures that are followed by Region 5 and the States in approving biocides.

Bromine

When Regions 4 and 5 were faced with establishing WQBELs for bromine, review of FIFRA acute toxicity data included in the Material Safety Data Sheets indicated that bromine was considerably less toxic to aquatic organisms than chlorine. This was surprising since biocide vendors were emphasizing that bromine had far greater efficacy as a microbicide than chlorine. Because it was evident that use of bromine may equal or surpass chlorine in the future, Region 4, Region 5, and EPA Headquarters requested that acute toxicity testing be done with flow-through bioassays and LC_{50}s be based on measured rather than nominal concentrations. When the bromine industry conducted these tests, the LC_{50}s for comparable test organisms were decreased by as much as an order of magnitude.

This example illustrates many of the technical problems encountered with the toxicity testing conducted by the biocide industry. Aquatic organisms are exposed to these biocides in discharge canals and mixing zones on a real-time basis, and not decreasing concentrations that occur in a static bioassay. Toxicity data from static bioassays are simply not acceptable unless acute and chronic toxicity information is based on measured concentrations, and it has been documented that the concentration of the biocide was present throughout the test at 30 percent of the nominal concentration.

Octylphenolpolyethoxylate

This nonionic surfactant was being investigated as a potential molluscicide by the Electric Power Research Institute. It is also used as a biodispersant in at least one FIFRA-registered molluscicide. EPA's Office of Toxic Substances has required an environmental review of a very closely related compound, nonylphenol, under Section 4 of the Toxic Substances Control Act. This review included a discussion of the degradation products of both octylphenolpolyethoxylate and nonylphenopolyethoxylate. Biodegradation is very rapid to octylphenol and nonylphenol. Both of these degradation products are very toxic and persistent.

Acute and chronic toxicity data for octylphenol were derived by studies required by a consent order between industry and the Interagency Testing Committee. The lowest observed effect concentration for chronic effects was approximately 8 parts per billion for rainbow trout subjected to a 60-day life cycle test.

As a condition of a Section 4 consent order with the EPA for nonylphenol, industry conducted a survey to document nonylphenol concentrations in bulk sediments at a number of sites in the United States. The highest concentration found was 3 mg/kg in sediments of the Grand Calumet River, which flows to the Indiana Harbor. Water column concentrations were estimated at 0.6 ppb. In another study, nonylphenol in sediment pore water was believed to contribute significantly to the toxicity of the sediment pore water of the Cal Sag Channel, which leads to the Illinois River.

Studies referenced above have formed the basis for Region 5's objection to use of one biocide that contains octyphenolpolyethoxolate as a biodispersant. In this case, cooling water flow represented the entire streamflow. This objection will continue until it can be demonstrated that use of this product will not result in sediment impairment and WQBELs can be established.

Region 5 concerns for other FIFRA-registered biocides

Our review indicates that use of FIFRA-registered biocides may not be allowed when noncontact cooling water flow represents a major portion of the streamflow. Several biocide vendors are now obtaining toxicity data for their biocide which can be used to document compliance with State water quality standards.

Waterways where use of FIFRA-registered biocides constitutes a concern

It has now been documented that the zebra mussel has spread to the Illinois and Mississippi Rivers. Detailed examples of multiple dischargers to single waterways are discussed. These include the Indiana Harbor and Illinois River drainage basin. In these situations, multiple industrial discharges occur, and many discharges represent a significant portion (sometimes in excess of 100 percent) of the Q7,10 streamflow. Similar, but less detailed examples for other waterways in Region 5 are also highlighted. These include the Ohio River (39 power plants); Wabash River; West Fork and Main Stem of the White River in Indiana; and the Great Miami and Muskegum Rivers in Ohio.

Summary Because of the uncertainties associated with biocides specified above, Region 5 is approaching a point where only chlorine on a continuous basis and chlorine and bromine on an intermittent basis will be authorized when a noncontact cooling water flow represents a major portion of streamflow. This decision is based on the fact that the existing toxicity data for may biocides indicate that use at recommended concentrations will not comply with State water quality standards. Alternatively, Region 5 will not object to use of any FIFRA-registered biocide which can be used such that the effluent concentration does not exceed State water quality standards.