Aquatrols

DRIFT Snowmaking Additive

Blow snow, not your budget.

Environmental Impact Summary

Polyether-modified siloxanes (PEMS) used in snowmaking have relatively low toxicity, and for this reason little research has been directed toward characterizing potential environmental impacts of this group of chemicals. The data that have been generated, however, indicate that PEMS are expected to degrade under most environmental conditions, including in most soils, streams and lakes.

In soils, PEMS are immobilized by readily adsorbing to clay particles. Laboratory testing data indicate that in soils, some parts of the PEMS molecule would be degraded by microbes and other parts by chemical reactions with the soil moisture. Soil microbes "acclimate" to PEMS, resulting in a more rapid rate of degradation of these chemicals with repeated use. The available testing data suggest that the environmental fate of PEMS is similar to that of a closely-related group of chemicals called polydimethylsiloxanes (PDMS), which have been shown not to accumulate in the environment. Furthermore, the fact that large amounts of PEMS are applied directly to soils each year without measurable build-up in the environment indicates that environmental degradation is relatively efficient.

In the atmosphere, PEMS photo-oxidize when contacted by sunlight and water vapor.

The toxicity of PEMS is low for soil microbes and invertebrates as well as for aquatic invertebrates and fish. Lethal concentrations (LC_{50}) and effective toxic concentrations (EC_{50}) for short-term exposures are in the range of several parts per million to hundreds of parts per million (ppm). Soluble PEMS materials are practically non-toxic to algae (EC_{50}=>623 ppm), aquatic vertebrates (LC_{50}=311 to>960 ppm), and fish (LC_{50} = 115 to >1000 ppm). Similarly, toxicity values for long-term exposure to soluble PEMS are >10 ppm (the highest test concentration tested) for zebra fish (Brachidanio) and the fresh water invertebrate Daphnia magna. Higher molecular weight, insoluble PEMS materials are only slightly more toxic, with long-term LC_{50} values of 4 and 41 ppm for fathead minnows and Daphnia, respectively.

PEMS can cause severe toxicity to plants, but only at a very high concentration: plants sprayed with a 25% solution of a PEMS chemical exhibited only partial leaf damage 48 hours after treatment and showed no grossly observable damage one year after exposure. Therefore, only a large accidental spill of PEMS material would be expected to cause any significant damage to plants.

In summary, the available environmental fate and effects data suggest that no significant adverse ecological impact is expected from PEMS materials, particularly at the rates and under the intensely aerobic conditions under which these products are used in snowmaking.

This assessment was prepared in October 2002 by Dr. Christopher J. Borgert, Consulting Toxicologist, Applied Pharmacology & Toxicology, Alachua, FL.

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