ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

Methoxychlor

This organochlorine insecticide, first registered in 1948, consists essentially of a molecule of DDT with a couple of methoxy groups attached at either end. (DDT was banned in the U.S. in 1972 because of extreme environmental persistence and linkage to bird -shell thinning.) In many urban areas, summer methoxychlor (tradenames Marlate™ or Prentox™, Methoxy-DDT) applications are the rule to control elm tree pests like the elm bark beetle, but this chemical is also used in a bewildering variety of other sites. Al though EPA has essentially no safety data in its files on the chemical, methoxychlor is registered for use on 87 agricultural crops, for mosquito control, on ornamentals, in forestry, and in structural pest control. Methoxychlor is even registered for direct application to humans and animals, to human clothing and for use in kennels. EPA's Office of Drinking Water estimated that 2 million pounds were produced in 1982, and EP A's Office of Pesticide Programs believes as much as 900,000 pounds of it may be used in the U.S. each year.

EPA published a Registration Standard reviewing its database on methoxychlor in December 1988. According to the Agency, "...with the exception of one mutagenicity study, there are no acceptable acute, subchronic, or long-term toxicology/oncogenicity studies available to support [the registrations of] technical methoxychlor...". It will be years before more is known, since the deadline for manufacture submission (not agency review) of animal cancer studies is February 1993. Meanwhile, the Agency reports that none of the legal food tolerances are "adequately supported" and that methoxychlor is being found at "low levels" in "a limited number of commodities," some of which have no legal tolerances. Unrestricted use will continue for all registered purposes while data collection goes on.

The general literature reports that methoxychlor (like DDT) is not an acutely toxic substance (oral rat LD50= 5000-6000 mg/kg). Both DDT and methoxychlor are nerve poisons a t the level of the nerve cell membrane, where they cause the generation of abnormal action potentials (the nerve's electrical impulses). However, methoxychlor is more susceptible to metabolism than DDT, with little tendency to bioaccumulate in living organisms. The general literature cites it as slightly irritating to the skin, but it is not believed to be absorbed appreciably through the skin.

Because methoxychlor is a close structural relative to DDT, the literature on the latter is in- structive. DOT exposure has occasionally been associated with allergic dermatitis, blood abnormalities (e.g., thrombocytopenia and aplastic anemia), even though investigators do not generally report specific organ lesions in animals dosed with large amounts of DDT. Although DDT is not carcinogenic to rats and mice, a breakdown product, DDE, is a known carcinogen in both sexes of mice. One reviewer, Melvin Reuber (Environ. Health Perspec. 36:205 (1980)) believes methoxychlor to be carcinogenic in rats and mice at a number of different sites and possibly in dogs. Reuber reports that miniature swine given methoxychlor developed chronic renal disease, and dermal application of methoxychlor to rabbits caused chronic renal disease and atrophy of the testes. Nevertheless, the conclusion of both the National Cancer Institute (NCI, 1978) and the International Agency for Research on Cancer (IARC, 1979) is that methoxychlor is not carcinogenic, while EPA has required submission of extensive tests to settle these questions.

According to EP A, technical methoxychlor (the concentrate) is characterized as very highly toxic to fish and aquatic invertebrates, but it is practically nontoxic to birds and bees. Animals metabolize methoxychlor by means of the liver's "mixed function oxidase" enzymes, but the rate of metabolism is slower in fish (where higher levels accumulate) than in mammals. Snails accumulate over two times more methoxychlor than DDT. In tests with fish, concentration factors range from 40 to 1500. Compare these figures with DDT concentration factors (under similar condi-

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tions) of up to 84,000. Fishkills have only rarely been reported. Nevertheless, the U.S. Fish and Wildlife Service has determined that the "use of methoxychlor as a mosquito larvicide may jeopardize the continued existence of certain endangered species," and EPA will be taking this finding into account as it complies with the Endangered Species Act in. the next decade.

Preliminary data indicate that methoxychlor is quite stable in the environment, with a half-life of more than 3 months in aerobic soil degradation tests. Residues have been demonstrated to re main in the soil for up to 14 months. One of the very few federal standards for a pesticide in water under the Safe Drinking Water Act established 100 ppb as the "maximum contamination level (MCL)." Methoxychlor has only rarely been detected in a water system, arid never at levels higher than 50 ppb. EPA will also be requiring specific examination of methoxychlor formulations for the presence of potential impurities, specifically DDT and other structurally similar compounds. EPA is concerned since the insecticide dicofol (Kelthane™), another DDT-analogue, at one time contained as much as 15% DDT and related compounds as a by-product of synthesis.

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Update: 2003 Cancellation

Methoxychlor is listed as a persistent, bioaccumulative, and toxic (PBT) chemical by the EPA's Toxics Release Inventory (TRI) program. PBT chemicals are of particular concern not only because they are toxic, but also because they remain in the environment for long periods of time, are not readily destroyed, and build up or accumulate in body tissue. EPA's Office of Solid Waste and Emergency Response has identified methoxychlor as one of thirty waste minimization priority chemicals, in order to focus efforts on reducing or eliminating the generation of hazardous wastes containing these chemicals. A human health risk assessment has not been done as a result of the incomplete database for methoxychlor. The EPA has significant concerns about the effects of methoxychlor on human health and the environment.

Kincaid Enterprises Inc. (Kincaid) was the sole registrant who committed to produce the generic data for methoxychlor. On April 7, 1998, the EPA issued a Notice of Intent to Suspend to Kincaid because of its failure to submit certain data required by the 1988 data call-in. On December 3, 1999, Kincaid failed to satisfy certain data requirements as required and the EPA requested a suspension order. As of June 2000, all product registrations of methoxychlor were either suspended due to registrants' noncompliance with a Data Call-In Notice issued, or cancelled pursuant to registrants voluntary cancellation request. All registered technical sources of methoxychlor were canceled in 2003, and all tolerances revoked. The EPA has since determined that methoxychlor is not eligible for reregistration.

Methoxychlor *chemicalWATCH* Factsheet Bibliography

EPA. (1989). Recognition and Management of Pesticide Poisonings. 4th edition. Office of Pesticide Programs, Washington, DC.

EP A. (1988). "Guidance for the Reregistration of Pesticide Prod ucts Containing Methoxychlor as the Active Ingredient." Office of Pesticide Programs, Washington, DC.

EP A. (1986). "Part VIII: Dicofol; Intent to Cancel Registrations of Pesticide Products Containing Dicofol…," Federal Register, 51(103):19508-19525/ May 29/ 1986.

EPA. (2004). Methoxychlor Reregistration Eligibility Decision (RED). EPA Publication No. EPA 738-R-04-010. Washington DC.

EPA. (1985). "Draft Health Advisory for Methoxychlor." Office of Drinking Water, Washington, DC.

Gosselin, R.E., et al. (1983). Clinical Toxicology of Commercial Products. 5th edition. Williams & Wilkins. Baltimore, MD.

Reuber, M.D. (1980). "Carcinogenicity and toxicity of methoxychlor," Environ. Health Perspect. 36:205-219.

Thomson, W.T. (1983). Agricultural Chemicals: Book 1. Thomson Publications, Fresno, CA.

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