ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

Alachlor

First registered in 1969, alachlor is an acetanilide herbicide that may be applied for the control of annual grassy weeds and certain annual broadleaf weeds. Tied with atrazine for the highest use pesticide in the U.S. by volume, Monsanto reported Lasso™ sales of $500 million in 1985, making it their largest moneymaker. Three crops account for approximately 94% of the 80-100 million pounds used annually in the U.S.: corn (63%), soybeans (28%), and peanuts (3%).

Health concerns associated with the use of alachlor focus on widespread reports of groundwater contamination and evidence of potent carcinogenicity. In 1985, EPA initiated a Special Review based on laboratory studies from as early as 1981 that demonstrated the potential for alachlor to produce cancer in mammals. Despite concerns from the environmental community and even within EPA at the Office of Drinking Water, which initially pushed the Office of Pesticide Programs to consider suspension given extensive groundwater contamination, the final decision was to allow continued use on agricultural and non-food crops with certain conditions and label modifications. These included: restricted use status; a tumor warning on the label; requirement of a closed mixing and loading system for all users treating 300 acres or more annually; and a lifting of the 1984 ban on aerial application with a new requirement for mechanical flaggers only.

According to EPA's classification scheme, alachlor is a B2 or probable human carcinogen. This reflects data indicating that alachlor induced statistically significant tumors at multiple sites and doses in the rat (nasal, stomach, and thyroid) and at one site, at one dose, in one sex in the mouse (lung). During chronic exposure studies, cancer was found in rats sacrificed as early as 5 months into a 2-year study, at the same rate as in animals examined at the end of the study. This suggests that partial lifetime exposure (approximately 1/4 of the lifespan of the animals) can result in tumor incidences similar to lifetime exposures. In the National Academy of Science report, Regulating Pesticides in Food: The Delaney Paradox, alachlor was listed as the fifth most potent carcinogen of the 25 pesticides examined.

chemical*WATCH* Stats:

Chemical Class: Acetanilide herbicide
Use: Agriculture, Ornamental (grasses, broadleaf)
Toxicity Rating: Toxic
Signal Words: Danger, Warning, Toxic
Health Effects: Likely carcinogenic at high doses, probable endocrine disruptor, linked to kidney/liver damage and birth/developmental defects.
Environmental Effects: Detected in groundwater, toxic to fish/aquatic organisms.

In the Special Review Position Document 1 (PD 1, 1984), EPA estimated total dietary risk to be $1x10^{-4}$ to $1x10^{-5}$. In the Special Review Technical Support Document (1986) EPA presents new estimates of $2x10^{-5}$ to $2x10^{-6}$ for alachlor residues in the food supply. The new estimates rely on Monsanto residue data and Best Available Estimates of residues rather than assuming residues may be present at the tolerance levels. Legally, foods may contain residues up to the tolerance. Also, these estimates fail to include simultaneous consideration of alachlor residues in drinking water.

Worker risk estimates were similarly revised downward. In the PD 1, worker risk estimates ranged from 10^{-2} to 10^{-8}, with the majority in the 10^{-3} to 10^{-5} range. The Technical Support Document cites them as $6x10^{-4}$ to $4x10^{-7}$.

Monitoring efforts have detected alachlor in ground, surface, and tap water. Alachlor contamination of groundwater has been reported over a variety of soil and hydrogeological conditions in North America. EPA's 1988 Interim Groundwater Database Report cites detection of alachlor in 19 states at levels as high as 113 ppb due to normal agricultural use.

EPA's Technical Support Document notes Monsanto monitoring data which detected alachlor in raw and finished surface water in 14 of 24 community water systems from seven states. Detected amounts averaged less than 1 ppb, but ranged as high as 10.7 ppb. 1989 monitoring of midwestern surface waters by the U.S. Geological Survey found alachlor concentrations exceeding EPA's proposed drinking water maximum contaminant level in 44 of 127 samples. There is presently no federally enforceable drinking water standard for this common water contaminant and alachlor is not removed by common drinking water treatment systems. While granular activated carbon (GAC) is considered effective, GAC is in use at less than 1 % of public drinking water wells.

In addition to cancer, the principal chronic effects are skin sensitization, liver toxicity and irreversible eye lesions referred to as the uveal degeneration syndrome. A 3-generation rat reproduction study noted no adverse effect on reproduction up to the highest doses tested (30 mg/kg/day) but noted renal toxicity in both parents and pups. A rat teratology study showed no teratogenic potential at the highest doses tested (400 mg/kg/day). The second study required, a rabbit teratology study, is considered inadequate. Mutagenicity tests of alachlor have produced negative and weakly positive results.

The acute systemic toxicity is low: rat oral LD_{50}=930 mg/kg; rabbit dermal LD_{50}=13.3 g/kg; and rabbit inhalation LD_{50}=>5.1 ml/l. Slight skin and eye irritation may follow acute exposure.

In the environment, alachlor is taken up by plants and asserts its pesticidal action by interfering with protein synthesis. Once in the soil, it is degraded by bacteria, with a half-life of 6-10 weeks, depending on soil type and climatic conditions. It is not photodegradable and does not hydrolyze under environmental conditions. Toxicity to bird species is low, to fish moderate.

Several regulatory authorities have sought to ban alachlor. In 1987, Massachusetts banned sale and use effective January 1988. Monsanto filed suit against the state to block the ban, and the MA Pesticide Board reviewed the decision and decided to make alachlor restricted use instead. Also, in early 1988, Canada's Agriculture Minister decided to continue to enforce a two year old ban on the use of alachlor despite continual challenges by Monsanto. The ban is still in effect.

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Update, *March 2007*:
In a study published in the April 2003 issue of *Environmental Health Perspectives*, researchers found that men from Missouri with high levels of alachlor in their urine were significantly more likely to have decreased sperm quality than were men with low levels of alachlor. Also in 2003, the Attorneys General from New York, Connecticut, Massachusetts and New Jersey filed a lawsuit against EPA for failing to protect children from the risks of five pesticides (including alachlor) widely used on crops often consumed by children. EPA has failed to set residue standards for these pesticides as required by the 1996 Food Quality Protection Act (FQPA). In 1998, EPA signed a reregistration eligibility decision for alachlor, despite the lack of residue standards under FQPA.

Alachlor *chemicalWATCH* Factsheet Bibliography

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