



# ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

## DDVP

Dichlorvos, also known as DDVP or Vapona™, is an organophosphate insecticide widely used in agriculture, as well as for such consumer items as No-Pest™ strips and flea collars. EPA has finally decided, after years of controversy, to enroll DDVP in the Special Review program, for the second time in a decade. EPA has determined that the worst-case cancer risk to workers handling DDVP, even when wearing protective clothing, ranged up to 1/100 for exposures that amount (in many cases) to only a couple of weeks of work per year.

Concerning inhalation exposures encountered by ordinary consumers, EPA estimates that the cancer risk to people with No-Pest™ strips hanging in their homes may be as high as 8/1000. Cancer risk estimates for flea-collared dogs range as high as 9/1000, and for cats as high as 5/1000.

First registered by Shell in 1948, dichlorvos products are now produced by 10 companies. Between 1.5-2.5 million pounds were used in 1986, according to EPA. Approximately 60% of the total is used in agriculture, on salad crops like radishes, lettuce,

and tomatoes, to fumigate bulk stored products like grains and packaged processed foods, and on animals and poultry. DDVP is also registered for use as a mosquito control agent, and for use on lawns. About 15% is used to make household sprays, foggers, pest-strips and flea collars.

The vapor pressure of dichlorvos, 0.032 mm Hg, @ 32° C., is extremely high. Residues can easily penetrate cardboard and paper packages. Pest-

Dichlorvos is quite acutely toxic by either the oral or the dermal route, indicating good skin absorption. Like all organophosphates, dichlorvos exerts its toxic effects, in part, by inactivating a critical nervous system enzyme, acetylcholine esterase (AChE). Acute symptoms of poisoning include: headaches, stomach cramps, excessive salivation, and muscle

twitching. Dichlorvos can cause delayed neuropathy. A number of reports attest that flea-collared cats have developed such symptoms as lethargy, ataxia, depression, severe dermal irritations, anemia and even death. Dichlorvos is also very acutely toxic to birds and aquatic life.

EPA classified DDVP as a Category

B2 (probable human) carcinogen. The National Toxicology Program's bioassays found that dichlorvos caused increased incidences of pancreatic acinar adenomas (benign tumors) and mononuclear cell leukemia in male rats, and mammary gland fibroadenomas in female rats. In mice, squamous cell carcinomas and papillomas of the forestomach were seen at high doses. Dichlorvos is a direct-acting

### *chemicalWATCH Stats:*

**CAS Registry Number:** 62-73-7

**Chemical Class:** Organophosphate insecticide

**Use:** DDVP is registered to control insect pests in agricultural sites, commercial, institutional and industrial sites; in and around homes; and on pets.

**Toxicity rating:** Highly toxic

**Signal Words:** Danger, Warning

**Health Effects:** Possible human carcinogen and listed as a carcinogen in California, linked to pancreatic acinar adenomas and leukemia in rats. DDVP has also been shown to be mutagenic and a cholinesterase inhibitor.

**Environmental Effects:** DDVP is toxic to fish and other aquatic organisms. It is highly toxic to birds and to honey bees.

strips contain DDVP in a PVC plastic that allows slow release of the vapors for as long as 4 months. The residues, which can deposit on surfaces, are sensitive to humidity, so that for every 30% increase in humidity there is a 50% decrease in the amount released. However, in warm, dry environments such as houses, dichlorvos vapors and residues are particularly stable, and animal tests have shown that poisoning symptoms are exacerbated under such conditions.

mutagen capable of alkylating DNA. Significantly, several related pesticides, tetrachlorvinphos, triallate, and dichloropropene, are known animal carcinogens, while naled and trichlorfon breakdown to DDVP. Although dichlorvos can cross the placenta and cause AchE depression in the young of treated animals, it has not been found to adversely effect fertility or the development of the young.

EPA has also found a number of problems with existing food residue tolerances. According to Agency officials, "scant data available indicate that actual residues in plant commodities are approximately

the same as established tolerances." (Tolerances are usually set at levels in comfortable excess to actual residues usually encountered, both to protect the public and to avoid the possibility of unfairly seizing commodities treated at legal use rates.) EPA also found that existing residue data are inadequate to justify current tolerances on cucumbers, lettuce, radishes, and a number of bulk raw, processed or packaged commodities. EPA calculates a "Provisional Acceptable Dietary Intake (PADI)," as the maximum amount of residue that may safely be consumed. Comparison of this figure with another, the "Anticipated Residue Contribution," or the amount that likely is being consumed if all foods contain residues at tolerance levels, finds that adults, and particu-

larly children, are consuming levels well in excess of the PADI, instead of the fraction usually permitted for safety's sake.

EPA has proposed in a Briefing Paper that dichlorvos be classified for "restricted use" by certified applicators only, with such products containing a cancer warning statement. Home products, such as resin strips and flea-collars, would be specifically exempted from this requirement, however.

*Reprinted from Volume 7, No.5, December, 1987*

#### **UPDATE: October 2007**

The EPA in 1995, published a Notice of Preliminary Determination to Cancel Certain Registrations (PD2/3) and a Draft Notice of Intent to Cancel (60 FR 50337) which determined that exposure to DDVP from the registered uses posed carcinogenic risks of concern, as well as risks of concern for cholinesterase inhibition. In July 2006, the EPA completed its Interim Reregistration Eligibility Decision (IRED) for DDVP outlining the tolerances for DDVP on agricultural (food and feed) crops and animal commodities, even though the reregistration eligibility decision does not fully satisfy the requirements for reassessment of the existing DDVP food residue tolerances as called for by FQPA. Amended language for pest-strip product labels as directed by the IRED would be effective January 2008 to incorporate new personal protective equipment (PPE) requirements and environmental hazards statements.

DDVP is now banned in the United Kingdom, Denmark and Sweden and the WHO lists it as a possible carcinogen. In February 2007, the NRDC filed a lawsuit against the EPA charging that the EPA failed for 20 years to finish an expedited review of ddvp, and failed to respond to a petition calling for its ban. In September 2007, the EPA proposed to terminate the Special Review of ddvp based on measures outlined in the IRED, requested label amendments, and the voluntary cancellation of uses by the registrant, which limit overall DDVP exposures.

---

## DDVP *chemicalWATCH* Factsheet Bibliography

---

Bell, T.G., et al. (1975). "Ataxia, depression and dermatitis associated with the use of dichlorvos-impregnated collars in the laboratory cat." *JAVMA* 167:579-586.

Bingham, E.; Cohrssen, B.; Powell, C.H.; *Patty's Toxicology Volumes 1-9* 5th ed. John Wiley & Sons. New York, N.Y. (2001), p. 7:823

Dean, B.J. (1972). "The mutagenic effects of organophosphorus pesticides on microorganisms." *Arch. Toxicol.* 30:67-74.

"DDVP regulatory action based on oncogenic, non-oncogenic effects," *Pesticide & Toxic Chemical News*, October 7, 1987.

Maslinska, D. & Z. Zalewska. (1978). "Effect of dichlorvos administered to pregnant rabbits on the cholinesterase activity in the progeny." *Folia Histochemica et Cytochemica* 16(4):335-342.

"NTP finds dichlorvos is carcinogenic," *Pesticide & Toxic Chemical News*, July 22, 1987.

Reeves, J. (1982). "Household insecticide-associated blood dyscrasias in children." *Amer. J. Ped. Hematology* 4(4):438-439.

Reeves, J. & D.A. Driggers. (1980). "Febrile seizures, aplastic anemia, and acute leukemia in children exposed to a popular household insecticide." *Clin. Res.* 28(1), February issue.

"Toxic residue said found on firm's cigarettes," *The Washington Post*, January 6, 1988.

W.T. Thomson. (1984). *Agricultural Chemicals: Insecticides*. Thomson Publications. Fresno, CA.

U.S. EPA. (2006). *Interim Reregistration Eligibility Decision (IRED) Document for Dichlorvos (DDVP)*. Office of Pesticide Programs. Washington, DC.

U.S. EPA. (1988). *Dichlorvos: Initiation of Special Review*. Office of Pesticide Programs. Washington, DC.

U.S. EP A. (1987). *Guidance for the reregistration of pesticide products containing dichlorvos as the active ingredient*. Office of Pesticide Programs. Washington, DC.

U.S. EP A. (1983). *Dichlorvos: Combined data call-in notice*. Office of Pesticide Programs. Washington, DC.

U.S. EP A. (1981). *Summary of reported pesticide incidents involving dichlorvos*. Pesticide Incident Monitoring System Report No. 403. Office of Pesticide Programs. Washington, DC.