

1. Caller reports an accident to CHEMTREC or 800-424-9300. CHEMTREC gathers as much information as possible.

2. CHEMTREC contacts the area coordinator for the region in which the accident has occurred. The country is divided into 10 areas or regions. Each area has several pesticide safety teams which are staffed by chemical company personnel.

3. The area coordinator then contacts either the manufacturer of the chemical involved in the spill or the person who reported the accident to obtain additional information.

4. If the manufacturer or the area coordinator cannot handle the problem, then the area coordinator will have to contact and dispatch a pesticide safety team to the spill site.

Each pesticide safety team and each area coordinator is provided with guidelines for handling accidental spills and has emergency equipment available to control, contain, and clean up the chemical.

Emergency Telephone Number on the Label.
One additional, very important telephone number to remember is the emergency number found on many product labels. These lines are staffed 24 hours a day and the people on the other end of the line are prepared to handle pesticide emergencies involving their products.

Knowing how to safely handle accidental chemical spills and leaks is as important as knowing how to correctly apply or use the material. Each person who uses or distributes pesticides or other hazardous chemicals has a responsibility to protect the public and the environment. Knowledge of a few basic guidelines involving hazardous chemical spills and leaks can go a long way toward meeting that responsibility.

*Extension Pesticides Specialist
Department of Plant Pathology
Pennsylvania State University
University Park, Pennsylvania*

SEVIN: A CONTROVERSIAL INSECTICIDE¹

by Winand K. Hock

If you can believe the headlines which appeared in newspapers from the Delaware Valley and New Jersey last spring, the manufacturers of carbaryl or Sevin must have developed and released to the public a "chemical black death" which will make Love Canal, DDT, PCB's, and Kepone in the Chesapeake Bay seem rather insignificant.

One Canadian environmental organization in a letter addressed to local citizens cites some of the "documented" effects of carbaryl.

1. It causes birth defects in mammals, especially dogs.

2. It worsens the condition of people with

hypertension and people on anti-depressant drugs.

3. It impairs the function of the pituitary gland, the thyroid gland, and the reproductive system.

4. It causes hyperactivity and learning disabilities in mammals.

5. It could increase the chance of heart attack in people with weak hearts.

6. The main break-down product, nitrosocarabaryl, which is easily created in the human gut, is a potent cancer-causing agent.

7. It causes irreversible chromosomal damage

¹Presented at the 1981 Penn-Del Chapter Shade Tree Symposium

to human DNA (the genes in our cells).

These are indeed very serious accusations against a pesticide that presumably has had a good safety record for over 20 years. How did such a situation develop? Was it media sensationalism or was it simply a lack of understanding that prompted the outcry against the use of Sevin for control of gypsy moth in New Jersey and southeastern Pennsylvania last spring? It all started in Cape May County, New Jersey, where several young women gave birth to babies with defects . . . specifically four cases of *Spina bifida*, a crippling birth defect where the spinal cord protrudes from the body, and three cases of hydrocephalus, which is an accumulation of fluid in the brain.

As a result of the accusations leveled against Sevin that the chemical causes birth defects, the New Jersey Department of Health conducted a rather extensive case study in which they investigated the occurrence of birth defects in three New Jersey counties where gypsy moth spraying with Sevin had occurred.

Carbaryl is an insecticide and like any other insecticide, it must be toxic to insects to be effective. And, like all pesticides, carbaryl is also toxic to certain nontarget organisms, including humans. But, with proper use and handling, carbaryl is rarely a problem to the applicator, the general public, and to the environment.

Sevin is the registered trademark for carbaryl insecticide. Carbaryl is the common name for the active ingredient, 1-naphthyl methylcarbamate. Union Carbide discovered carbaryl, a synthetic organic carbamate pesticide, and is the sole domestic producer and major world manufacturer of the chemical.

Sevin insecticide was introduced commercially in 1958 and now ranks third in domestic sales among all insecticides. It occupies a leading position in commercial agriculture, forest and rangeland protection, and in home and garden pest control products.

During recent years the economic benefits derived by users of Sevin for agricultural pest control ranged from an estimated 3 to 24 dollars per dollar invested. Sevin is a key product in certain pest management programs. It also represents at

least 22 percent of the insecticide usage by homeowners and grounds maintenance professionals.

Carbaryl breaks down readily and experience shows it readily decomposes on plants, and in soil and water to less toxic byproducts. Accumulation in animal tissues and biomagnification of residues in food chains with carbaryl and its metabolites does not occur.

Sevin is a mild to moderate cholinesterase inhibitor; cholinesterase is the enzyme that regulates the flow of nerve impulses in humans. Recovery in cases of accidental exposure is usually quite rapid. Atropine is the only antidote recommended and then only in more severe poisoning cases such as the accidental ingestion of carbaryl by a child. During the almost two decades of extensive carbaryl use in the United States, few cases of overexposure have occurred and no fatalities have been reported. Under most use situations no special protective clothing is necessary to provide worker safety and no federal or state agencies require adult worker re-entry restrictions following the application of Sevin.

Toxicology/Toxicity

The toxicology of Sevin carbaryl insecticide has been extensively investigated by many different research groups, including universities, governmental agencies, and private research foundations. Laboratory tests to determine toxicological (tumor producing, birth defects, mutations, etc.) effects have been conducted on at least a dozen species of mammals. In addition, toxicity (how poisonous is the chemical) studies are known for at least 20 species of mammals, 50 species of birds, and 40 species of fish. Even some human exposure studies have been conducted.

We do know that carbaryl is quite toxic to honey bees, certain beneficial insects such as lady beetles, and parasitic wasps and bees, certain species of aquatic insects, and some forms of shellfish such as shrimp and crabs. Care must be taken when using carbaryl in areas where these organisms exist.

Extensive evidence indicates that carbaryl does not cause cancer or genetic changes in animals. Carbaryl has also been extensively tested for its

effect on reproduction and the occurrence of birth defects (we call this teratogenic potential). Experiments have been conducted on various strains of rats and mice, and on hamsters, gerbils, guinea pigs, rabbits, dogs, sheep, and monkeys. Adverse effects have occurred only in dogs.

New Jersey Department of Health Study

The purpose of this investigation was to explore whether there is any correlation between spraying for gypsy moth with carbaryl and the occurrence of birth defects. The study was designed to answer two questions:

1. Is there an increased rate of birth defects in municipalities where carbaryl is used in aerial spraying for gypsy moth?
2. Is there a relationship in time between the occurrence of birth defects and this spraying?

The counties of Morris, Monmouth, and Cape May were chosen for this study based on the level of spraying conducted in the three counties and the common suburban/rural characteristics of each county. The time frame for the study includes all births from January 1, 1977 through March 31, 1980. Birth records from all 10 hospitals in the three counties with maternity services were reviewed by personnel of the New Jersey Department of Health. The study population consisted of 34,355 live births; only the occurrence of birth defects in live born infants was included in the analysis.

New Jersey Superior Court Judge Philip A. Gruccio, who last May rejected an appeal to stop further use of the insecticide, reached the same conclusion that Sevin is safe as currently used in the gypsy moth program.

Now I would like you to consider some additional facts when analyzing the Sevin/gypsy moth spray program.

1. The highest human exposure measured during gypsy moth spraying is 740,000 times less than that encountered hourly during a 40-hour work week by carbaryl manufacturing plant workers. Some workers have been exposed to carbaryl for more than 10 years with no clinically significant adverse effects.

2. Human volunteers have orally ingested carbaryl at 2 mg/kg of body weight with no observed

effects. Exposure during gypsy moth spray programs is about 20,000 times less than the human volunteers ingested.

3. The exposure during gypsy moth spray programs is 100 times lower than the acceptable daily intake (ADI) for humans established by the World Health Organization.

4. Exposure during gypsy moth spray programs is 5,000,000 times lower than the dose fed to rats during pregnancy and 200,000 times lower than the dose fed to pregnant monkeys. Even more important than these safety margins, birth defects did not occur in rhesus monkeys fed carbaryl throughout the gestation period. The monkey anatomy and physiology are, of course, quite similar to those of humans.

EPA Reaction

What does EPA say about the use of carbaryl and the accusations of teratogenicity or birth defects associated with the use of the chemical? In a letter addressed to the Secretary, New Jersey Department of Agriculture, EPA states . . . and I quote . . .

"The Agency has reviewed all available information on the teratogenic potential of carbaryl and concludes that the weight of evidence suggests that this potential effect from carbaryl in humans is low. There is more data on carbaryl in this area than for most other chemicals. The scientific data available does not pose an imminent hazard . . ."

EPA also points out, and rightfully so, that "one must never conclude that risks from exposure to any chemical are zero . . . and that women of child-bearing age should avoid any unnecessary exposures to carbaryl and other chemicals as well." This is certainly sound advice, no pesticide is absolutely safe to all persons at all times.

In conclusion, EPA does not plan to initiate any regulatory action against carbaryl at this time. The final chapter to this saga came in December 1980, when EPA returned carbaryl to the regular registration process, thus completing the review.

*Extension Pesticides Specialist
Department of Plant Pathology
Pennsylvania State University
University Park, Pennsylvania*