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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Cypermethrin - Review of Pesticide Poisoning Incident Data

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TO: Laura Morris, Occupational & Residential Exposure Branch

The following data bases have been consulted for the poisoning incident data on the active ingredient cypermethrin (Case Number 2130):

1) OPP Incident Data System (IDS) - reports of incidents from various sources, including registrants, other federal and state health and environmental agencies and individual consumers, submitted to OPP since 1992.

2) Poison Control Centers - as the result of Data-Call-Ins issued in 1993, OPP received Poison Control Center data covering the years 1985 through 1992 for 28 organophosphate and carbamate chemicals. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance which obtains data from 70 centers at hospitals or universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc.

3) California Department of Food and Agriculture (replaced by the

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Department of Pesticide Regulation in 1991) - California has collected uniform data on suspected pesticide poisonings since 1982. Physicians are required, by statute, to report to their local health officer all occurrences of illness suspected of being related to exposure to pesticides. The majority of the incidents involve workers. Information on exposure (worker activity), type of illness (systemic, eye, skin, eye/skin and respiratory), likelihood of a causal relationship, and number of days off work and in hospital are provided.

4) National Pesticide Telecommunications Network (NPTN) - NPTN is a toll-free information service supported by OPP. A ranking of the top 200 active ingredients for which telephone calls were received during calendar years 1984-1991, inclusive has been prepared. The total number of calls was tabulated for the categories humans, animals, calls, incidents and others.

CYPERMETHRIN REVIEW

Incident Data System

As of June 21, 1996, there were 124 reports in the Incident Data System for cypermethrin (PC Code 109702). Seventy-six (76) reports of adverse effects involved 129 humans; three additional reports were of offensive odor only. Many of the reports did not contain sufficient details to make a judgment as to whether the illness was caused by exposure to cypermethrin. However, there were reports of 22 cases of skin effects (described as irritation or tingling) and 6 reports of eye irritation (when product splashed in eyes) which are consistent with the known toxic effects of the chemical. There were four reports of children ingesting the chemical without symptoms of illness. In one report, 50 of 58 people in an office building treated with cypermethrin complained of odor, burning eyes, headaches, sore throat, chapped lips and itchy eyes. There was one suicide attempt in which a young woman drank 1 ounce of a 26% cypermethrin formulation. There were no details on her symptoms in the report; she was hospitalized in the intensive care unit but was discharged within 2 days.

Thirty-nine (39) reports involved the following number and species of animals: dogs (25); cats (10), goats (1), birds (1), gold fish (1), iguana (1) and python (1). The majority of these reports, most of which were submitted by FMC Corporation, were extremely sketchy and did not provide the clinical signs of illness. Therefore, any judgment about causality is not feasible.

An additional 6 reports dealt with environmental or ecological effects.

Poison Control Center Data

Cypermethrin is not a organophosphate or carbamate, therefore it was not included in the Data-Call-In.

California Data

There were 61 reports in the California data base from 1982 through 1993 involving exposure to cypermethrin alone, cypermethrin plus adjuvant or cypermethrin plus diazinon in which cypermethrin was judged to be responsible for the adverse reaction. In some of the reports, those affected experienced multiple signs of illness, e.g. systemic and skin reactions. The types of illnesses reported by the year in which incidents were received are presented in Table 1:

Table 1: California Cypermethrin Incidents, 1982-1993

Year	Illness Categories ^a				Total
	Systemic	Eye	Skin	Eye/Skin	
1986			1		1
1987	1	1			2
1988 ^b	12		1		13
1989			1	1	2
1990 ^c	25	7	3	2	37
1991			1		1
1992	2	1	1		4
1993 ^d	13	1	1		15
Total	53	10	9	3	75

a There may be multiple illnesses per report.

b Includes one incident involving 11 persons.

c Includes two incidents involving 22 persons.

d Includes one incident involving 7 persons.

There were several incidents in which groups of employees were exposed in work situations. In 1988, 11 employees became ill with nausea, headache, vomiting, burning eyes and chest tightness after a store was treated by a structural pest control operator (SPCO). In 1990, 8 employees in a medical clinic became ill a day after a SPCO treated a 9 square foot waiting room; symptoms included headache, nausea, chest pain and cough. Also in 1990, a SPCO contaminated the ventilation system of an office during a treatment with cypermethrin. When the employees entered the office two days later, they noticed an odor; 16 visited a physician, 14 had symptoms including headache, watery eyes, coughing, chest tightness, sneezing, burning in the throat, diarrhea, fatigue and

cypermethrin and the exterior with diazinon; 7 workers developed symptoms (similar to those listed above) within 15-60 minutes after entry.

The majority of the people in this data base were exposed to cypermethrin in a non-agricultural work situation but were not assigned to deal with pesticides. Of the 61 incidents, 47 exposures occurred while working in a structure previously treated with cypermethrin. The remaining activity categories (number of incidents) were exposure to drift (7), mixer/loader (4), applicator (1) and exposure to concentrate (1).

NPTN

Cypermethrin was number 16 on the top 200 active ingredients for which NPTN received calls from 1982-1991. There were 2905 calls reporting 310 incidents; 206 were in humans, 50 in animals and 54 others.

Use Information

California has use data on cypermethrin from 1984 through 1993 with the exception of 1989 when such data was not collected.

California Use Data for Cypermethrin

Year	Number of Applications	
	Agricultural	Non-agricultural
1984	516*	-
1985	1102**	-
1986	2047	188
1987	5782	3642
1988	13636	6788
1990***	8796	10465
1991	7714	11528
1992	11154	13627
1993	12329	13088

* Used on cotton only.

** Used on cotton and clover only.

*** There were no use data for 1989.

Literature Review

Morgan reports that there have been very few systemic poisonings of humans by pyrethroids.¹ The most frequently observed adverse effect

is observed with pyrethroids containing a cyano group (fenvalerate, flucythrinate, cypermethrin and fluvalinate). Paresthesia is experienced when liquid or volatilized chemical contacts the skin. Sensations are described as stinging, burning, itching, and tingling progressing to numbness. The skin of the face seems to be most commonly affected, but the hands, forearms, and neck are sometimes involved. Sweating and exposure to sun, heat or water may enhance the sensations. The effect is usually noted within minutes of exposure but may be delayed 1-2 hours before the appearance of symptoms. Sensations rarely persist more than 24 hours. It is presumed that the clinical signs result from pyrethroid contact with the sensory nerve endings. Race, skin type or disposition to allergic disease do not appear to be risk factors.

In a study from China, 199 workers engaged in dividing and packaging pyrethroids (deltamethrin, fenvalerate and cypermethrin) were monitored and air concentrations were measured (deltamethrin and fenvalerate only).² The workers were responsible for pouring imported barrelled 2.5% deltamethrin emulsion, 20% fenvalerate emulsion or 10% cypermethrin emulsion into 100 ml bottles. About 50,000 bottles a day were filled and packed into boxes. All of the work was conducted over a period of four to five months in the late winter or during the summer. The workers wore rubber gloves and gauze masks only in the winter. Approximately 70% of the workers developed abnormal facial sensations described as burning, tingling, itching, tightness or numbness. The sensations appeared about one-half hour after exposure and lasted no longer than 24 hours. Direct contact with the pyrethroid emulsion was not necessary to induce the paresthesias. Sneezing and increased nasal secretion were also present at work, more often in the winter group. Systemic symptoms such as dizziness, fatigue or nausea were subtle or mild. Red miliary papules with mild itching were found on 14.1% of workers, mainly on the face and chest.

In a study to test the irritation and sensitization risks of 7 pyrethroids, including cypermethrin, 230 human volunteers were patch tested with the chemicals. Only 2 irritant reactions, both to resmethrin, were observed.³

Summary/Conclusions

Incident Data System

There were 124 reports in the Incident Data System for cypermethrin. Seventy-six (76) reports of adverse effects involved 129 humans; three additional reports were of offensive odor only. Many of the reports did not contain sufficient details to make a judgment as to whether the illness was caused by exposure to cypermethrin. However, there were reports of 22 cases of skin effects (described as irritation or tingling) and 6 reports of eye irritation (when product splashed in eyes) which are consistent

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California Data, 1982-1993

There were 61 reports in the California data base from 1982 through 1993 involving exposure to cypermethrin alone, cypermethrin plus adjuvant or cypermethrin plus diazinon in which cypermethrin was judged to be responsible for the adverse reaction.

The majority of the people in this data base were exposed to cypermethrin in a non-agricultural work situation but were not assigned to deal with pesticides as a part of their employment. Of the 61 incidents, 47 exposures occurred while working in a structure previously treated with cypermethrin. The remaining activity categories (number of incidents) were exposure to drift (7), mixer/loader (4), applicator (1) and exposure to concentrate (1).

There were four reports involving 40 people exposed when offices were treated by a structural pest control operator. The majority of those affected had symptoms of systemic illness, including chest pain/tightness, coughing, sneezing, headache, nausea, vomiting and diarrhea. Watery/burning eyes and tingling skin were also reported.

NPTN

Cypermethrin was number 16 on the top 200 active ingredients for which NPTN received calls from 1982-1991. There were 2905 calls reporting 310 incidents; 206 were in humans, 50 in animals and 54 others.

Adverse Effects Reported in the Literature

There have been very few systemic poisonings of humans by pyrethroids. However, chemicals containing a cyano group, including cypermethrin, are known to cause a paresthesia reaction when the liquid or volatilized substance comes in contact with the skin. The face seems to be the most commonly affected; sweating and exposure to sun, heat or water may enhance the sensation. The effect is usually noted within minutes of the exposure and rarely persists more than 24 hours. It is thought to result from pyrethroid contact with sensory nerve endings.

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Recommendations

Based on the review of incident data from California, there is evidence that groups of people may experience systemic illness when exposed to cypermethrin residue after premise treatments by structural pest control operators. Mitigation measures should be aimed at reducing this exposure. Product labels should have clear instructions that an area should be vacated prior to treatment and well-ventilated after treatment to reduce cypermethrin exposure. In addition, based on the known toxic effects of pyrethroids, dermal exposure to cypermethrin should be minimized.

REFERENCES

1. Morgan DP. *Recognition and Management of Pesticide Poisonings, Fourth Edition*. U.S. Government Printing Office, Washington, D.C., p. 35
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3. Lisi P. Sensitization risk of pyrethroid insecticides. *Contact Dermatitis* 1192;26:349-350.