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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

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MEMORANDUM

**SUBJECT:** Review of Permethrin Incident Reports  
DP Barcode D298313, Chemical#109701

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**BACKGROUND**

The following data bases have been consulted for the poisoning incident data on the active ingredient Permethrin (PC Code: 109701):

- 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. Reports submitted to the Incident Data System represent anecdotal reports or allegations only, unless otherwise stated. Typically no conclusions can be drawn implicating the pesticide as a cause of any of the reported health effects. Nevertheless, sometimes with enough cases and/or enough documentation risk mitigation measures may be suggested. This review contains reports specific to permethrin only through 2002.
- 2) Poison Control Centers - as the result of a data purchase by EPA, OPP received Poison

Control Center data covering the years 1993 through 1998 for all pesticides. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance System which obtains data from about 65-70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc.

3) California Department of Pesticide Regulation - 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 the 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 human incidents, animal incidents, calls for information, and others.

5) National Institute of Occupational Safety and Health's Sentinel Event Notification System for Occupational Risks (NIOSH SENSOR) performs standardized surveillance in seven states from 1998 through 2002. States included in this reporting system are Arizona, California, Florida, Louisiana, Michigan, New York, Oregon, Texas, and Washington. Reporting is very uneven from state to state because of the varying cooperation from different sources of reporting (e.g., workers compensation, Poison Control Centers, emergency departments and hospitals, enforcement investigations, private physicians, etc.). Therefore, these reports should not be characterized as estimating the total magnitude of poisoning. The focus is on occupationally-related cases not residential or other non-occupational exposures. However, the information collected on each case is standardized and categorized according the certainty of the information collected and the severity of the case.

## PERMETHRIN REVIEW

### I. Incident Data System submitted 1992-2002

#### Incident#16-1

A pesticide incident occurred in 1992, when the product was used on cattle. An individual reported effects on their skin, hands, nose, and lips. No further information on the disposition of the case was reported.

#### Incident#124-6

A pesticide incident occurred in 1992, when a pest control operator, who has allergies,

wanted to obtain information on the potential for allergic reactions after using the product. The product was applied nineteen days earlier. No further information on the disposition of the case was reported.

Incident#165-38

A pesticide incident occurred in 1992, when a home was treated with the product. Several days later, a young child reported diarrhea. No further information on the disposition of the case was reported.

Incident#165-42

A pesticide incident occurred in 1992, when an individual reported a rash after mixing the product that got on their arm. No further information on the disposition of the case was reported.

Incident#165-61

A pesticide incident occurred in 1992, when an individual sprayed the product and reported skin tingling and numbness. The individual was treated by a physician. No further information on the disposition of the case was reported.

Incident#225-1

A pesticide incident occurred in 1992, when a four year old boy hugged a dog near an area where the product was applied. Four hours later, the boy reported a burning and tingling on his face and erythema. No further information on the disposition of the case was reported.

Incident#225-3

A pesticide incident occurred in 1992, when an eighteen year old girl reported hives on her limbs four days after the product was used on a dog. The girl was treated by a physician. No further information on the disposition of the case was reported.

Incident#225-4

A pesticide incident occurred in 1992, when a two year old boy reported a rash on his shoulder after his dog was treated with the product. The boy was treated by a physician. No further information on the disposition of the case was reported.

Incident#234-1

A pesticide incident occurred in 1992, when a woman applied the product to her dog. A short time later, she brushed the dog and reported itching and a rash on her elbow, wrists, knees, and ankles. No further information on the disposition of the case was reported.

Incident#256-10

A pesticide incident occurred in 1992, when a grower sprayed the product on alfalfa. The grower reported nausea. No further information on the disposition of the case was reported.

Incident#256-33

A pesticide incident occurred in 1992, when a woman walked barefoot through a wet area

that was treated with the product. The woman, who was pregnant at the time, lost her baby. No further information on the disposition of the case was reported.

Incident#299-1

A pesticide incident occurred in 1992, when a woman opened the product and squeezed it too hard. Some of the product got into her eyes and on her cheek. The woman reported a burning sensation on her cheek that lasted more than twelve hours. No further information on the disposition of the case was reported.

Incident#338-1

A pesticide incident occurred in 1992, when an owner applied the product to their dog. The owner reported rhinitis and eye irritation. No further information on the disposition of the case was reported.

Incident#340-4

A pesticide incident occurred in 1992, when a pest control operator treated a home with the product. An individual reported headaches. No further information on the disposition of the case was reported.

Incident#340-5

A pesticide incident occurred in 1992, when a pest control operator treated a home with the product. An individual reported a stomach ache, back pain, and dizziness. No further information on the disposition of the case was reported.

Incident#340-12

A pesticide incident occurred in 1992, when an individual sprayed the product with a dust mask instead of a respirator. The individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#340-16

A pesticide incident occurred in 1992, when an individual was asleep while their home was being treated with the product. The individual reported blurry vision. No further information on the disposition of the case was reported.

Incident#444-9

A pesticide incident occurred in 1993, when the exterior of a home was treated with the product. The homeowner reported skin tingling. No further information on the disposition of the case was reported.

Incident#444-13

A pesticide incident occurred in 1993, when a child reported conditions similar to an asthma attack after the product was applied. No further information on the disposition of the case was reported.

**Incident#444-27**

A pesticide incident occurred in 1993, when the hose on an applicator broke while a pest control operator was applying the product. The pest control operator was soaked and several days later reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#478-1**

A pesticide incident occurred in 1993, when an owner, who has a history of allergies, touched their dog a short time after the product was applied. The owner reported itching and difficulty breathing. No further information on the disposition of the case was reported.

**Incident#553-1**

A pesticide incident occurred in 1993, when a woman applied the product to a dog. The next day, she reported respiratory irritation. No further information on the disposition of the case was reported.

**Incident#582-11**

A pesticide incident occurred in 1993, when a home was treated several times with the product. The family reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#582-15**

A pesticide incident occurred in 1993, when wet soil around a home was treated with the product. A woman reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#582-31**

A pesticide incident occurred in 1993, when a grower, who did not wear personal protective equipment, sprayed the product and left his tractor cab doors open. The grower reported malaise and went to the hospital for treatment. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#582-42**

A pesticide incident occurred in 1993, when the basement in a home was treated with the product. Three days later, the homeowner reported nausea and sneezing. No further information on the disposition of the case was reported.

**Incident#582-60**

A pesticide incident occurred in 1993, when an individual, who did not wear personal protective equipment, applied the product. The individual reported welts and itchy skin. No further information on the disposition of the case was reported.

**Incident#707-6**

A pesticide incident occurred in 1993, when a homeowner returned home before the

product was dry and reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#707-31

A pesticide incident occurred in 1993, when an applicator's face was exposed to the product. The applicator reported skin irritation. No further information on the disposition of the case was reported.

Incident#707-41

A pesticide incident occurred in 1993, when a maintenance worker, who did not wear personal protective equipment, in an office building cleaned up a spill with an air blower. Several hours later, the worker reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#707-43

A pesticide incident occurred in 1993, when an individual's home was treated with Dragnet. Immediately afterwards, the occupants experienced minor skin rash. No further information on the disposition of the case was reported.

Incident#844-1

A pesticide incident occurred in 1993, when a man's home was treated with the product several times. The man reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#844-2

A pesticide incident occurred in 1993, when an individual's rug was treated with the product. The individual reported headaches and nausea. No further information on the disposition of the case was reported.

Incident#844-10

A pesticide incident occurred in 1993, when a crawl space in a home was treated with the product. The homeowners reported a mild headache. No further information on the disposition of the case was reported.

Incident#844-11

A pesticide incident occurred in 1993, when an individual walked barefoot through a puddle that contained the product. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#844-15

A pesticide incident occurred in 1993, when an individual reported coughing and a sore throat after the product was applied. No further information on the disposition of the case was reported.

**Incident#844-18**

A pesticide incident occurred in 1993, when an individual's home was treated with the product. A woman reported eye symptoms that were not mentioned and skin tingling. The woman's husband reported mild symptoms that were not mentioned. No further information on the disposition of the case was reported.

**Incident#844-29**

A pesticide incident occurred in 1993, when a pest control operator applied the product in a home. The homeowner reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#844-36**

A pesticide incident occurred in 1993, when a pest control operator applied the product in a home. The homeowner reported nausea, dizziness, and headaches. No further information on the disposition of the case was reported.

**Incident#844-39**

A pesticide incident occurred in 1993, when a home was treated with the product. Thirty days later, the homeowner reported an allergic reaction. No further information on the disposition of the case was reported.

**Incident#844-40**

A pesticide incident occurred in 1993, when a pest control operator applied the product in a home with a drill. The operator accidentally drilled into the air duct system and contaminated the carpet in the home. The occupants of the home reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#844-42**

A pesticide incident occurred in 1993, when a home was treated with the product. The occupants of the home reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#1028-7**

A pesticide incident occurred in 1994, when a home was treated with the product. Two days later, the homeowner reported a sore throat. No further information on the disposition of the case was reported.

**Incident#1028-9**

A pesticide incident occurred in 1994, when a home was treated with the product. A year later, the homeowner reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#1028-17**



A pesticide incident occurred in 1994, when a neighbor's home was treated with the product. The neighbor reported a skin rash. No further information on the disposition of the case was reported.

Incident#1028-18

A pesticide incident occurred in 1994, when the carpet and padding in a home were soaked after the product was applied to it. The homeowner reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1028-20

A pesticide incident occurred in 1994, when an individual entered an area that was treated with the product. The individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1028-26

A pesticide incident occurred in 1994, when an applicator applied the product and three hours later reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1028-31

A pesticide incident occurred in 1994, when a home was treated with the product. The occupants reported skin tingling. No further information on the disposition of the case was reported.

Incident#1138-1

A pesticide incident occurred in 1994, when the product was applied to a dog. A sixty-one year old woman reported burning sensations on her tongue and was treated by a physician. No further information on the disposition of the case was reported.

Incident#1179-3

A pesticide incident occurred in 1994, when an individual reported a skin rash five days after the product was used. No further information on the disposition of the case was reported.

Incident#1179-5

A pesticide incident occurred in 1994, when a construction worker reported a skin condition after working in a treated area several days earlier. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1179-6

A pesticide incident occurred in 1994, when an individual, who has a history of asthma, reported an asthma attack after entering a home that was treated with the product. No further information on the disposition of the case was reported.

Incident#1179-9

A pesticide incident occurred in 1994, when an individual reported a headache after their home was treated with the product. No further information on the disposition of the case was reported.

Incident#1179-10

A pesticide incident occurred in 1994, when an infant reported malaise and was treated at a hospital. Specific symptoms were not mentioned. The product was found in household water samples that were taken as part of an investigation. No further information on the disposition of the case was reported.

Incident#1179-29

A pesticide incident occurred in 1994, when a home was treated with the product. The next day, the occupants reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1179-43

A pesticide incident occurred in 1994, when a grower, who wore personal protective equipment, reported malaise a week after the product was applied. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1179-56

A pesticide incident occurred in 1994, when an individual reported skin irritation on their arms after using the product. The individual was treated at the hospital. No further information on the disposition of the case was reported.

Incident#1179-67

A pesticide incident occurred in 1994, when an individual reported a headache and a sore throat. The individual's home was treated with the product and was flooded two weeks earlier. No further information on the disposition of the case was reported.

Incident#1280-5

A pesticide incident occurred in 1994, when a man applied the product and accidentally spilled it on himself. Several hours later, he reported tingling in his legs. No further information on the disposition of the case was reported.

Incident#1280-7

A pesticide incident occurred in 1994, when an individual's home was treated with the product. The individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1280-9

A pesticide incident occurred in 1994, when several teenagers, who detasseled corn, reported skin irritation. The field was sprayed two days earlier with another product. No further information on the disposition of the case was reported.

## Incident#1280-11

A pesticide incident occurred in 1994, when a woman entered her home after it was treated with the product. She reported numbness. No further information on the disposition of the case was reported.

## Incident#1280-15

A pesticide incident occurred in 1994, when a homeowner reported malaise nine weeks after their home was treated with the product. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-16

A pesticide incident occurred in 1994, when a pest control operator treated a lawn with the product. The air conditioner dispersed the product throughout the home and the residents reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-21

A pesticide incident occurred in 1994, when the product was spilled at a crime scene. Several police officers reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-22

A pesticide incident occurred in 1994, when a home was treated with the product. An individual reported lightheadedness. No further information on the disposition of the case was reported.

## Incident#1280-24

A pesticide incident occurred in 1994, when the product was accidentally spilled on the outside of a home. One of the occupants reported flu-like symptoms. No further information on the disposition of the case was reported.

## Incident#1280-26

A pesticide incident occurred in 1994, when an applicator was accidentally drenched with the product. The applicator did not change clothes and later reported a skin rash. No further information on the disposition of the case was reported.

## Incident#1280-30

A pesticide incident occurred in 1994, when an individual got the product on their skin and reported a minor rash. No further information on the disposition of the case was reported.

## Incident#1280-42

A pesticide incident occurred in 1994, when an applicator treated a home with the product. The applicator reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-51

A pesticide incident occurred in 1994, when an apartment was treated with the product. The resident of the apartment reported skin tingling. No further information on the disposition of the case was reported.

## Incident#1280-53

A pesticide incident occurred in 1994, when an applicator, who has a history of epilepsy, was admitted to the hospital after reporting convulsions. No further information on the disposition of the case was reported.

## Incident#1280-56

A pesticide incident occurred in 1994, when a home was treated with the product while the owner was on vacation. A week later, the owner returned home and reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-57

A pesticide incident occurred in 1994, when a four year old child drank the product but immediately spit it out. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1280-64

A pesticide incident occurred in 1994, when a pest control operator entered a closed building a day after it was treated with the product. The pest control operator reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#1838-6

A pesticide incident occurred in 1994, when a homeowner reported a skin rash fourteen days after a rug was treated with the product. No further information on the disposition of the case was reported.

## Incident#1838-8

A pesticide incident occurred in 1994, when a transfer motor exploded during an application. The product got in the eyes of the applicator. No further information on the disposition of the case was reported.

## Incident#1838-9

A pesticide incident occurred in 1994, when an applicator sprayed a corn field with the product. After the applicator entered the field he reported a skin rash. No further information on the disposition of the case was reported.

## Incident#1838-15

A pesticide incident occurred in 1994, when a home was treated with the product. An

individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1838-19

A pesticide incident occurred in 1994, when an applicator, who applied the product for two years without wearing personal protective equipment, reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1838-20

A pesticide incident occurred in 1994, when a pest control operator treated a home with the product. An individual's daughter reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1838-23

A pesticide incident occurred in 1994, when the crawl space in a home was treated with the product. Several days later, a woman reported bronchial irritation and a dry throat. No further information on the disposition of the case was reported.

Incident#1838-28

A pesticide incident occurred in 1994, when a home was treated with the product. Residents of the home reported itching of the skin. No further information on the disposition of the case was reported.

Incident#1838-30

A pesticide incident occurred in 1994, when an area under an old trailer home was treated with the product. An individual fell through the floor and into the treated area and reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1838-31

A pesticide incident occurred in 1994, when an individual, who did not wear personal protective equipment, stood in close proximity to a treated area. The individual reported itching of the skin. No further information on the disposition of the case was reported.

Incident#1838-32

A pesticide incident occurred in 1994, when an individual worked in an area that was treated with the product without any ventilation. The individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#1838-35

A pesticide incident occurred in 1994, when a home was treated with the product. Eight days later, a woman, who is pregnant, reported nose bleeds. No further information on the disposition of the case was reported.

**Incident#1838-36**

A pesticide incident occurred in 1994, when a home was treated with the product and the heating ducts were accidentally punctured. As a result, occupants of the home reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#1838-37**

A pesticide incident occurred in 1994, when a home was treated with the product. A week later, occupants of the home reported headaches. No further information on the disposition of the case was reported.

**Incident#1854-1**

A pesticide incident occurred in 1994, when a woman was sprayed as a result of an aerial application. The next day she saw her doctor for a rash. The doctor suspected poison ivy or contact dermatitis. No further information on the disposition of the case was reported.

**Incident#2067-1**

A pesticide incident occurred in 1995, when an applicator applied the product to a home and the heating ducts were contaminated. A woman reported respiratory problems and was later treated by a physician. No further information on the disposition of the case was reported.

**Incident#2290-1**

A pesticide incident occurred in 1994, when the product was applied in a home and the duct work was contaminated. No further information on the disposition of the case was reported.

**Incident#2290-7**

A pesticide incident occurred in 1994, when a home was treated with the product. An individual reported nausea and headaches. No further information on the disposition of the case was reported.

**Incident#2290-9**

A pesticide incident occurred in 1995, when a home was treated with the product. A woman reported a throat problem. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#2290-10**

A pesticide incident occurred in 1995, when a small enclosed office was treated with the product. An individual who works in the office reported headaches and dizziness. No further information on the disposition of the case was reported.

**Incident#2290-20**

A pesticide incident occurred in 1995, when a shelter for women was treated with the product. Occupants of the shelter reported headaches, fever, and vomiting. The shelter was later evacuated. No further information on the disposition of the case was reported.

## Incident#2290-23

A pesticide incident occurred in 1995, when an elderly day center was treated with the product. Several individuals reported nausea and headaches. The treated areas were not cleaned up properly. No further information on the disposition of the case was reported.

## Incident#2290-27

A pesticide incident occurred in 1995, when an individual reported a headache after an area was treated with the product. No further information on the disposition of the case was reported.

## Incident#2290-28

A pesticide incident occurred in 1993, when an individual reported headaches. The applicator who applied the product admitted that the application was not done correctly. No further information on the disposition of the case was reported.

## Incident#2290-29

A pesticide incident occurred in 1995, when a home was treated with the product. Upon reentering the home, an individual reported flu-like symptoms. No further information on the disposition of the case was reported.

## Incident#2290-30

A pesticide incident occurred in 1995, when a home was treated with the product. The homeowner reported headaches. No further information on the disposition of the case was reported.

## Incident#2290-33

A pesticide incident occurred in 1995, when a home was treated the product. A twenty-five month old child reported skin rash, coughing, running nose, and fever. The child was treated by a physician. No further information on the disposition of the case was reported.

## Incident#2290-34

A pesticide incident occurred in 1995, when a six month old child reported vomiting after a home was treated with the product. No further information on the disposition of the case was reported.

## Incident#2423-5

A legal case was brought in 1995, alleging a pest control operator developed rash on chest and arms as a result of using the termiticide product. No further information on the disposition of the case was reported.

## Incident#2443-9

A pesticide incident occurred in 1995, when a home was treated with the product. A guest, who has allergies, reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#2443-15

A pesticide incident occurred in 1995, when a pest control operator cleaned out spray tanks and allowed the product to travel into the ground toward an individual's home. The individual reported headaches. No further information on the disposition of the case was reported.

## Incident#2443-17

A pesticide incident occurred in 1995, when an individual reported nausea, dizziness, muscle aches, and headaches after inhaling the product. No further information on the disposition of the case was reported.

## Incident#2443-19

A pesticide incident occurred in 1995, when the product splashed into their face while an individual was mixing it. The individual showered and changed their clothes. The individual reported mild skin irritation near the corner of their eye. No further information on the disposition of the case was reported.

## Incident#2443-27

A pesticide incident occurred in 1995, when a crawl space in a home was treated with the product. The homeowners reported dry eyes and a rash on the face. They were treated by a physician. No further information on the disposition of the case was reported.

## Incident#2443-31

A pesticide incident occurred in 1995, when a home was treated with the product. An individual reported a severe sore throat. No further information on the disposition of the case was reported.

## Incident#2443-48

A pesticide incident occurred in 1995, when a twenty-five gallon tank of the diluted product overturned. The product got in the eyes, mouth, and on the skin of an individual. The individual reported tingling of the skin. No further information on the disposition of the case was reported.

## Incident#2443-49

A pesticide incident occurred in 1995, when an applicator spilled twenty gallons of the diluted product on himself. The applicator showered and changed his clothes. He reported tingling of the skin. No further information on the disposition of the case was reported.

## Incident#2443-72

A pesticide incident occurred in 1995, when a home was treated with the product. Two weeks later, the homeowner, who is a heavy smoker, reported coughing. No further information on the disposition of the case was reported.



## Incident#2443-73

A pesticide incident occurred in 1995, when a home was treated with the product. A three year old child reported sneezing and watery eyes. No further information on the disposition of the case was reported.

## Incident#2443-77

A pesticide incident occurred in 1995, when a home was treated with the product. A woman reported headache, nausea, diarrhea, and a skin rash. No further information on the disposition of the case was reported.

## Incident#2495-1

A pesticide incident occurred in 1995, when an individual touched their dog four days after the product was applied to the dog. The individual then touched their face and reported facial irritation. No further information on the disposition of the case was reported.

## Incident#2796-107

Report unavailable due to technical difficulties.

## Incident#3296-5

A pesticide incident occurred in 1995, when the product blew into the eyes and face of a technician while he was applying it. The technician reported tingling of the skin. No further information on the disposition of the case was reported.

## Incident#3296-14

A pesticide incident occurred in 1995, when an individual, who did not wear personal protective equipment, applied the product for three weeks. The individual reported swollen glands and was treated by a physician. No further information on the disposition of the case was reported.

## Incident#3296-15

A pesticide incident occurred in 1995, when a home was treated with the product. A homeowner reported headaches and lightheadedness. No further information on the disposition of the case was reported.

## Incident#3296-20

A pesticide incident occurred in 1995, when a home was treated with the product. Three weeks later, an individual reported eye irritation. No further information on the disposition of the case was reported.

## Incident#3296-21

A pesticide incident occurred in 1995, when a home was treated with the product. Two days later, an individual reported burning of the throat. No further information on the disposition of the case was reported.

**Incident#3296-23**

A pesticide incident occurred in 1995, when a home was treated with the product. An individual reported headaches, tingling of the skin, disorientation, and memory loss. No further information on the disposition of the case was reported.

**Incident#3296-24**

A pesticide incident occurred in 1995, when an applicator, who did not wear personal protective equipment, applied the product in a home. The applicator reported dermal and inhalation symptoms. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#3296-26**

A pesticide incident occurred in 1995, when a home was treated with the product. Six weeks later, an individual reported headaches, scabs on nose, queasy stomach, skin burns and tumors on the left hand. No further information on the disposition of the case was reported.

**Incident#3296-40**

A pesticide incident occurred in 1995, when the carpet was treated with the product. Occupants of the home reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

**Incident#3296-46**

A pesticide incident occurred in 1995, when an apartment was treated with the product. Three weeks later, the occupant reported inability to open eyes, crusty scalp, and itchy eyelids. No further information on the disposition of the case was reported.

**Incident#3296-50**

A pesticide incident occurred in 1995, when a room was treated with the product. The room was sealed off for one week. When a pest control operator's work crew reentered the room, they reported eye irritation, drowsiness, and vomiting. The individuals were treated by a physician. No further information on the disposition of the case was reported.

**Incident#3296-56**

A pesticide incident occurred in 1995, when a home was treated with the product. An occupant reported skin puffiness and difficulty breathing. No further information on the disposition of the case was reported.

**Incident#3296-62**

A pesticide incident occurred in 1995, after a home was treated with the product. The occupant reported a dry throat. No further information on the disposition of the case was reported.

**Incident#3296-72**

A pesticide incident occurred in 1995, when an individual mixed the product in a spray

operation for several days. The worker reported weakness, dizziness, and nausea. No further information on the disposition of the case was reported.

Incident#3296-77

A pesticide incident occurred in 1995, when a home was treated with the product. An occupant reported a headache. No further information on the disposition of the case was reported.

Incident#3296-80

A pesticide incident occurred in 1995, when a home was treated with the product that was sealed for several days. When the occupant returned home, the man reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#3296-88

A pesticide incident occurred in 1995, when a home was treated with the product. Six days later, the homeowner reported diarrhea and tingling of the fingers. No further information on the disposition of the case was reported.

Incident#3518-1

A pesticide incident occurred in 1996, when a woman reported a headache and dizziness after sleeping with her dog that was treated with the product. No further information on the disposition of the case was reported.

Incident#3544-1

A pesticide incident occurred in 1996, when a veterinary doctor got some of the product on her hands. She reported blisters on her hand and peeling skin. No further information on the disposition of the case was reported.

Incident#3582-2

A pesticide incident occurred in 1996, when a worker transferred the product from a large to a small container and it got into his eyes. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#3582-8

A pesticide incident occurred in 1996, when a home was treated with the product. Two patients were treated in the emergency room by a physician. They were not responding and were staggering. No further information on the disposition of the case was reported.

Incident#3582-9

A pesticide incident occurred in 1996, when a home was treated with the product. An occupant reported malaise and was treated by a physician. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-17

A pesticide incident occurred in 1996, when an apartment was treated with the product. A woman's young son reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-29

A pesticide incident occurred in 1996, when a home was treated with the product. An individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-30

A pesticide incident occurred in 1996, after a home was treated with the product. A woman reported a headache. No further information on the disposition of the case was reported.

## Incident#3582-31

A pesticide incident occurred in 1996, when a crawl space was treated with the product. An individual reported flu-like symptoms and malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-43

A pesticide incident occurred in 1996, when an office was treated with the product. An office worker reported blurry vision and burning eyes. No further information on the disposition of the case was reported.

## Incident#3582-45

A pesticide incident occurred in 1996, when a home was treated with the product. The occupants reported nausea. No further information on the disposition of the case was reported.

## Incident#3582-50

A pesticide incident occurred in 1996, when the inside of a truck cab was contaminated during a spray application. The worker rode for thirty minutes and later reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-53

A pesticide incident occurred in 1996, after a home was treated with the product. A woman reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#3582-59

A pesticide incident occurred in 1996, when a home was treated with the product. A woman, who has a history of asthma, reported difficulty breathing and a swollen face. No further information on the disposition of the case was reported.

**Incident#3785-1**

A pesticide incident occurred in 1996, when an individual reported an asthmatic reaction after exposure to the product. No further information on the disposition of the case was reported.

**Incident#4289-1**

A pesticide incident occurred in 1996, when the product was aerielly applied to a nearby cornfield. The woman reported a fever and difficulty breathing and was later hospitalized for several days. No further information on the disposition of the case was reported.

**Incident#4439-1**

A pesticide incident occurred in 1996, when a baby was under a tree that was sprayed with the product. The baby reported vomiting. No further information on the disposition of the case was reported.

**Incident#4439-14**

A pesticide incident occurred in 1996, when a nine year old child mixed the product with a chocolate drink and drank it. The child immediately spit the drink out. No further information on the disposition of the case was reported.

**Incident#4439-20**

A pesticide incident occurred in 1996, when the product was applied in a home. The next day, a woman, who has allergies, reported swollen eyes, itchy skin, and a sore throat. She was treated by a physician. No further information on the disposition of the case was reported.

**Incident#4439-23**

A pesticide incident occurred in 1996, when a home was treated with the product. A woman reported flu-like symptoms and was treated by a physician. No further information on the disposition of the case was reported.

**Incident#4439-30**

A pesticide incident occurred in 1996, when a gallon of the product was spilled during an application. An individual reported drowsiness and tingling skin. No further information on the disposition of the case was reported.

**Incident#4439-44**

A pesticide incident occurred in 1996, when the sprayer leaked while the product was applied. As a result, an individual was soaked and continued to wear their contaminated boots. The individual reported tingling skin. The individual continued to use the product for two more days. After the third application, the individual reported diarrhea and tingling of his feet. No further information on the disposition of the case was reported.

**Incident#4439-46**

A pesticide incident occurred in 1996, when a home was treated with the product. An occupant reported vomiting. No further information on the disposition of the case was reported.

## Incident#4439-48

A pesticide incident occurred in 1996, when an individual entered a treated field two days after it was treated with the product. The individual reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#4439-49

A pesticide incident occurred in 1996, when a worker entered a corn field eight or nine hours after it was treated with the product. The re-entry interval is twelve hours. The worker reported tingling of the skin and fatigue. No further information on the disposition of the case was reported.

## Incident#4439-52

A pesticide incident occurred in 1996, when a home was treated with the product. An individual reported headaches. No further information on the disposition of the case was reported.

## Incident#4439-56

A pesticide incident occurred in 1996, when a worker spent three hours in a corn field after it was treated with the product. The worker was not aware that the field had been treated. The worker reported an upset stomach and a headache. No further information on the disposition of the case was reported.

## Incident#4439-57

A pesticide incident occurred in 1996, when the top of a hand sprayer was loose and the diluted product hit an individual in their face. The individual reported vomiting, weakness, and clammy. No further information on the disposition of the case was reported.

## Incident#4439-58

A pesticide incident occurred in 1996, when a woman reentered a home several days after it was treated with the product. She walked across treated rugs in her barefeet. She reported coughing, chest tightness, nausea, headaches, vomiting, and tingling in her feet. No further information on the disposition of the case was reported.

## Incident#4439-59

A pesticide incident occurred in 1996, when the product was applied aerially and it drifted into a family's home through windows that were open. The family reported sore throats. No further information on the disposition of the case was reported.

## Incident#4439-63

A pesticide incident occurred in 1996, when the undiluted product was transferred to a mixing tank and the pump motor burst into flames. An individual was taken to the hospital. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#4439-65

A pesticide incident occurred in 1996, when the product was applied on the outside of a woman's home. A woman reported swollen feet and a skin rash and was treated by a physician. No further information on the disposition of the case was reported.

## Incident#4439-68

A pesticide incident occurred in 1996, when the product was applied in a home and three individuals started working in the crawl space. The workers reported skin tingling and a rash. No further information on the disposition of the case was reported.

## Incident#4439-77

A pesticide incident occurred in 1996, when an applicator reported an upset stomach and dizziness after applying the product. No further information on the disposition of the case was reported.

## Incident#4439-80

A pesticide incident occurred in 1996, when a bystander was sprayed with the product after it was applied nearby. Hours later, the individual reported numb skin. No further information on the disposition of the case was reported.

## Incident#4439-83

A pesticide incident occurred in 1996, when an individual observed the product being applied and reported malaise. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#4439-85

A pesticide incident occurred in 1996, when a home was treated with the product. An occupant reported malaise but feels better whenever she leaves the home. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#4439-86

A pesticide incident occurred in 1996, when an apartment, that was not properly ventilated, was treated with the product. The treatment holes were not plugged. Occupants reported headaches, sore throats, and nausea. No further information on the disposition of the case was reported.

## Incident#4439-115

A pesticide incident occurred in 1996, when the outside of a home was treated with the product. The applicator did not know that there was a well about fifteen feet from the application site. Later in the day, the water had an odor. No further information on the disposition of the case was reported.

## Incident#4439-117

A pesticide incident occurred in 1996, when a two year old girl drank some of the concentrated product. No further information on the disposition of the case was reported.

Incident#4439-132

A pesticide incident occurred in 1996, when a home was treated with the product. A woman reported peripheral neuropathy. No further information on the disposition of the case was reported.

Incident#4439-136

A pesticide incident occurred in 1996, when an apartment was treated with the product. An individual was in the apartment at the same time. Twenty minutes later, the individual reported a headache, stomachache, dizziness, and itchy skin. The individual was treated by a nurse. No further information on the disposition of the case was reported.

Incident#4439-139

A pesticide incident occurred in 1996, when a home was treated with the product. Several hours later, a one month old baby reported difficulty swallowing, watery eyes, and respiratory arrest and was treated at the hospital. No further information on the disposition of the case was reported.

Incident#4439-140

A pesticide incident occurred in 1996, when an employee, who did not wear personal protective equipment, reported malaise while treating a confined crawl space in a house. The area was very hot and humid. The employee was taken to the hospital. No further information on the disposition of the case was reported.

Incident#4439-143

A pesticide incident occurred in 1996, when the product was applied to a concrete block wall. An occupant of the office reported a sore throat, chest tightness, and hoarseness. The symptoms disappear whenever the individual is away from the office. No further information on the disposition of the case was reported.

Incident#4852-1

A pesticide incident occurred in 1996, when a home was treated with the product. An occupant reported burning eyes. Due to heavy rains it was not possible to ventilate the treated areas. No further information on the disposition of the case was reported.

Incident#4852-3

A pesticide incident occurred in 1996, when a homeowner, who is sensitive to chemicals, reported a facial reaction. No further information on the disposition of the case was reported.

Incident#4852-4

A pesticide incident occurred in 1996, when a home was treated with the product. The treated areas were not ventilated. Several days later, individuals reentered the room and reported



eye irritation, headaches, and asthma-like symptoms. No further information on the disposition of the case was reported.

Incident#4852-10

A pesticide incident occurred in 1996, when a home was treated with the product. The hollow cement blocks were not capped following treatment. The homeowner did not specify symptoms. No further information on the disposition of the case was reported.

Incident#4852-14

A pesticide incident occurred in 1996, when a home was treated with the product. Specific symptoms were not mentioned by the homeowner. No further information on the disposition of the case was reported.

Incident#4852-20

A pesticide incident occurred in 1996, when an apartment was treated with the product. An individual reported burning skin, head pain, confusion, and disorientation. The individual was also exposed to several other chemicals at work. No further information on the disposition of the case was reported.

Incident#4852-22

A pesticide incident occurred in 1996, when workers entered mushroom houses twelve hours after they were treated with the product. One worker reported a headache and a second worker reported spots in front of their eyes. No further information on the disposition of the case was reported.

Incident#4852-24

A pesticide incident occurred in 1996, when a home was treated with the product. Spray puddles were present on the floor. The homeowner reported skin burning. No further information on the disposition of the case was reported.

Incident#5529-1

A pesticide incident occurred in 1997, when a woman applied the product to her dog. Later in the evening, the woman reported vomiting, stomach pain, and numb fingers. No further information on the disposition of the case was reported.

Incident#5543-2

A pesticide incident occurred in 1997, when a home was treated with the product. The next day, an occupant reported swollen lips. A rug in the home was contaminated with the product. No further information on the disposition of the case was reported.

Incident#5543-3

A pesticide incident occurred in 1997, when an office was treated with the product. A spill occurred that was not cleaned up. Occupants reported skin irritation. No further

information on the disposition of the case was reported.

Incident#5572-2

A pesticide incident occurred in 1988, when a woman reported burning hands and feet and itchy skin on two different occasions when she cleaned the interior of her house. No further information on the disposition of the case was reported.

Incident#5598-1

A pesticide incident occurred in 1997, when an individual handled a dog that was treated with the product. The individual reported a rash. No further information on the disposition of the case was reported.

Incident#7025-1

A pesticide incident occurred in 1997, when the product was spilled in a storeroom and was not properly cleaned up. A female worker handled a wet box that was on the storeroom floor. The next day, she reported a rash, swollen knees, and achy joints. The woman missed twelve weeks of work. No further information on the disposition of the case was reported.

Incident#7155-42

Report unavailable due to technical difficulties.

Incident#7155-62

A pesticide incident occurred in 1996, when the product was applied around a football field. A cheerleader entered the area for a game and reported swollen lips. The woman was treated by a physician. No further information on the disposition of the case was reported.

Incident#7155-63

A pesticide incident occurred in 1996, when the product got into a man's eyes. The man reported eye irritation and pain and was treated by a physician in an emergency room. No further information on the disposition of the case was reported.

Incident#7374-1

A pesticide incident occurred in 1998, when a twenty-four year old woman, who has a history of asthma, reported dyspnea and shortness of breath and was treated in an emergency room. She returned home about 5 hours after the product was applied. No further information on the disposition of the case was reported.

Incident#7429-1

A pesticide incident occurred in 1998, when a woman was accidentally exposed after her dogs got onto a blanket after they were treated with the product. She reported hives and was later treated by a physician. No further information on the disposition of the case was reported.

Incident#7545-7

A pesticide incident occurred in 1998, when a home was treated with the product. Seven

days later, an individual reported fatigue, headaches, chills, fever, and episodic ringing in the ears. No further information on the disposition of the case was reported.

Incident#7545-8

A pesticide incident occurred in 1998, when a home was treated with the product. The individual reported coughing, sneezing, and a runny nose. No further information on the disposition of the case was reported.

Incident#7545-13

A pesticide incident occurred in 1998, when a man was in a building that was treated with the product a week earlier. The man reported eye irritation. His wife reported diarrhea and coughing. No further information on the disposition of the case was reported.

Incident#7545-19

A pesticide incident occurred in 1998, when a worker, who will not wear a respirator, reported congested lungs while applying the product. No further information on the disposition of the case was reported.

Incident#7545-30

A pesticide incident occurred in 1998, when an applicator removed a pump from a fifteen gallon container and got some of it on his skin. The worker reported skin sensitivity, congestion, and a runny nose. No further information on the disposition of the case was reported.

Incident#7545-47

A pesticide incident occurred in 1998, when a man applied the product and immediately reported a skin rash. No further information on the disposition of the case was reported.

Incident#7546-1

A pesticide incident occurred in 1997, when occupants entered an apartment several minutes after it was treated with the product. The next day, a young child reported a skin rash and swollen eyes. No further information on the disposition of the case was reported.

Incident#7546-2

A pesticide incident occurred in 1997, when a crawl space was treated with the product. The homeowner, who did not wear eye protection, reported eye irritation. No further information on the disposition of the case was reported.

Incident#7546-3

A pesticide incident occurred in 1997, when a home was treated with the product. The homeowner reported a skin rash. No further information on the disposition of the case was reported.

Incident#7546-12

A pesticide incident occurred in 1997, when a home was treated with the product. The

next day, a twenty-month old child visited the home and reported stumbling. No further information on the disposition of the case was reported.

Incident#7546-13

A pesticide incident occurred in 1997, when an applicator applied the product and got some of it on his clothes. The applicator reported chest pains and shortness of breath and was treated at the hospital. No further information on the disposition of the case was reported.

Incident#7546-19

A pesticide incident occurred in 1997, when a home was treated with the product but was not properly ventilated. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

Incident#7546-23

A pesticide incident occurred in 1997, when a homeowner cleaned up a spill in their basement after the product was applied. The homeowner reported headaches, nausea, and salivation. No further information on the disposition of the case was reported.

Incident#7546-30

A pesticide incident occurred in 1997, when the product was applied and a neighbor was accidentally sprayed in the face. The neighbor reported vomiting, nausea, and a skin rash. No further information on the disposition of the case was reported.

Incident#7546-32

A pesticide incident occurred in 1997, when a home was treated with the product. A woman reported a runny nose and a swollen face, throat, and eyes. No further information on the disposition of the case was reported.

Incident#7546-42

A pesticide incident occurred in 1997, when a home was treated with the product. An individual reported skin burning to the face and other areas. No further information on the disposition of the case was reported.

Incident#7546-43

A pesticide incident occurred in 1997, when the product was applied to a yard. Several children reported a headache. No further information on the disposition of the case was reported.

Incident#7546-45

A pesticide incident occurred in 1997, when a home was treated with the product. A woman reported an allergic reaction whenever she enters her home. No further information on the disposition of the case was reported.

Incident#7546-47

A pesticide incident occurred in 1997, when a home was treated with the product. The

homeowner reported malaise whenever he enters his home. No further information on the disposition of the case was reported.

Incident#7546-48

A pesticide incident occurred in 1997, when an applicator applied the product. The next day, the applicator reported skin irritation, hot flashes, and a sore throat. No further information on the disposition of the case was reported.

Incident#7546-60

A pesticide incident occurred in 1997, when a home was treated with the product. A woman, who is seven months pregnant, reported symptoms similar to a cold and allergies. No further information on the disposition of the case was reported.

Incident#7546-63

A pesticide incident occurred in 1997, when two applicators applied the product. They reported eye irritation and a skin rash. No further information on the disposition of the case was reported.

Incident#7546-64

A pesticide incident occurred in 1997, when the product was applied and the next day a man reported blurry vision and elevated blood pressure. No further information on the disposition of the case was reported.

Incident#7546-66

A pesticide incident occurred in 1997, when an individual was exposed through the dermal route to the product. Three days later, the individual reported dizziness and weakness. No further information on the disposition of the case was reported.

Incident#7546-67

A pesticide incident occurred in 1997, when the diluted product splashed in the caller's face and mouth. The individual reported nausea, dizziness, and skin irritation. No further information on the disposition of the case was reported.

Incident#7546-71

A pesticide incident occurred in 1997, when a home was treated with the product. Three days later, an individual reported nausea and diarrhea. No further information on the disposition of the case was reported.

Incident#7546-74

A pesticide incident occurred in 1997, when an apartment was treated with the product. A woman, who is pregnant, reported a headache, difficulty breathing, and dizziness. No further information on the disposition of the case was reported.

Incident#7546-75

A pesticide incident occurred in 1997, when a man applied the product to several fields within a few days. He entered the fields and reported nausea, headache, swollen lymph nodes, blisters in his mouth, and chest tightness. No further information on the disposition of the case was reported.

Incident#7546-92

A pesticide incident occurred in 1997, when an office building was treated with the product. Several individuals reported headaches and tingling lips. No further information on the disposition of the case was reported.

Incident#7546-96

A pesticide incident occurred in 1997, when an individual obtained the product from someone that worked for a pest control operator. The individual then applied the product that is an illegal use of it. The individual's family reported malaise. No further information on the disposition of the case was reported.

Incident#7546-98

A pesticide incident occurred in 1997, when the product splashed on a woman's arm. The woman reported a skin rash and pain in her joints and was treated by a physician. No further information on the disposition of the case was reported.

Incident#7546-101

A pesticide incident occurred in 1997, when a home was treated with the product. A man reported severe headaches and was treated by a physician. No further information on the disposition of the case was reported.

Incident#7546-105

A pesticide incident occurred in 1997, when an applicator got some of the spray solution in his mouth through the spray hose. The applicator reported dizziness and nausea and was treated at the hospital. No further information on the disposition of the case was reported.

Incident#7546-106

A pesticide incident occurred in 1997, when an individual sprayed the product and got some of it on his arms. The individual reported a rash on his back and arms. No further information on the disposition of the case was reported.

Incident#7546-109

A pesticide incident occurred in 1997, when an applicator was accidentally sprayed in the face. The applicator reported eye irritation. No further information on the disposition of the case was reported.

Incident#7546-116

A pesticide incident occurred in 1997, when a home was treated with the product

monthly. A man reported a rash and nose bleeding. No further information on the disposition of the case was reported.

Incident#7546-117

A pesticide incident occurred in 1997, when a pest control operator treated a slab inside a building. Nearby workers and neighbors reported dizziness, upset stomach, and diarrhea. No further information on the disposition of the case was reported.

Incident#7546-118

A pesticide incident occurred in 1997, when a home was treated with the product. The home was not properly ventilated. An individual reported a headache, burning eyes, and sinus trouble. No further information on the disposition of the case was reported.

Incident#7546-119

A pesticide incident occurred in 1997, when a home was treated with the product. A man and his wife reported flu-like symptoms. No further information on the disposition of the case was reported.

Incident#7546-121

A pesticide incident occurred in 1997, when an applicator sprayed the product and got some of it in his mouth and on his skin. The applicator reported vomiting and nausea. No further information on the disposition of the case was reported.

Incident#7546-122

A pesticide incident occurred in 1997, when a home was treated with the product. The homeowner reported malaise. No further information on the disposition of the case was reported.

Incident#7587-46

A pesticide incident occurred in 1996, when a two year old boy reported a sore throat, eye irritation, and anorexia. No further information on the disposition of the case was reported.

Incident#7666-80

A pesticide incident occurred in 1998, when the product was applied at a woman's work site. The 42 year-old woman reported hives, welts, rash, tingling, throat irritation, blurry vision, ocular irritation and pain, bronchospasm, nasal irritation, and shortness of breath. The woman was treated by a physician. No further information on the disposition of the case was reported.

Incident#7791-18

A pesticide incident occurred in 1998, when a forty-six year old man reported paresthesia, nausea, and headache. The man used the diluted product and some of the mist got into his face. No further information on the disposition of the case was reported.

Incident#7906-5

A pesticide incident occurred in 1998, when a woman applied the product in her home.

The woman's ten year old girl reported a rash on her chest, back, and face and swollen eyes. The girl was treated at the hospital by a physician. No further information on the disposition of the case was reported.

Incident#7906-9

A pesticide incident occurred in 1998, when a fifty-four year old woman applied the product to her lawn. The woman reported respiratory irritation, sore throat, and chest tightness. The woman was treated in the emergency department by a physician. No further information on the disposition of the case was reported.

Incident#8046-6

A pesticide incident occurred in 1998, when a home was treated with the product for about three years. Five months after a new occupant moved into the home the woman reported a rash, itchy skin, and eye redness. No further information on the disposition of the case was reported.

Incident#8210-3

A pesticide incident occurred in 1998, when a man applied the product and reported chest pains. No further information on the disposition of the case was reported.

Incident#8260-1

A pesticide incident occurred in 1998, when an individual used six canisters of the product in their home. The individual reported allergy problems, memory loss, burning eyes, bronchitis, arthritis, neuralgia, and burning lips and tongue. No further information on the disposition of the case was reported.

Incident#8384-3

A pesticide incident occurred in 1997, when an individual reported dizziness and diaphoresis that was not related to exposure to the product. No further information on the disposition of the case was reported.

Incident#8384-4

A pesticide incident occurred in 1997, when an eight year old child ingested the product and reported oral irritation. No further information on the disposition of the case was reported.

Incident#8384-347

A pesticide incident occurred in 1998, when an individual inhaled the product. The individual reported numb lungs that was not related to exposure to the product. No further information on the disposition of the case was reported.

Incident#8384-348

A pesticide incident occurred in 1998, when an individual inhaled the product. The individual reported numb lungs that was not related to exposure to the product. No further information on the disposition of the case was reported.



## Incident#8384-349

A pesticide incident occurred in 1998, when an individual reported nausea, confusion, hyperactive bowels, and sinus problems that was not related to exposure to the product. No further information on the disposition of the case was reported.

## Incident#8400-4

A pesticide incident occurred in 1999, when a twenty-one year old man reported muscle twitching after the product was applied in his apartment. He was later treated by a physician. No further information on the disposition of the case was reported.

## Incident#8400-5

A pesticide incident occurred in 1998, when the product was applied in a basement. The next day, a woman reported dysrhythmia, tingling, and a headache. The woman was later treated by a physician. No further information on the disposition of the case was reported.

## Incident#8534-1

A pesticide incident occurred in 1999, when a twenty year old man reported vomiting and a seizure after his home was treated with the product. No further information on the disposition of the case was reported.

## Incident#8534-2

A pesticide incident occurred in 1997, when a seventy-two year old woman, who has a history of emphysema, was hospitalized with pneumonitis. No further information on the disposition of the case was reported.

## Incident#9150-27

A pesticide incident occurred in 1999, when a woman applied the product in her home. The woman reported dermal irritation and pain, pruritus, rash, diarrhea, lacrimation, and bullae. No further information on the disposition of the case was reported.

## Incident#9150-28

A pesticide incident occurred in 1998, when a woman used the product in her crawl space under her mobile home. The woman reported malaise for a year. Specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## Incident#9252-1

A pesticide incident occurred in 1999, when a home was treated with the product. Two hours later, a two month old girl reported a single seizure after returning home. The girl was then treated by a physician. No further information on the disposition of the case was reported.

## Incident#9441-1

Report unavailable due to technical difficulties.

## Incident#9970-4

A pesticide incident occurred in 1999, when a home was treated with the product by a pest control operator. A woman reported severe lung damage, lightheadedness, burning eyes, and throat and back problems. No further information on the disposition of the case was reported.

Incident#10170-3

A pesticide incident occurred in 1999, when a thirty-four year old man got some of the product on his arm. The man reported numbness, spinal cord problems, and abdominal pain and was later treated by a physician. No further information on the disposition of the case was reported.

Incident#10444-2

A pesticide incident occurred in 2000, when a woman was accidentally sprayed in the face when the home was being treated with the product. The woman reported difficulty breathing, and sores on the skin. Three months later, she reported loss of sensation in her fingers and itchy skin. No further information on the disposition of the case was reported.

Incident#10444-3

A pesticide incident occurred in 2000, when a home was treated with the product. A woman reported swollen feet and legs, a rash on legs, post nasal drip, nausea, and coughing and was later treated by a physician in the emergency room. No further information on the disposition of the case was reported.

Incident#10459-17, 66

Reports unavailable due to technical difficulties.

Incident#10547-7

A pesticide incident occurred in 2000, when the product was applied to the perimeter of a home. An eighty year old woman reported edema, pruritus, and a rash and was treated by a physician. No further information on the disposition of the case was reported.

Incident#10566-1

Report unavailable due to technical difficulties.

Incident#10749-3

Report unavailable due to technical difficulties.

Incident#10977-3

Report unavailable due to technical difficulties.

Incident#11226-1

A pesticide incident occurred in 1999, when the product was applied to the ground under a home. An eighty-four year old woman reported anorexia, coughing/choking, nausea, facial hair

growth, pneumonia, and tremor. No further information on the disposition of the case was reported.

Incident#11226-2

A pesticide incident occurred in 2000, when a home was treated with the product. A woman reported hives, welts, pruritus, headache, shortness of breath, swollen tongue, and itchy head and toes. She was treated by a physician at the hospital three times. No further information on the disposition of the case was reported.

Incident#11381-8

A pesticide incident occurred in 2000, when a man used the fogger product for years and reported headaches. No further information on the disposition of the case was reported.

Incident#11381-13

A pesticide incident occurred in 2001, when a school library was treated with the product. Two days later, a forty-two year old woman reported hypotension, nausea, vomiting, drowsiness, and dyspnea. No further information on the disposition of the case was reported.

Incident#10534-1

Report unavailable due to technical difficulties.

Incident#10593-5

Report unavailable due to technical difficulties.

Incident#11967-40

A pesticide incident occurred in 2001, when a fifty year old woman used four foggers in her home. She was accidentally sprayed in her face when she used a fifth fogger. The woman reported coughing, choking, and shortness of breath and was treated by a physician at an emergency room. No further information on the disposition of the case was reported.

Incident#12498-4

A pesticide incident occurred in 2001, when a sixty-five year old man, who is a farmer, previously used the product. The man reported peripheral neuropathy and was treated by a physician. No further information on the disposition of the case was reported.

Incident#12686-9

A pesticide incident occurred in 2002, when a home was treated with two foggers on two different occasions. A woman reported fever, tingling, dyspnea, coughing, choking, myalgia, and drowsiness. She was treated by a physician at two different times. No further information on the disposition of the case was reported.

Incident#12715-8

A pesticide incident occurred in 2002, when a home was treated with the product. The product was applied and was shot through a wall and leaked into the garage and onto the

resident's carpet. A sixty-nine year old man later removed the carpet. He reported malaise, fever, coughing, choking, and pneumonia and was treated by a physician at the emergency department. No further information on the disposition of the case was reported.

Incident#12795-9

A pesticide incident occurred in 2002, when an office was treated with the product every six to eight weeks. A woman reported coughing, choking, nasal irritation, respiratory depression, and shortness of breath. She was treated by a physician on-site. No further information on the disposition of the case was reported.

Incident#12802-1

A pesticide incident occurred in 2001, when a home was treated with the product. A fifty-seven year old man reported a rash and skin irritation and pain and was treated by a physician. No further information on the disposition of the case was reported.

Incident#12802-3

Report unavailable due to technical difficulties.

Incident#13098-14 and 15

A pesticide incident occurred in 2002, when a man's neighbor used the product in their apartment. The man reported tremor, diarrhea, tingling in his fingers, and difficulty with fine motor coordination. He was treated by a physician. No further information on the disposition of the case was reported.

Incident#13176-1

A pesticide incident occurred in 2002, when a woman, who has scabies, sprayed the product in her work area. The woman's co-worker reported bruises on her entire body area and blood pathogens that were down to 1000. She was given a blood transfusion and was hospitalized for an unknown number of days. No further information on the disposition of the case was reported.

Incident#13229-25

A pesticide incident occurred in 2002, when the product was applied to the front and back yard. A thirty-six year old woman reported coughing, choking, dyspnea, chest tightness, vomiting, and throat irritation. She was treated by a physician. No further information on the disposition of the case was reported.

Incident#13243-206

Report unavailable due to technical difficulties.

Incident#13314-1

A pesticide incident occurred in 2002, when a forty year old man reported lightheadedness and blurry vision. The man sprayed the product and some of it got on his lip. No further information on the disposition of the case was reported.

**Incident#13314-9**

A pesticide incident occurred in 2002, when a man, who wore gloves, applied the product to treat ant colonies. He reported a swollen tongue and throat irritation and was later treated by a physician. No further information on the disposition of the case was reported.

**Incident#13314-17**

A pesticide incident occurred in 2002, when a forty-five year old man applied the product and some of it got on his wrist. He reported tingling. No further information on the disposition of the case was reported.

**Incident#13314-21**

A pesticide incident occurred in 2002, when a sixty-eight year old woman poured the product into a different plastic container that may have contained glyphosate. She rinsed out the container and some of it got on her wrist. The woman reported muscle aches and depression and was later treated by a physician. No further information on the disposition of the case was reported.

**Incident#13316-2**

A pesticide incident occurred in 2002, when the township sprayed the product at two different times. A man reported flu-like symptoms, shortness of breath, and vision changes and his wife reported flu-like symptoms and a facial rash. No further information on the disposition of the case was reported.

**Incident#13316-3**

A pesticide incident occurred in 2002, when a man reported three heart attacks and his wife and several other neighbors of the town were hospitalized after the township was sprayed with the product. No further information on the disposition of the case was reported.

**Incident#13355-1**

A pesticide incident occurred in 2002, when an individual reported chest pain and trouble breathing. No further information on the disposition of the case was reported.

**Incident#13355-2**

A pesticide incident occurred in 2002, when a woman used the product to treat her mattress. She reported numbness in both hands. No further information on the disposition of the case was reported.

**Incident#13355-3**

A pesticide incident occurred in 2002, when an individual reported numbness in the face and on head. No further information on the disposition of the case was reported.

**Incident#13355-4**

A pesticide incident occurred in 2002, when an individual reported chest pain, tachycardia, twitching, tingling, burning, back pain, and numbness. No further information on the disposition of the case was reported.

Incident#13355-5

A pesticide incident occurred in 2002, when an individual reported shaking over their entire body area and difficulty concentrating. No further information on the disposition of the case was reported.

Incident#13419-2

A pesticide incident occurred in 2002, when the product was applied on the outside of a home. A thirty-three year old woman reported dyspnea, chest pain, edema, hives, welts, and numbness in the arms. She was treated by a physician at the emergency room. No further information on the disposition of the case was reported.

Incident#13458-38

A pesticide incident occurred in 2002, when an eighty-two year old woman, who wore shorts and a sleeveless blouse, applied the product outside and did not read the directions on the label fully. She reported pruritus, rash, hives, and welts and was treated by a physician. No further information on the disposition of the case was reported.

Incident#13494-3

A pesticide incident occurred in 2002, when a woman applied the product and accidentally spilled it on her hands. She reported numbness and tingling on her fingertips. No further information on the disposition of the case was reported.

Incident#13494-9

A pesticide incident occurred in 2002, when a woman, who is allergic to mold, applied the product in the crawl space of her home. Two or three days later, she noticed that mold started growing. The woman reported throat constriction. No further information on the disposition of the case was reported.

Incident#13510-15

Report unavailable due to technical difficulties.

Incident#13510-27

Report unavailable due to technical difficulties.

Incident#13521-7

A pesticide incident occurred in 2002, when a woman used the product. A few days later, an eleven month old girl reported a seizure and was treated by a physician. No further information on the disposition of the case was reported.

Incident#13537-1

A pesticide incident occurred in 2002, when a twenty-four year old woman applied the product to her couch to treat lice. She laid down on the wet couch and reported numbness and lightheadedness. No further information on the disposition of the case was reported.

Incident#13579-1

A pesticide incident occurred in 2002, when product escaped container attached to hose and splashed a 40 year-old male with concentrated and diluted product in the face. Developed redness, swelling, irritation, and tearing of the eyes. These symptoms persisted one week. One week later reported nausea, runny nose, inability to sleep, and loss of appetite. Five months later a family member reported he had died and that the death was related to the exposure. Circumstances and cause of death not reported. No further information on the disposition of the case was reported.

Incident#13610-27

A pesticide incident occurred in 2002, when a home was treated with the product. A seven year old boy reported shortness of breath and was treated by a physician. No further information on the disposition of the case was reported.

Incident#13645-7

A pesticide incident occurred in 1998, when two employees used the product at a two-story office building to control insects. Six employees reported headache, upset stomach, and sore throat. No further information on the disposition of the case was reported.

Incident#13702-1

A pesticide incident occurred in 2002, when a thirty-six year old woman used the product to treat lice on items inside her home. The woman reported chest pain and tightness. No further information on the disposition of the case was reported.

Incident#13702-2

A pesticide incident occurred in 2002, when a thirty-two year old man applied the product to his body and reapplied the product the next day. He reported hallucination and asthma. No further information on the disposition of the case was reported.

Incident#13751-1

A pesticide incident occurred in 2002, when a home was treated with the product. A forty-seven year old man, who has multiple chemical sensitivity, reported tingling in face, insomnia, irritability, and muscle rigidity. No further information on the disposition of the case was reported.

Incident#13872-26

A pesticide incident occurred in 2003, when a thirty-three year old man reported syncope after using the product outside. The man passed out and was taken to the emergency department. No further information on the disposition of the case was reported.

**Incident#13939-19**

A pesticide incident occurred in 1998, when a home was treated with the product five years ago. A family member reported asthma problems and skin irritation. No further information on the disposition of the case was reported.

**Incident#13940-3**

A pesticide incident occurred in 2003, when the product was applied around the perimeter of a home about six to seven years ago. The man reported dry skin and his young son reported painful urination. No further information on the disposition of the case was reported.

**Incident#13940-8**

A pesticide incident occurred in 2003, when the product was applied in an auto shop. A man reported an allergic reaction and was treated by a physician. No further information on the disposition of the case was reported.

**Incident#13959-20**

A pesticide incident occurred in 2003, when the product was applied to a driveway. A man reported an ear infection, joint pain, weakness, and a rash. A woman reported an ear infection and a rash. No further information on the disposition of the case was reported.

**Incident#14004-6**

A pesticide incident occurred in 2003, when a woman applied the product on her carpet in her home. The sixty year old woman reported edema and was treated by a physician. No further information on the disposition of the case was reported.

**Incident#14028-1**

A pesticide incident occurred in 2003, when a home was treated with the product. A seventy-eight year old man reported shortness of breath and wheezing. No further information on the disposition of the case was reported.

**Incident#14034-11**

A pesticide incident occurred in 2003, when a pest control operator used the product in a backpack for about five years. He reported a rash and fever and was treated by a physician at the emergency department. No further information on the disposition of the case was reported.

**Incident#14035-1**

A pesticide incident occurred in 2003, when a home was treated. The young woman, asleep during treatment, reported hives, shortness of breath, and blue finger tips and was treated at the emergency room. No further information on the disposition of the case was reported.

The majority of cases reported re primarily of unsubstantiated allegations. The most prevalent complaints reported by ten or more individuals included: headache (44 cases); rash (35 cases); tingling/burning skin (35 cases); difficulty breathing/shortness of breath/asthma (24 cases); nausea (23 cases); eye irritation (15 cases); itching (15 cases); dizziness (13 cases); and



vomiting (13 cases). Note that 20 of the 26 cases of tingling or burning skin were tingling, a symptom known to be associated with exposure to pyrethroids. Other dermal symptoms including burning, itching, and irritation to skin are known to be related to exposure to pyrethroids (Reigart and Roberts 1999). Symptoms that occurred more than 24 hours after exposure are excluded from the listing above. No doubt some of the symptoms that occurred were coincidental to the exposure rather than caused by it. Other symptoms may have been a result of an anxiety reaction to the exposure. Headache, dizziness, eye irritation, nausea, and vomiting are also listed as symptoms that occur in pyrethroid poisoning (Reigart and Roberts 1999).

## II. Poison Control Center Data - 1993 through 1998

Results for the years 1993 through 1998 are presented below for occupational cases, non-occupational involving adults and older children, and for children under age six. Cases involving exposures to multiple products and cases with unrelated medical outcome are excluded. Tables 1-4 present the hazard information for permethrin compared with all other pesticides on six measures: percent with symptoms, percent with moderate, major, or fatal outcome, percent with major or fatal outcome, percent of exposed cases seen in a health care facility, and percent hospitalized and percent seen in a critical care facility. Table 1 reports the number of cases on which the data derived in Tables 2-4 are based. Table 2 presents this information for occupational cases, Table 3 for non-occupational cases involving adults and older children (six years or older), and Table 4 for children under age six.

Table 1. Number of permethrin exposures reported to the Toxic Exposure Surveillance System (AAPCC), number with determined outcome, number seen in a health care facility for occupational and non-occupational cases (adults and children six years and older) and for children under six years of age only, 1993-1998 .

Subgroup	Exposures	Outcome determined	Seen in Health Care Facility
Occupational: adults and older children	108	72	39
Non-occupational: adults and older children	2432	1092	282
Children under age six	2457	1243	246

Table 2. Comparison between permethrin and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or fatal outcome (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) reported to Poison Control Centers, 1993-1998 for occupational cases only.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Permethrin	72.2%	15.3%	1.389%	36.1%	10.26%	7.69%
All Pesticides	86.0%	18.8%	0.621%	47.0%	6.08%	2.36%
Ratio	0.84	0.81	2.24	0.77	1.69	3.26

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

Table 3. Comparison between permethrin and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or fatal outcome (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) reported to Poison Control Centers, 1993-1998 for non-occupational cases involving adults and older children.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Permethrin	62.8%	11.7%	0.092%	11.6%	2.13%	0.35%
All Pesticides	68.5%	10.5%	0.359%	16.5%	6.24%	2.67%
Ratio	0.92	1.11	0.26	0.70	0.34	0.13

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

Table 4. Comparison between permethrin and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or fatal outcome (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) for adults and children six years and older reported to Poison Control Centers, 1993-1998 for children under six years old.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Permethrin	24.7%	4.0%	0.322%	10.0%	4.06%	1.63%
All Pesticides	21.8%	1.40%	0.120%	16.4%	4.78%	1.36%
Ratio	1.13	2.86	2.68	0.61	0.85	1.20

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all

cases seen in a health care facility.

The occupational cases with elevated (above 1.0) ratios were due to a relatively small number of cases. The ratio for major medical outcome was based on a single case and the hospitalized and critical care ratios were based on 4 and 3 cases, respectively. Conclusions should be cautious when based on such small numbers. The non-occupational category is probably the most representative of human exposure to permethrin pesticides because the children were much more likely exposed to head lice control products regulated by the Food and Drug Administration (FDA). Note, that 84% of the permethrin exposures in children identified by specific product, were products for control of head lice. Such uses are now regulated by FDA instead of EPA. These uses involve direct application to the human body and such intentional exposure is not comparable to the unintentional exposures due to other pesticides. In the non-occupational adult and older children category, only one ratio for moderate outcome was elevated. This finding was further investigated by examining the symptoms reported among all cases with moderate outcome. Ten or more people reported eye (40 persons) or skin (26 persons) irritation and/or pain. Other dermal symptoms included edema (15 persons), erythema/flushed (21 persons), hives/welts (11 persons), pruritus (itching - 22 persons), and rash (18 persons). Tingling or paresthesia is not a choice coded by Poison Control Centers. Neurological symptoms reported in ten or more people included dizziness/vertigo (21 persons) and headache (18 persons). Gastrointestinal symptoms reported in ten or more people included nausea (25 persons), vomiting (23 persons), and diarrhea (15 persons). Respiratory symptoms were reported by 10 persons with bronchospasm, 16 with cough/choke, and 32 person with dyspnea (difficulty breathing). The relatively high occurrence of dyspnea (second most common symptom among Poison Center cases and fourth most common among cases reported to the Incident Data System) suggests that permethrin may pose a hazard of asthma-like reactions in sensitive individuals.

### III. California Data - 1982 through 2001

Detailed descriptions of 432 cases submitted to the California Pesticide Illness Surveillance Program (1982-2001) were reviewed. In 79 of these cases, permethrin was used alone or was judged to be responsible for the health effects. Only cases with a definite, probable or possible relationship were reviewed. Permethrin ranked 58<sup>th</sup> as a cause of systemic poisoning in California based on data for 1982 through 2001. Table 1 presents the types of illnesses reported by year. Table 2 gives the total number of workers that took time off work as a result of their illness and how many were hospitalized and for how long.

Table 1. Cases Due to Permethrin in California Reported by Type of Illness, 1982-2001.

Year	Illness Type					Total
	Systemic <sup>a</sup>	Eye	Skin	Respiratory <sup>b</sup>	Combination <sup>c</sup>	
1982	1	-	1	-	-	2
1983	-	-	-	-	-	-
1984	-	-	1	-	-	1
1985	-	-	2	-	-	2
1986	1	-	1	-	-	2
1987	-	-	-	-	-	-
1988	6	-	-	-	-	6
1989	-	1	4	-	-	5
1990	1	3	-	-	-	4
1991	1	-	-	-	1	2
1992	2	-	6	-	-	8
1993	2	1	-	-	-	3
1994	2	-	1	-	-	3
1995	1	2	1	-	-	4
1996	3	2	-	-	-	5
1997	4	1	-	-	-	5
1998	5	2	-	-	1	8
1999	4	1	-	2	1	8
2000	7	-	-	-	-	7
2001	1	3	-	-	-	4
<b>Total</b>	<b>41</b>	<b>16</b>	<b>17</b>	<b>2</b>	<b>3</b>	<b>79</b>

<sup>a</sup> Category includes cases where skin, eye, or respiratory effects were also reported.

<sup>b</sup> Category not used until 1990. Prior respiratory cases classified as systemic.

<sup>c</sup> Category includes combined irritative effects to eye, skin, and respiratory system.

Table 2. Number of Persons Disabled (taking time off work) or Hospitalized for Indicated Number of Days After Permethrin Exposure in California, 1982-2001.

Time period	Number of Persons Disabled	Number of Persons Hospitalized
One day	12	-
Two days	5	-
3-5 days	3	-
6-10 days	2	-
more than 10 days	-	-
Unknown	8	1
Indefinite	1	-

A variety of worker activities were associated with exposure to permethrin as illustrated in Table 3 below.

Table 3. Illnesses by Activity Categories for Permethrin Exposure in California, 1982-2001

Activity Category	Illness Category					Total
	Systemic <sup>a</sup>	Eye	Skin	Respiratory <sup>b</sup>	Combination <sup>c</sup>	
Applicator	9	8	4	-	-	21
Mixer/Loader	1	2	4	-	1	8
Field Worker	2	-	3	-	-	5
Emergency Response	4	-	-	-	-	4
Routine Indoor	19	2	-	2	2	25
Transport/Storage/Disposal	-	2	-	-	-	2
Other	4	2	-	-	-	6
Unknown	2	-	6	-	-	8
<b>Total</b>	<b>41</b>	<b>16</b>	<b>17</b>	<b>2</b>	<b>3</b>	<b>79</b>

<sup>a</sup> Category includes cases where skin, eye, or respiratory effects were also reported.

<sup>b</sup> Category not used until 1990. Prior respiratory cases classified as systemic.

<sup>c</sup> Category includes combined irritative effects to eye, skin, and respiratory system.

According to the above activity categories, routine indoor use was associated with more exposures than any other category. Outside handlers, applicators and mixer/loaders accounted for the next largest group. Together, inside and outside handlers accounted for two-thirds of the illnesses reported. The most prevalent symptoms in ten or more individuals were eye irritation (including burning, pain, redness, and swelling), rash, headache, dizziness, nausea, and shortness of breath or difficulty breathing.

#### IV. National Pesticide Information Center

From April 1, 1995 through February 29, 2004, the National Pesticide Information Center (NPIC) received 220 calls concerning human incidents and 150 calls concerning animal incidents and permethrin. Most of the 172 human cases that were categorized by certainty were coded possible. Another 36 cases were considered probable and one was considered definite. Further review of the definite case suggested miscoding and the identity of the product was uncertain. More detailed information was examined for the human cases considered probable. Nearly half of these case had skin complaints (e.g., rash, itching, pain or burning sensation) and and nearly half also report effects to the eyes (e.g., pain, irritation, tearing). Headache, dizziness, or light-headedness were reported by nearly half the cases and respiratory problems such as tight chest or difficulty breathing were reported by 22% of the probable cases. Six (17%) reported asthma or asthma-like symptoms and 6 cases reported problems with the permethrin product used for termite treatment.

#### V. NIOSH SENSOR Data 1998-2002

From 1998 through 2002, seven NIOSH SENSOR state received 40 reports of exposure to permethrin in a single product. Nearly half of these cases, 18, occurred and California which have already been reported above. This left 22 reports from the other six states, including 7 from Florida, 2 from Louisiana, and the other 13 from Texas. Eighteen of these cases were reported as having minor effects and four were classified as moderate. Three cases were classified as definite, three probable, 13 as possible, and 3 as suspicious. Dermal symptoms were most common reported in 10 of 22 cases. Ocular symptoms were reported in six cases, respiratory and gastrointestinal symptoms in 9 cases each, and neurological symptoms in 7 cases.

#### VI. Scientific Literature

Kolomodin-Hedman et al. (1982) studied exposure in workers handling treated seedlings. Of the 45 workers handling a permethrin product with 60% trans isomers and 40% cis isomers, there were eight cases with eye irritation, one case of itching, one with increased nasal secretions, and 3 workers with headache. Among 42 workers handling a permethrin product with 75% trans isomers and 25% cis isomers, there were 5 reporting either burning skin, dry feeling in face or sneezing. Six reported increased nasal secretion, four had blisters, 3 had cough, 2 had eye irritation, and one had difficulty breathing. The authors note that the differences in the frequency

of symptoms might be explained by the use of different formulations - wettable powder and emulsifiable concentrate.

A follow-up study was performed to see if the symptoms reported in the study above could be reduced by using improved planting devices that would reduce exposure (Edling et al. 1985). Twenty-nine subjects reported working with a permethrin product and three of these reported symptoms of either eye irritation, sneezing, or numbness in the lips. Eight persons that reported symptoms from the previous study were tested for skin sensitivity with the skin prick and scratch test and all were negative. This suggests that permethrin products are more likely to cause a direct irritative effect rather than an allergic reaction. An earlier study had found subjective symptoms in one-third of handlers of the 60%/40% trans/cis isomers (an emulsion) and nearly two-thirds had subjective symptoms from handling the 75%/25% trans/cis isomers (a wettable powder) of permethrin.

A study was conducted of topical application of permethrin to the skin by Flannigan et al. (1985). Six workers were treated with a 0.05 ml of field strength formulation at 0.13 mg/cm<sup>2</sup>. Typically sensations would develop 30 minutes after application, peak at eight hours after application and resolve by 24 hours after application. A regression equation was determined for normalized skin sensations from exposure to formulated permethrin and concentration of active ingredient. Topical application of vitamin E was found to effectively inhibit the development of skin sensations.

In 1990, the World Health Organization summarized information about the effects of permethrin in humans, noticing that "data on permethrin human toxicity are scanty". After summarizing the studies listed above they noted another study of 23 laboratory workers involved in field trials. In this study the most frequent symptom was a facial sensation described as tingling or burning. This did not occur when permethrin alone was involved but when exposures included cypermethrin, fenvalerate, or fenpropathrin. These workers did not have any abnormal neurological findings or electro-physiological measurements that differed significantly from a control group. Another study cited tested permethrin impregnated clothing on 10 male volunteers and they did not complain of any irritation. A third study tested permethrin for up to nine days using a patch test and 2 out of 17 volunteers developed mild erythema (flushing). A test of permethrin against head lice in 10 adults found 3 with mild, patchy erythema which faded away after 4-7 days.

A review of pyrethrins and pyrethroids dermatological effects was reported by Taplin and Meinking (1990). This review focuses more on the use and success of pesticides used against body parasites. They reported that 21,000 patients had been studied under controlled conditions following permethrin treatment for head lice. The overall reported adverse effects rate was 2.5 per 1,000 patients. These effects included pruritus (itching) which may have been related to the infestation rather than the treatment. Other effects were not reported.

Andrews et al. (1992) reported on postmarketing surveillance of permethrin creme rinse in the American Journal of Public Health. The authors were employees and funded by Burroughs

Wellcome, the manufacturer of this product. A total of 38,160 patients received a total of 47,478 treatments with permethrin or other pediculicides. Follow-up was collected between 7 and 14 days after treatment by return visit or telephone contact. Reported adverse effects occurred at a rate of 2.2 per 1,000 treatments (2.5 per 1,000 patients) with permethrin. None of the effects reported were considered serious despite a sample size adequate to detect such an effect at a rate of 1 per 10,000 treatments with 85% probability. Of the 103 adverse effects reported from permethrin treatment, the leading effects were itching and rash. Five of the 103 adverse effects were considered "medically important": a 16 year old girl with no previous history of allergy experienced breathing difficulty while her sister was being treated which subsided when she left the room; a 34 year-old woman with drug allergies experienced mild nausea and moderate to severe shortness of breath that lasted four hours; a 10 year-old girl with a history of asthma and allergies experienced arm-shaking and stuttering that lasted less than a minute and did not recur; a 35 year-old woman with food allergies experienced two incidents of arm shaking for about 40 seconds and some skin irritation; and a 23 year-old woman with no allergy history experienced a swollen face starting the day after treatment and lasting one week (coincident use of a new facial soap may have been the cause).

Kolmodin-Hedman et al. (1995) followed up on their earlier studies (cited above) to determine the frequency of symptoms in a double-blind design and estimate the dermal contamination from use of permethrin. Three groups of 18 workers were followed for 3 days over a 2-week period during planting season. They planted untreated plants and plants sprayed with 1.5% permethrin. Workers wore short-sleeved gloves with plastic palms and received a 20 symptom questionnaire at the end of each work day. The estimated dermal dose among these workers was 0.001 mg/dm<sup>2</sup>. Only a few symptoms were reported but they did not appear to be significantly greater among those who were exposed compared to the unexposed. Symptoms were incompletely reported, sample size was too small, and analysis was inadequate to draw conclusions.

Gotoh et al. (1998) reported a suicide attempt in a 59 year-old man who drank approximately 600 ml of a 20% permethrin emulsion (43.5% cis and 56.5% trans). The patient exhibited vomiting, diarrhea, loss of consciousness, and metabolic acidosis. On regaining consciousness the patient complained of burning sensation in the mouth. The authors suggest that the vomiting and diarrhea limited the absorption of permethrin in this case. Estimated dose of permethrin in this case was 143 g of permethrin and 361 g of xylene and 64 g surfactant. Given his body weight of 63 kg, this would be a dose of 2,270 mg/kg body weight. No hyperactivity, tremor, or motor ataxia was observed during 12 days of hospitalization.

Yang et al. (2002) reviewed 48 cases of ingestion of permethrin (also containing xylene and surfactant) in Taiwan. Ten cases were unintentional and 38 were attempted suicide. Gastrointestinal symptoms were most common (73% of patients) including sore throat, mouth ulcerations, difficulty swallowing, stomach pains, and vomiting. Respiratory problems were reported in 29% of patients including aspiration pneumonitis in 8 patients (one of whom died) and pulmonary edema in two cases. Sixteen patients had central nervous system effects including confusion, coma, and seizures. Mild renal and hepatic dysfunction were found in 10%



and 6% of patients, respectively. Except for the 8 patients with pneumonitis, all recovered within 1-6 days. Cases classified as mild, moderate, or severe did not correlate with estimated amount ingested. However, of 22 patients who ingested more than 200 ml, 10 lost consciousness in 1-2 hours and four had seizures that lasted from half a minute to three minutes. None of the patients ingesting 200 ml (equal to 48 g of permethrin) or less experienced loss of consciousness or seizures. The authors note that the xylene (70% of the formulated product) might be an important cause of the gastrointestinal, pulmonary, and CNS signs and symptoms.

## VI. Conclusion

It appears likely that most poisonings due to permethrin resulted from misuse or inadvertent exposures. The large majority of cases resulted in minor effects to the skin (primarily rash, irritation, itching), eyes (redness, pain, burning), headache, dizziness, nausea, vomiting, and shortness of breath or difficulty breathing. Loss of consciousness appears to occur only in cases of ingestion involving 700 mg/kg body weight or more (Yang et al. 2002).

Persons handling permethrin directly are the most likely to experience symptoms. Permethrin does not appear to pose significant risks from exposure to residues or drift though a relatively small number of cases have been documented. Compared to other pesticides, permethrin is much less likely to result in serious or persistent medical outcome. Even suicidal ingestions typically resolve within a few days. The only death reported was due to pneumonitis likely due to the xylene solvent rather than the permethrin.

Though a relatively safe product, permethrin can readily cause problems to skin and eyes and inhalation may lead to headache, dizziness, and difficulty breathing. A number of the data sources reviewed for this report suggest permethrin can aggravate asthma or lead to asthma like symptoms. Ingestion or inhalation has led to nausea and vomiting.

## VII. Recommendations

Label warnings should clearly state the risks dermal, ocular, inhalation, and ingestion hazards. Measures to reduce inadvertent exposure should be encouraged, including skin and eye protection.

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