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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

January 22, 2004

MEMORANDUM

SUBJECT: Review of Deltamethrin Incident Reports
DP Barcode D298119, Chemical #097805

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BACKGROUND

The following data bases have been consulted for the poisoning incident data on the active ingredient deltamethrin (PC Code: 097805):

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. For the purposes of this review, only case coded as moderate or above are included. Cases with minor outcome are excluded.

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- 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.

DELTAMETHRIN REVIEW

I. Incident Data System

Incident#7906-10

A pesticide incident occurred in 1998, when a pest control operator shook the powder out of the bottom of a bag and inhaled some of it. The next morning, the pest control operator reported throat burning and coughing and was later treated by a physician. No further information on the disposition of the case was reported.

Incident#7906-13

A pesticide incident occurred in 1998, when an individual reported upper respiratory tract irritation after the product was applied in cracks and crevices. No further information on the disposition of the case was reported.

Incident#8006-1

A pesticide incident occurred in 1997, when the product was applied at a home to exterminate roaches and a woman reported lung problems. Specific symptoms were not mentioned. The woman was in the hospital several times, for an unknown period of time, and was diagnosed with Reactive Airway Disease Syndrome. No further information on the disposition of the case was reported.

Incident#8378-2

A pesticide incident occurred in 1999, when a twenty-nine year old man reported coughing, grogginess, and nose bleeding. The man was diagnosed with upper respiratory tract infection. The man's three year old son reported coughing and was diagnosed with the flu. Several piles of dust were left after the product was applied by a pest control operator. No further information on the disposition of the case was reported.

Incident#8438-1

A pesticide incident occurred in 1999, when a thirty year old woman, who has a history of fibromyalgia and bronchitis, reported coughing, and respiratory irritation. She was later treated by a physician. The product was applied in her home on the carpet by a pest control operator. While the carpet was still wet, the woman got on her hands and knees to change the bedding and decorative fabric on her bed for several minutes. No further information on the disposition of the case was reported.

Incident#8569-1

A pesticide incident occurred in 1999, when a pest control operator applied the product in a home. A short time later, a four year old child reported a rash, welts from the elbow to the shoulder on her right arm, back, abdominal area, and neck. No further information on the disposition of the case was reported.

Incident#8569-2

A pesticide incident occurred in 1999, when the product was applied to cracks and crevices in a home. A thirty-seven year old woman, who has a history of liver disease, reported swollen lips and eyes, nausea, vomiting, and being unable to walk. One of her thirteen year old twin boys reported swelling, a rash and blisters. No further information on the disposition of the case was reported.

Incident#8801-1

A pesticide incident occurred in 1999, when a pest control operator treated a home. An eight week girl reported difficulty breathing and was hospitalized for three days. After returning home, the girl had difficulty breathing again and was rushed back to the hospital. No further information on the disposition of the case was reported.

Incident#9276-2

A pesticide incident occurred in 1999, when a twenty year old man reported muscle twitching after the product was used on a farm. No further information on the disposition of the case was reported.

Incident#9403-1

A pesticide incident occurred in 1999, when a forty-seven year old woman reported respiratory irritation and shortness of breath. After her home was treated with the product she cleaned up the residual dust from the floor and countertops. No further information on the

disposition of the case was reported.

Incident#9705-1

A pesticide incident occurred in 1999, when a one year old male child reported multiple seizures. Possible inhalation reported. No further information on the disposition of the case was reported.

Incident#9841-1

A pesticide incident occurred in 1998, when an adult male reported confusion, dizziness, short-term memory loss, and respiratory irritation. A pest control operator treated the man's home with the product a week earlier. No further information on the disposition of the case was reported.

Incident#9920-1

A pesticide incident occurred in 2000, when the product was applied by a pest control operator to a home. A boy reported swollen lymph nodes in the groin area. The boy's physician ran tests and discovered fluid in his testicles. No further information on the disposition of the case was reported.

Incident#9920-2

A pesticide incident occurred in 2000, when an employee accidentally got the product in his eyes. The employee rinsed his eyes for fifteen minutes and reported burning and red eyes for about a week. He was treated by a physician and diagnosed with corneal abrasion. No further information on the disposition of the case was reported.

Incident#10631-2

A pesticide incident occurred in 2000, when an individual reported fatigue and malaise with a history of chronic bronchitis and dysphasia. The individual walked through a garden where the product was applied several weeks earlier. No further information on the disposition of the case was reported.

Incident#10707-3

A pesticide incident occurred in 2000, when a building was treated with the product. A two year old boy lives in an apartment complex next door to the building. He put his hands in the product and then ate donuts from a shop next door and later developed fever and a blister. No further information on the disposition of the case was reported.

Incident#11029-1

A pesticide incident occurred in 2000, when a woman walked barefoot across an area in her home that was treated with the product. The woman reported red irritated skin, joint pain, and other sensations. No further information on the disposition of the case was reported.

Incident#11029-2

A pesticide incident occurred in 2000, when the product was applied in her attic five or six weeks earlier. Two days later, a woman reported that she lost her voice. She was treated by a physician and diagnosed with inflammation of the larynx. No further information on the disposition of the case was reported.

Incident#11117-9

A pesticide incident occurred in 1996, when a woman, who has a history of nervousness and blood pressure problems, reported hair loss, swelling and pain of the joints, red rash, lack of coordination, chills, nervousness, and depression. She was later treated by a physician. The woman was hospitalized for about three days for joint pain and was diagnosed with migratory arthritis. No further information on the disposition of the case was reported.

Incident#11213-1

A pesticide incident occurred in 2001, when a seventy-two year old woman, who has a history of an esophageal ulcer, reported itchy skin and watery eyes. The product was applied to her home about two or three days earlier. The woman was treated by a physician and was diagnosed with shortening and bowing of the vocal cords. No further information on the disposition of the case was reported.

Incident#11213-2

A pesticide incident occurred in 2001, when a two year old boy, who has a history of asthma, reported increased respiratory problems since the product was applied in air conditioning ducts about five months earlier. No further information on the disposition of the case was reported.

Incident#11213-3

A pesticide incident occurred in 2000, when a woman reported wheezing. The product was applied two days earlier at her workplace. The same woman reported the same problem a month later when the product was applied a second time. No further information on the disposition of the case was reported.

Incident#11341-7

A pesticide incident occurred in 2001, when a seven year old boy reported a skin rash and was treated at an emergency room. His home was treated a few times with the product. No further information on the disposition of the case was reported.

Incident#12048-15

A pesticide incident occurred in 2001, when a sixty-five year old man reported dyspnea and nausea. The product was applied in his home. No further information on the disposition of the case was reported.

Incident#12090-4

A pesticide incident occurred in 2001, when an employee applied the product in a woman's house in her ductwork. The woman reported sinus pain whenever she turns on the air conditioning or the heat. No further information on the disposition of the case was reported.

Incident#12090-5

A pesticide incident occurred in 2001, when the product was applied outdoors by a pest control operator. A woman, who has a history of allergies including a "tested pyrethrin allergy", opened the front door and reported welts on her legs and arms about ten or fifteen minutes later. These same symptoms reoccurred several other times after she opened the patio door while her treated furniture was still wet. The woman was treated by a physician. No further information on the disposition of the case was reported.

Incident#12184-2

A pesticide incident occurred in 2001, when a pest control operator applied the product around a woman's home. She reported headaches and nausea, especially when it is hot and humid outside. Reportedly odor problems persisted for four months which seems unlikely for this product. No further information on the disposition of the case was reported.

Incident#12184-4

A pesticide incident occurred in 2001, when an employee applied the product at a school. A fourteen year old girl, who has a history of sensitivity to pyrethrins, reported lightheadedness, visual changes, increased heart rate, and a decrease in blood pressure. She did not enter the room that was treated with the product. No further information on the disposition of the case was reported.

Incident#12260-10

A pesticide incident occurred in 2001, when a woman reported a rash, blisters, and edema. She was treated by an allergy doctor. No further information on the disposition of the case was reported.

Incident#12287-3

A pesticide incident occurred in 2001, when a woman's home was treated with the product. She reported redness and hives on her feet and hands that spread up her thigh, that was swollen. No further information on the disposition of the case was reported.

Incident#12462-4

A pesticide incident occurred in 2001, when a man, who was wearing a mask that may have been old and inadequate, applied the product in the attic. He reported shortness of breath which persisted to the following day. No further information on the disposition of the case was reported.

Incident#12462-5

A pesticide incident occurred in 2001, when the product was applied in a woman's home by a pest control operator. Nearly four weeks later, the woman reported hives on both sides of her legs and buttocks, and redness on her arms that subsides when she leaves her home. Symptoms are more likely to develop immediately after exposure and unlikely weeks later. She was treated by a physician. No further information on the disposition of the case was reported.

Incident#12589-3

A pesticide incident occurred in 2002, when the product was applied in a woman's home by a pest control operator. The container was left in the woman's guest bedroom. The woman reported a rash, hives, and itching whenever she walks into the bedroom. She was treated by a physician. The woman's granddaughter slept in the guest bedroom and reported a swollen face and eyes. No further information on the disposition of the case was reported.

Incident#12589-4

A pesticide incident occurred in 2001, when the product was applied in an apartment. The tenant's child reported a seizure and was taken to an emergency room for treatment. The child was later released. No further information on the disposition of the case was reported.

Incident#12589-5

A pesticide incident occurred in 2001, when the product was applied in a customer's apartment. Three weeks later, the customer reported ocular itching, sore throat, and blisters in the mouth and was treated by a physician. Symptoms developing three weeks later are unlikely to be related to the exposure. No further information on the disposition of the case was reported.

Incident#12674-1

A pesticide incident occurred in 2001, when a woman reported skin tingling and itching and was treated by a physician. The product was applied in the attic and was distributed throughout the area with a fan. No further information on the disposition of the case was reported.

Incident#12704-5

A pesticide incident occurred in 2002, when the product was applied on the outside of a woman's home. The woman reported joint pain and red and burning skin for three or four months beginning about three weeks after the application. Symptoms developing three weeks later are unlikely to be related to the exposure. She was treated by a physician. No further information on the disposition of the case was reported.

Incident#12771-1

A pesticide incident occurred in 2002, when an exterminator applied the product inside a man's home. One of the family members, who is a woman, reported difficulty breathing, an increased heart rate and blood pressure. The woman's symptoms subsided when she was not at home. No further information on the disposition of the case was reported.

Incident#12833-1

A pesticide incident occurred in 2002, when the product was applied on the carpet and around the baseboards in a home. A woman reported a stinging scalp and back, chest pain, shortness of breath, and itching and burning of the nose. No further information on the disposition of the case was reported.

Incident#12879-10

A pesticide incident occurred in 2002, when a pest control operator applied the product on the front porch of a man's home. On the same day, the man's 19 month-old grandson reported vomiting and a fever. No known exposure by ingestion. Fever suggests other cause for illness. No further information on the disposition of the case was reported.

Incident#12980-7

A pesticide incident occurred in 2002, when a pest control operator applied the product on squares of concrete in a woman's front yard. The woman walked barefoot on the wet treated area. She reported tingling and irritation on the bottom of her feet about ten or fifteen minutes later. Her symptoms later spread to the top of her feet. No further information on the disposition of the case was reported.

Incident#13054-1

A pesticide incident occurred in 2002, when a pest control operator applied the product at a woman's home. The woman, who has a history of asthma, reported asthma and sore throat. Later reported numbness on the left side of her face, blurred vision, nausea, vomiting especially when exposed to other chemical odors. She was treated at an emergency room. No further information on the disposition of the case was reported.

Incident#13057-1

A pesticide incident occurred in 2002, when a thirty year old woman reported skin irritation, and redness on her face during the first thirty-six hours. A collar was applied to her dog about ten days earlier that she touched while doing sheep work in the pouring rain. She then wiped the rain out of her face with her hands. Later, her face and lips were severely swollen and stiff. No further information on the disposition of the case was reported.

Incident#13110-1

A pesticide incident occurred in 2002, when an individual reported eye pain after eye exposure. The individual was treated by a physician and diagnosed with an eye burn. No further information on the disposition of the case was reported.

Incident#13110-6

A pesticide incident occurred in 2002, when the inside of a home was treated with the product. The homeowner, who has a history of asthma, remained inside while this was done. An hour later, the homeowner reported shortness of breath, bronchospasms, throat irritation, and chest tightness. The woman was treated in an emergency room. She reports symptoms recur to a

lesser extent when she reenters home. No further information on the disposition of the case was reported.

Incident#13110-7

A pesticide incident occurred in 2002, when the product was applied in and around a woman's home. The woman reported exacerbation of her myasthenia gravis when re-entering her home and was treated by a physician. Her physician noted that she has a couple of such reactions per year and this occurrence may have been coincidental with the pesticide application. No further information on the disposition of the case was reported.

Incident#13240-1

A pesticide incident occurred in 2002, when a woman's home was treated with the product. The woman reported a swollen face and eyes and was taken to an emergency room for treatment. Symptoms were consistent with an apparent allergic reaction. No further information on the disposition of the case was reported.

Incident#13240-4

A pesticide incident occurred in 2002, when the product splashed onto a man's small finger while he tried to open it. He washed his finger off and nine days later reported numbness and paresthesia on it and the palm of his hand. The delay of nine days is inconsistent with the exposure being a likely cause of symptoms. No further information on the disposition of the case was reported.

Incident#13240-7

A pesticide incident occurred in 2002, when the product was applied in an apartment in the cracks and crevices. The next day, the resident, who is sensitive, took a shower before going to work and reported welts on their entire body area. Not clear how or if this woman was exposed. No further information on the disposition of the case was reported.

Of the 49 incidents reported above, about 30% had symptoms consistent with an asthma or allergic-type reaction (e.g., bronchospasm, dyspnea, hives, edema), about 30% had reactions principally related to skin, eye, or respiratory irritation, and about 30% had symptoms that appeared to be unrelated based on timing or likelihood of other causes.

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 are excluded. Tables 1-4 present the hazard information for deltamethrin 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 deltamethrin 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	11	7	5
Non-occupational: adults and older children	149	73	29
Children under age six	763	374	199

Table 2. Comparison between deltamethrin 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*
Deltamethrin	85.7%	28.6%	0%	45.4%	0%	0%
All Pesticides	86.0%	18.8%	0.62%	47.3%	7.18%	2.85%
Ratio	1.0	1.5	0.0	0.96	0.0	0.0

* 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. All percentages based on fewer than 25 observations in the denominator and are therefore unstable estimates.

Table 3. Comparison between deltamethrin 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*
Deltamethrin	71.2%	11.0%	0%	19.5%	6.90 %	3.45%
All Pesticides	68.5%	10.5%	0.36%	18.1%	7.35%	3.24%
Ratio	1.04	1.04	0.0	1.08	0.94	1.06

* 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 deltamethrin 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*
Deltamethrin	19.2%	1.34%	0.27%	26.1%	3.02%	1.00%
All Pesticides	21.8%	1.40%	0.12%	16.8%	5.12%	1.48%
Ratio	0.88	0.96	2.23	1.55	0.59	0.68

* 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.

There were insufficient numbers of cases to evaluate the hazards of occupational risks to warrant analysis. For non-occupational exposures in adults and older children, the hazards seemed to be similar to that of all other pesticides. For exposures to children less than six years old, major medical outcomes appeared more than twice as likely, but this was based on a single case that occurred in California. Separate follow-up of this case and others involving impregnated chalk suggested that effects were due to choking on the chalk rather than toxicological effects of deltamethrin. Among 62 child ingestions with symptoms, vomiting occurred in two-thirds of these cases and was often the only symptom.

III. California Data - 1982 through 2000

Detailed descriptions of 11 cases submitted to the California Pesticide Illness Surveillance Program (1982-2000) were reviewed. In 5 of these cases, deltamethrin was used alone or was judged to be responsible for the health effects. Only cases with a definite, probable or possible relationship were reviewed. In the first and second case, two sisters ingested Miraculous Insecticide Chalk after they mistook it for a bar of vitamins. One sister reported dizziness and nausea and the other sister reported dizziness, nausea, and abdominal pain. In the third case, a child ingested Miraculous Insecticide Chalk after mistaking it for candy. The child reported lethargy and a slightly unsteady gait. In the fourth case, a supervisory pest control operator found a leak in the tank of his truck, that was parked at his home. The man sprayed the remainder of the product on his yard before he repaired the leak. He then took a shower and later reported tingling on his nose and elbows. In the fifth case, a supervisory pest control operator applied the product on the outside of a restaurant. He then took off the backpack sprayer and the spray wand hit an object and the product got in his face. The pest control operator showered and later reported red, itchy, and burning facial skin and bulging eyes. Deltamethrin ranked 129th as a cause of systemic poisoning in California based on data for 1982 through 1994.

IV. National Pesticide Information Center

On the list of the top 200 chemicals for which NPIC received calls from 1984-1991 inclusively, deltamethrin was not reported to be involved in human incidents.

V. Scientific Literature

He et al. (1991) reported on twenty-four adult male sprayers (17 to 57 years old) and twenty-nine male unexposed sprayers (17 to 62 years old). Nervous diseases were excluded in both groups before spraying. The workers sprayed 2.5% deltamethrin with a single nozzle pressure type of sprayer for five hours a day for three consecutive days in cotton fields. The median nerve was excited in the exposed group before and after the three day spraying and two days after exposure was stopped. Urinary deltamethrin was detected in most of the sprayers after exposure. Half of the sprayers reported abnormal facial sensations 0.5 to 5 hours after the spraying. These symptoms disappeared four to twenty-four hours later. One exposed worker reported congestion in facial skin. There was not a correlation between the deltamethrin detected in the urine and the symptoms. The authors concluded that precautionary measures should be emphasized for protecting sprayers from exposure to deltamethrin.

Shujie et al. (1988) reported on a health survey of forty-four farmers (thirteen males and thirty-one females) who used deltamethrin in cotton fields to eliminate pests in the summer of 1985 and 1986 (June to July). The control group consisted of thirty-one (nine males and twenty-two females) farmers who were referred to a clinic for health examinations. The farmers sprayed the fields in the morning and evening for about six hours a day and three successive days. The

exposed group were exposed to deltamethrin at concentrations of .022-24.070 micrograms/m³ in respiratory zone air and of 0.013-0.347 micrograms/cm² of skin contact. About half of the exposed group reported itching and burning sensations on their skin when deltamethrin dropped on their skin, especially their face. One of the forty-four individuals reported miliary red papules on the face. One farmer reported severe pain on his hands and fingers. A second farmer reported numbness in his hands and feet. A third farmer reported muscle tremors in his face. There were no significant differences between the exposed and control group in sodium, potassium, and urea contents in the serum, sodium potassium ATPase and serotonin in whole blood, and 3-methyl-4-hydroxymandelic acid and 5-hydroxyindoleacetic acid in the urine. The authors concluded that there was no significant difference between the exposed and control group. This could be because the exposure levels were low and the amount of deltamethrin that was absorbed into the body did not reach an effective dose.

Zaleska et al. (2001 - abstract only) reported on a seventeen year old boy that was admitted to the hospital. The boy reported coughing, hemoptysis, and a mild fever. In the hospital, he reported respiratory failure and alveolar hemorrhage. All of the boy's symptoms disappeared after five months of corticosteroids therapy.

VI. Conclusion

According to the Incident Data System, it appears that a majority of cases involved symptoms of skin such as rash, hives, welts, itching and respiratory effects such as difficulty breathing, respiratory irritation, and chest pain and tightness. The risk of acute poisoning was about average when compared to other pesticides. There was some evidence suggesting that deltamethrin could be a problem for sensitive individuals with allergy or asthma. Vomiting was the most common symptom reported among those who ingested the product.

VII. Recommendations

Measures to limit skin, eye, and respiratory exposure are recommended for this pesticide. Skin protection is recommended for both handlers and field workers who are likely to have substantial contact with deltamethrin. Labeling and other protective measures should be designed to limit respiratory exposure among the general public.

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cc: Deltamethrin file (097805)
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