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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

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MEMORANDUM

**SUBJECT:** Update of Dimethoate Incident Review, DP Barcode 261515, Chemical 035001, Reregistration Case #0088

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BACKGROUND

An incident review of dimethoate was completed in October 1996 by Dr. Virginia Dobozy. The purpose of this update is to report on additional data on incidents that have been reported since that review. The following data bases were reviewed for the poisoning incident data on the active ingredient dimethoate:

1) **OPP Incident Data System (IDS)** - reports of incidents from various sources, including registrants (required under Federal Insecticide Fungicide and Rodenticide Act (FIFRA) Section 6(a)(2)), 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.

2) **American Association of Poison Control Centers (AAPCC)** - as the result of Data-Call-Ins issued in 1993, OPP received Poison Control Center data covering the years 1985 through 1992

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for 28 organophosphate and carbamate chemicals. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance System which obtains data from about 60-70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc. The analysis of this data is reported on in the earlier review by Dobozy (1996, DP Barcode 230204). EPA purchased data for the time period 1993-1996 for all pesticides which is analyzed and reported below. Additional analysis of residential exposures for this time period can be found in the earlier memorandum by Blondell (1999, DP Barcode 253361).

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. Data for the years 1982 through 1993 are presented in the earlier review by Dobozy (1996, DP Barcode 230204). Data for the more recent years 1994-1996 are presented below. Note that, as of the date of this memorandum, California did not have data available yet for 1997-98.

### Dimethoate Updated Review

#### I. Incident Data System

The earlier review of dimethoate covered reports received from June 1992 through June 1996. Since that time the following incident involving dimethoate alone have been reported:

##### Incident #5797-1

In 1997 a woman in Florida reported she used dimethoate according to the product label but developed flu-like symptoms including respiratory problems, dizziness, coughing, and bronchial spasms. She went to the emergency room and her physician diagnosed her symptoms as related to her exposure to dimethoate. Her symptoms suggest respiratory irritation rather than organophosphate poisoning due to reduced cholinesterase.

##### Incident #7587-125

In 1996 Washington State Health Department investigated the case of a 19 year old male loader who worked with dimethoate and developed eye irritation, headache, nausea, and weakness. He reported was splashed in the face by two organophosphates though the report lists only dimethoate. He was not wearing proper protective equipment at the time.

##### Incident #7834-37

In California in 1998 a grower applied dimethoate to a vineyard using a ground rig. Across the road 7 of 54 field workers in another vineyard developed headache and nausea and

were seen at a medical clinic. This case is not included in the review of California cases provided below.

## II. Poison Control Center Data - 1993 through 1996

Results for the years 1993 through 1996 are presented below for occupational cases, non-occupational involving adults and older children, and for children under age six. Unlike the earlier analysis for 1985-1992, cases involving exposures to multiple products are excluded. This is because the earlier analysis showed little difference in rankings and measurement of hazard when multiple exposure cases were included. Tables 1-4 present the hazard information for dimethoate 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 numbers of dimethoate cases on which percentages were 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 dimethoate exposures reported to Poison Control Centers participating in TESS and number of cases for which medical outcome was determined by age group and occupational category.

Age group and occupational category	Number of exposures	Number with medical outcome determined
Adults and older children (6-19 years), occupational exposure	57	35
Adults and older children (6-19 years), non-occupational exposure	295	157
Children under 6 years old	45	23

Table 2. Comparison between dimethoate 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, 1993-1996 for occupational cases only.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Dimethoate	82.8%	14.3%	0%	47.4%	3.7%	0%
All Pesticides	85.9%	18.8%	0.60%	46.8%	7.18%	2.89%

\* 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 dimethoate 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, 1993-1996 for non-occupational cases involving adults and older children.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Dimethoate	67.5%	8.28%	0%	23.4%	13.0%	5.80%
All Pesticides	70.8%	10.8%	0.34%	18.7%	7.62%	3.36%

\* 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 dimethoate 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, 1993-1996 for children under six years old.

Pesticide	SYM*	MOD*	LIFE-TH*	HCF*	HOSP*	ICU*
Dimethoate	21.7%	0%	0%	24.4%	45.4%	27.3%
All Pesticides	22.3%	1.48%	0.13%	17.5%	5.47%	1.61%

\* See footnote to Table 3 above.

Dimethoate generally had average or below average evidence of hazard (Tables 2-4) when compared to other pesticides except for health care requirements for children under age six.

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However, the numbers for children were based on only 11 cases seen in a health care facility, 5 of which were hospitalized and 3 of which were treated in a critical care unit. Of five cases receiving follow-up to determine medical outcome only two exhibited minor signs or symptoms. Of the remaining six cases, none were expected to have moderate or serious effects based on the initial history provided to the Poison Control Center.

A separate review of residential exposures was performed for 13 organophosphate pesticide used in residential settings using the 1993-1996 Poison Control Center data (see Blondell J. Memorandum: Review of Poison Control Center Data for Residential Exposures to Organophosphate Pesticides, 1993-1996, DP Barcode 253361, dated Feb. 11, 1999). This review found that on a series of rankings, dimethoate ranked fourth overall among the 13 organophosphates:

Dimethoate ranked 3rd for health care facility use in both children and adults . . . The ratio of dimethoate poisonings per million containers ranked 2nd in adults, while the ratio per million applications in adults ranked 1st . . . The proportion of symptomatic cases due to environmental residues ranked second for dimethoate.

This information suggests that dimethoate toxicity may be underestimated by residential adult users and that residues left after application may be a significant source of illnesses.

### III. California Data - 1994 through 1996

Detailed descriptions of 123 cases involving dimethoate submitted to the California Pesticide Illness Surveillance Program (1994-1996) were reviewed. In 11 of these cases, dimethoate was judged to be responsible for the health effects. Only cases with a definite, probable or possible relationship were reviewed. Table 5 presents the types of illnesses reported by year.

Note that two large cluster poisonings occurred during these years when dimethoate was mixed with other pesticides and the primary pesticide responsible for the ill effects could not be identified. In one incident 73 workers were drifted on (from across the street) by a combination of methomyl, dimethoate and formetanate hydrochloride in 1994. The symptoms reported in this incident were generally categorized as possibly related to the exposure to these 3 pesticides, but not specifically tied to any one pesticide. In 1994 another drift incident occurred involving 24 workers 30 yards away from a broccoli field that was aerially treated with chlorothalonil, metalaxyl, and dimethoate. Only cases where dimethoate was deemed the primary cause of the illness are reviewed below.

Table 5. Cases Due to Dimethoate Exposure in California Reported by Type of Illness and Year, 1994-1996.

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Year	Illness Type					
	Systemic <sup>b</sup>	Eye	Skin	Combination <sup>c</sup>	Respiratory	Total
1994	4	-	-	1	-	5
1995	3	-	1	-	-	4
1996	1	-	-	-	1	2
Total	8	-	1	1	1	11

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

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

A total of 8 persons had systemic illnesses or 73% of 11 persons. A total of 3 workers took time off work as a result of their exposure to dimethoate and one person was hospitalized. Similar results were reported for 1982-93 when 81% of the 124 dimethoate cases were systemic (see Dobozy 1996). A variety of worker activities were associated with exposure to dimethoate from 1994 through 1996 as illustrated in Table 6 below.

Table 6. Illnesses by Activity Categories for Dimethoate Exposure in California, 1994-1996

Activity Category	Illness Category					
	Systemic <sup>b</sup>	Eye	Skin	Combination <sup>c</sup>	Respiratory	Total
Applicator	1	-	-	-	-	1
Mixer/Loader	-	-	-	1	-	1
Drift exposure	3	-	-	-	1	4
Field Residue	2	-	1	-	-	3
Other	2	-	-	-	-	2
Total	8	-	1	1	1	11

<sup>a</sup> Other Residue = worker exposed to residue neither agricultural nor structural.

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

According to the above activity categories, field workers exposed to drift or field residue accounted for the majority (64%) of cases. This is consistent with data from California for the years 1982-93, when 70% of the 132 cases related to dimethoate were due to drift or field

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residue.

#### IV. Summary/Conclusions

Outdoor agricultural use are associated with higher risks to field workers exposed to spray drift or field residue. Risks to handlers appears to be somewhat lower than other insecticides (Dobozy 1996). Among organophosphates used in residential settings, dimethoate may have one of the highest ratios of poisonings per million containers. The estimated ratio is based on poisonings occurring from 1993 through 1996 and the number of containers reported in 1990. If the number of container in residential use increased markedly from 1990 (by say two to three-fold) then the apparent high ratio would be spurious.

#### V. Recommendations

Homeowner dimethoate products should have strong warnings to encourage users to handle them safely. Minimally concentrated or ready-to-use formulations are recommended for the residential market in preference to concentrated solutions which have to be mixed by the user. Agricultural use of dimethoate should include appropriate label warnings to prevent use that will result in spray drift.

#### References

Blondell J. 1999. Memorandum: Review of Poison Control Center Data for Residential Exposures to Organophosphate Pesticides, 1993-1996 DP Barcode 253361. Feb. 11, 1999.

Dobozy VA. 1996. Memorandum: Dimethoate - Review of Pesticide Poisoning Incident Data, Chem ID 035001, DP Barcode 230204. Oct. 2, 1996.

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