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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

MEMORANDUM

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This memorandum is in response to your verbal request for estimates of human "bystander" exposure to malathion bait (MB) aerially applied in urban areas for fruit fly eradication. Historically, the Occupational & Residential Exposure Branch (OREB) has not had, and currently does not have data to support such an estimate. Instead, OREB relies on a massive body of environmental monitoring data that are collected by the California Department of Health Services and utilized in a very conservative model to estimate a range of human exposures that might result from varying levels of activity, clothing protection, amounts of contaminated home grown vegetables and soil consumed, and times spent outdoors during and after actual applications.

OREB has taken the following assumptions and estimates of exposure from: Marty, M., S. Dawson, M. Bradman, M. Harnly and M. DiBartolomeis. 1994. Assessment Of Exposure To Malathion And Malaoxon Due To Aerial Application Over Urban Areas Of Southern California. J. Expos. Analysis & Environm. Epidemiol. (4) No. 1, pp 65-80. OREB considers these estimates to be highly conservative but representative of active members of the adult general population. Three routes of exposure are considered: inhalation, ingestion, and dermal. The estimates are presented as an acute dose and a chronic dose. The chronic dose is based on the assumption of eleven total applications at 14 day intervals.

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Inhalation - It is assumed that this individual is moderately active and works outdoors 8 hr/day and rests indoors for 16 hr. Respiratory volume is assumed to be 30 L/min for work and 10 L/min at rest. It is also assumed that 100% of the airborne MB is absorbed via the lungs into the blood stream.

Ingestion - It is assumed that this portion of exposure is from eating backyard leafy vegetables and small amounts of contaminated soil. It is assumed that none of the MB is removed via washing or cooking prior to ingestion. It is assumed that 100% of the ingested MB is absorbed by the gastrointestinal tract. For the acute estimate it was assumed that the individual consumes 231 g leafy vegetables per meal (which equals 95th per centile nationwide for consumption of leafy vegetables). For the chronic estimate, the individual consumes 10 g of contaminated, home grown vegetables per day.

Dermal - The estimates of dermal exposure are based on a very active individual, outdoors for four hours, wearing shorts only. Dermal dose estimates include regional variation of absorption of MB through skin. For details, see Marty et al.

DOSE ESTIMATES OF EXPOSURE TO MALATHION BAIT  
TO 70 Kg ADULT  
DURING AERIAL APPLICATION

	ug/Kg/day	
	ACUTE	CHRONIC
<u>INHALATION</u>	0.055	0.03
<u>INGESTION</u>	12.5	0.18
<u>DERMAL</u>	<u>41.0</u>	<u>13.7</u>
	53.55	13.9

As stated earlier, these estimates are considered very conservative. In a 1991 study, Ross and his colleagues reported an adult male observer, wearing only running shorts, absorbed a total of 6-14 mg malathion from direct exposure to the bait applied in 18 helicopter overflights. This would equate to 0.3 to 0.8 mg absorbed MB per application.

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For further details, please see Marty et al. 1994 and a companion paper by Bradman, M., M. Harnly, L. Goldman, M. Marty, S. Dawson, and M. DiBartolomeis. 1994. Malathion And Malaoxon Environmental Levels Used For Exposure Assessment And Risk Characterization Of Aerial Applications To Residential Areas Of Southern California, 1989-1990. J. Expos. Analys. and Evironm. Epidemiol. (4) No. 1., pp 49-63.