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

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

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SUBJECT: 128946 Bacillus thuringiensis (Berliner) var. san diego
(MYX 7275) (HED Project # 1 - 0396)

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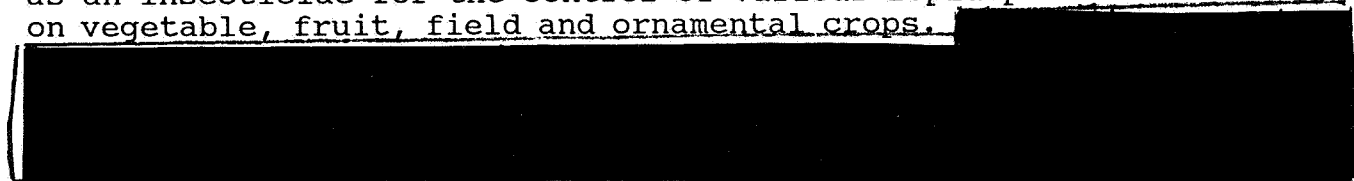
I. INTRODUCTION

A. Purpose:

OREB has been asked to review a study conducted by Pan-Agricultural Laboratories, Inc., (contracted by Mycogen Corporation) entitled "Worker Mixer, Loader, Applicator Exposure to Iodine."

B. Background Information:

MVP, an encapsulated aqueous formulation of delta endotoxin of Bacillus thuringiensis, is being developed by Mycogen Corporation as an insecticide for the control of various lepidopterous insects on vegetable, fruit, field and ornamental crops.



MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

C. Method of Application:

Applications of MVP are made by ground or aerial application equipment. Ground boom application is used in this study as the predominant method of application.

The maximum allowable label rate of MVP is 1.0 gallon of formulated material per acre.

Route of absorption for Iodine is primarily via inhalation exposure.

II. DETAILED CONSIDERATIONS

The study entitled, "Worker Mixer, Loader, Applicator Exposure to Iodine " has been reviewed by OREB and found to be acceptable according to EPA's Subdivision U.

A. Study Method:

Pan-Agricultural has conducted a study for Mycogen Corporation to measure mixer/loader/applicator exposure to Iodine during ground boom application on cabbage fields. The study was conducted at two sites located in Hidalgo County, Texas. Two mixer/ loader / applicators were monitored at above two sites and the following equipment was used:

Site 1: Weslaco, Texas

John Deere Tractor open with roll bar and sun canopy.
3-point hookup (Wylie) field crop sprayer with 200
gallon poly plastic tank.
48 feet spray boom, 28 nozzles.

Site 2: Donna, Texas

John Deere Tractor with roll bar and sun canopy.
Pull behind (FMC) field crop sprayer with 600
gallon tank.
61 feet spray boom, 61 nozzles.

MVP was applied to approximately 200 acres of cabbage over a 3 day period at a rate of 1.0 gallon of formulated material per acre. The duration of the ten replicates at each site (total of 20) of mixing, loading and application were 15 hours and 48 minutes.

Exposure to MVP was measured by utilizing two sampling trains each consisting of a Mini Safety Appliance Model S portable air pump to which a 1/4 inch inside diameter Tygon tubing, approximately three feet long was attached. A charcoal vapor tube was inserted into the vapor tube holder so that the airflow arrow on the charcoal tube was in the direction of the pump. A 37mm

cassette that contained a 37mm diameter glass fiber filter having a 1.0 um pore size and a cellulose support pad was placed at the front of the sampling train. Each cassette was sealed with a shrink band. The cassette was used for capturing particulate matter while charcoal vapor tubes were used for measuring the respirable vapors. Each sampling train was calibrated to an airflow rate of 1.51 LPM. Glass fiber filters and charcoal tubes were changed after each replicate.

The analytical methods used to quantitate iodine residues on the various media was NIOSH method #6005. Field fortication samples were prepared and average recovery was calculated to be 97.3%.

B. Data:

SITE I : Wesalco, Texas

1. Glass Fiber Filter

Rep	Residue (ug)	Sampling time (min)	Avg F.R. (lpm)	Liters sampled	Residue (ug/l)
1	0.33	90.0	1.50	135.0	2.44×10^{-3}
2	0.33	93.0	1.48	137.6	2.39×10^{-3}
3	0.33	118.0	1.50	177.0	1.86×10^{-3}
4	0.33	113.0	1.48	167.2	1.97×10^{-3}
5	0.33	110.0	1.50	165.0	2.0×10^{-3}

AVG: 5.33×10^{-3} ug/l

2. Vapor Collection Tubes

Rep	Residue (ug)	Sampling time (min)	Avg F.R. (lpm)	Liters Sampled	Residue (ug/l)
6	0.89	90.0	1.50	135.0	6.59×10^{-3}
7	0.33	93.0	1.48	137.6	2.39×10^{-3}
8	0.33	118.0	1.50	177.0	1.86×10^3
9	0.33	113.0	1.48	167.2	1.97×10^3
10	0.33	110.0	1.50	165.0	2.00×10^{-3}

AVG: 2.96×10^{-3} ug/l

SITE II: Donna, Texas

1. Glass Fiber Filter

Rep	Residue (ug)	Sampling time (min)	Avg F.R. (lpm)	Liters sampled	Residue (ug/L)
1	0.33	88.0	1.50	132.0	2.50×10^{-3}
2	0.33	95.0	1.50	142.5	2.31×10^{-3}
3	0.33	81.0	1.50	121.5	2.71×10^{-3}
4	0.33	89.0	1.48	131.7	2.50×10^{-3}
5	0.33	71.0	1.53	108.6	3.86×10^{-3}

AVG: 2.70×10^{-3} ug/l

2. Vapor Collection Tubes

Rep	Residue (ug)	Sampling time (min)	Avg. F.R. (lpm)	Liters sampled	Residue (ug/l)
6	0.33	88.0	1.50	132.0	2.50×10^{-3}
7	0.33	88.0	1.48	130.2	2.52×10^{-3}
8	2.01	81.0	1.50	121.5	1.65×10^{-2}
9	0.33	89.0	1.48	131.7	2.50×10^{-3}
10	0.90	79.0	1.50	118.5	7.59×10^{-3}

AVG: 6.30×10^{-3} ug/l

C. Assumptions:

In order to calculate daily and annual exposure estimates:

OREB assumes that a 70 KG body weight to represent average body weight and that a worker performs light tasks with inhalation rate of 29 LPM.

OREB assumes the predominant route of iodine exposure to be respiratory, with 100% absorption.

OREB assumes that average worker will mix and load ten tanks of spray per day.

D. Calculations:

SITE I

$$\begin{aligned} \text{Total Iodine Residue Collected} &= 5.33 \times 10^{-3} + 2.96 \times 10^{-3} \\ &= 8.29 \times 10^{-3} \text{ ug/l} \end{aligned}$$

$$\begin{aligned} \text{Average Daily Exposure} &= \\ (8.29 \times 10^{-3} \text{ ug/l}) &* (29 \text{ l/min}) * (8 \text{ hr}) (60 \text{ min/hr}) * (1/70\text{kg}) \\ &= 1.64 \text{ ug ai/ kg bw} \end{aligned}$$

SITE II

$$\begin{aligned} \text{Total Iodine Residue Collected} &= 2.70 \times 10^{-3} + 6.30 \times 10^{-3} \\ &= 9.00 \times 10^{-3} \text{ ug/l} \end{aligned}$$

$$\begin{aligned} \text{Average Daily Exposure} &= \\ (9.00 \times 10^{-3} \text{ ug/l}) &* (29 \text{ l/min}) * (8 \text{ hr}) (60 \text{ min/hr}) * (1/70 \text{ kg}) \\ &= 1.78 \text{ ug ai/kg bw} \end{aligned}$$

III. CONCLUSIONS

The OSHA time weighted average for I_2 is 1.038 ug/l. The exposure estimates calculated in this study are much lower than the OSHA limit; hence, OREB does not consider Iodine, at the present concentration, to be a worker exposure issue. OREB accepts the study as it fulfills EPA's Subdivision U requirements.

cc: A. Mehta (H7509C)
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Circulation File
Chemical Subject File