

Shaughnessy #: 081901

EAB Log-Out Date: MAR 28 1988

To: Donald Stubbs  
Product Manager #41  
Registration Division (TS-767C)

From: Michael P. Firestone, PhD, Chief  
Special Review Section  
Exposure Assessment Branch  
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Thru: Paul F. Schuda, PhD, Chief  
Exposure Assessment Branch  
Hazard Evaluation Division (TS-769C)

*Michael P. Firestone*

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Attached, please find the EAB review of...

Reg./File No.: 214,260

Chemical: Chlorothalonil

Type Product: Fungicide

Product Name: Bravo

Company Name: Fermenta Plant Protection

Submission Purpose: Section 18 Request for Use on Tart Cherries  
in Michigan

Date In: 15 MAR 88

ACTION CODE: 510

Date Completed: 25 MAR 88

EAB #: 80534

Deferrals To:

       Ecological Effects Branch

       Residue Chemistry Branch

       Toxicology Branch

XX Benefits and Use Division

Monitoring study requested by EAB:       

Monitoring study voluntarily conducted by registrant:

## 1.0 INTRODUCTION

The State of Michigan Department of Agriculture has submitted a petition requesting a Section 18 Emergency Exemption for chlorothalonil use on tart cherries. Chlorothalonil has been classified as a B<sub>2</sub> probable human carcinogen by the Toxicology Branch Peer Review Committee.

## 2.0 DISCUSSION OF DATA

EAB has performed an exposure assessment for chlorothalonil based on surrogate data found in the published literature. A number of assumptions are necessary for this assessment, namely:

1. An average worker has a mass of 70 kg.
2. Exposure is not adjusted for dermal absorption.
3. For ground applications, the mixer/loader and applicator are the same person.
4. Respiratory exposure is negligible compared to dermal exposure.

### 2.1 USAGE DATA

The following usage data were obtained from the State of Michigan Department of Agriculture and will be employed in this assessment (1). EAB defers on these data to BUD to ensure that the parameters presented accurately reflect the usage patterns.

|                                  |           |
|----------------------------------|-----------|
| Application<br>Rate<br>(lb ai/A) | 2.34-3.13 |
|----------------------------------|-----------|

|                    |      |
|--------------------|------|
| Average<br>Acreage | 25.1 |
|--------------------|------|

|                                                |  |
|------------------------------------------------|--|
| Potential<br>Exposure<br>Time -<br>Applicators |  |
|------------------------------------------------|--|

|                             |     |
|-----------------------------|-----|
| <u>Ground Boom</u><br>hr/dy | 3.4 |
| dy/yr                       | 4   |

Chlorothalonil is applied exclusively by ground boom equipment. BUD has previously stated that an applicator can treat 7.3 A/hr by ground (2). Workers using chlorothalonil employ

normal work clothing and gloves when mixing/loading and applying the product. Face shields or goggles are required during mixing/loading only.

## 2.2. SURROGATE MIXER/LOADER EXPOSURE

EAB utilized two studies from the published literature to estimate mixer/loader exposure (3,4). The label for chlorothalonil requires closed loading. Both studies employed workers wearing long-sleeved shirts, long pants and protective gloves performing closed loading. A summary of the exposure estimates and clothing scenarios is provided below.

| <u>Study</u> | <u>Replicates</u> | <u>Exposure<br/>(mg/lb ai)</u> | <u>Clothing</u>                                                                           |
|--------------|-------------------|--------------------------------|-------------------------------------------------------------------------------------------|
| Dubelman     | 9                 | 0.0041                         | long-sleeved shirt, long pants - 50% protection<br>protective gloves - actual measurement |
| Peoples      | 9                 | 0.025                          | long-sleeved shirt, long pants, protective gloves - actual measurement                    |

The 18 replicates give a mean exposure of 0.015 mg/lb ai handled. The lb ai handled by each mixer/loader per day for each scenario can be calculated as follows. EAB will assume that one mixer/loader will mix all of the product to be applied in a day. Knowing the application rate, the spray rate and the hours spent spraying per day, the total lb ai mixed per day can be calculated. Multiplying this by the days per year, the lb ai handled/yr per mixer/loader is calculated. Adjusting this exposure to the lb ai handled by a mixer/loader of chlorothalonil, the following exposures can be calculated.

### Mixer/Loader

#### Low Application Rate:

$$\frac{0.015 \text{ mg/lb ai} \times 2.34 \text{ lb ai/A} \times 25.1 \text{ A/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} = 0.050 \text{ mg/kg/yr}$$

#### Mean Application Rate:

$$\frac{0.015 \text{ mg/lb ai} \times 2.74 \text{ lb ai/A} \times 25.1 \text{ A/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} = 0.059 \text{ mg/kg/yr}$$

#### High Application Rate:

$$\frac{0.015 \text{ mg/lb ai} \times 3.13 \text{ lb ai/A} \times 25.1 \text{ A/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} = 0.067 \text{ mg/kg/yr}$$

Exposure: 0.059 mg/kg/yr (Range: 0.050-0.067 mg/kg/yr)

### 2.3 SURROGATE GROUND BOOM EXPOSURE

EAB used four studies found in the published literature to estimate dermal exposure to ground boom applicators (3,5,6,7). This scenario assumes workers wearing long-sleeved shirts and long pants that provide 50% protection to the covered areas and gloves that provide 90% protection to the hands. The exposures are presented below.

| <u>Study</u> | <u>Replicates</u> | <u>Exposure (mg/hr)</u> |
|--------------|-------------------|-------------------------|
| Abbott       | 18                | 8.7                     |
| Maitlen      | 21                | 0.079                   |
| Dubelman     | 12                | 0.72                    |
| Wojeck       | 23                | 41.6                    |

The 74 replicates have a weighted geometric mean exposure of 2.5 mg/hr. This is normalized to an application rate of 1.0 lb ai/A. Adjusting this to the application rates for chlorothalonil, the following exposures can be calculated.

#### Ground Boom Applicator

Low Application Rate:

$$\frac{2.5 \text{ mg/hr} \times 3.4 \text{ hr/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} \times \frac{2.34 \text{ lb ai/A}}{1.0 \text{ lb ai/A}} = 1.1 \text{ mg/kg/yr}$$

Mean Application Rate:

$$\frac{2.5 \text{ mg/hr} \times 3.4 \text{ hr/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} \times \frac{2.74 \text{ lb ai/A}}{1.0 \text{ lb ai/A}} = 1.3 \text{ mg/kg/yr}$$

High Application Rate:

$$\frac{2.5 \text{ mg/hr} \times 3.4 \text{ hr/dy} \times 4 \text{ dy/yr}}{70 \text{ kg individual}} \times \frac{3.13 \text{ lb ai/A}}{1.0 \text{ lb ai/A}} = 1.5 \text{ mg/kg/yr}$$

Exposure: 1.3 mg/kg/yr (Range: 1.1-1.5 mg/kg/yr)

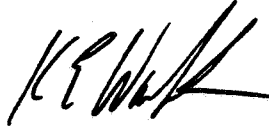
### 3.0 CONCLUSIONS

EAB has estimated the exposure of ground boom mixer/loader/applicators employing normal work clothing and gloves. The results are presented below.

**Ground Boom Application**

**MIXER/LOADER/APPLICATOR**

**1.4 mg/kg/yr (Range: 1.2-1.6 mg/kg/yr)**



**Karen E. Warkentien  
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Exposure Assessment Branch  
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## REFERENCES

1. Letter from David R. Wade (MI Department of Agriculture) to Donald Stubbs requesting Section 18 Emergency Exemption for tart cherries in Michigan. 2 FEB 88.
2. Memorandum from E. Neil Pelletier to Michael Firestone entitled, "Report on Use Practices and Estimates of Exposure Periods for Application of Chlorothalonil to Potatoes, Onions, Peanuts, and Turf." 12 JAN 88.
3. Dubelman, S., et al. 1982. "Operator Exposure Measurements During Application of the Herbicide Diallate." J. Agric. Food Chem. 30:375-381.
4. Peoples, S. A., et al. 1979. Monitoring of Potential Occupational Exposure of Mixer/Loaders, Pilots, and Flaggers During Application of Tributyl Phosphorotrithioate (DEF) and Tributyl Phosphorothioate (Folex) to Cotton Fields in the San Joaquin Valley of California in 1979. Report HS-676, Worker Health and Safety Unit, California Department of Food and Agriculture. 34 pp.
5. Abbott, I. M., et al. 1987. "Worker Exposure to a Herbicide Applied with Ground Sprayers in the United Kingdom." Am. Ind. Hyg. Assoc. J. 48(2):167-175.
6. Maitlen, J. C., et al. 1982. "Workers in the Agricultural Environment: Dermal Exposure to Carbaryl," in Pesticide Residues and Exposure. ACS Symposium Series 182. ACS Press: Washington, DC. pp. 83-103.
7. Wojeck, G. A., et al. 1983. "Worker Exposure to Paraquat and Diquat." Arch. Environ. Contam. Toxicol. 12:65-70.