



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

2-C-90

FEB 6 1990

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: MIXER/LOADER AND APPLICATOR EXPOSURE ASSESSMENT
FOR SECTION 18 USE OF BIFENTHRIN ON HOPS IN
WASHINGTON (HED PROJECT #0-0726B)

TO: J. Tompkins, PM 41
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THRU: Michael Firestone, Ph.D., Section Head
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Please find below the NDEB review of

HED Project #: 0-0726B

RD or SRRD Record #: 259808

Caswell #: 463F

Date Received: 02/22/90 Review Time: 2 days

Date Returned: 03/06/90

Deferral to: Biological Analysis Branch/BEAD

Science Analysis & Coordination Branch

TB - Insecticide/Rodenticide Support Section

☒ TB - Herbicide/Fungicide/Antimicrobial Support
Section

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1.0 INTRODUCTION

The Washington Department of Agriculture submitted a request to be granted a Section 18 emergency exemption for the use of Brigade 10 WP on 15 February 1990. The request is for the control of hop aphids on hops in Yakima and Benton counties. The use of Brigade is requested as a replacement for Systox which was removed in 1986. Alternatives such as diazinon, phorate, malathion, and the two parathions have proven ineffective. Brigade 10 WP is a wettable powder formulation containing 10% bifenthrin as the active ingredient and is produced by FMC Corporation.

2.0 CONCLUSION

The Non-Dietary Exposure Branch has estimated the exposure to mixer/loader/applicators applying Brigade 10 WP to hops. The exposure estimates assume the use of chemical resistant gloves during mixing/loading and the use of long pants and long sleeve shirts at all times. The exposure estimates have not been adjusted for the dermal absorption of bifenthrin. Based on label maximum rates, the daily exposure for mixing, loading, and applying Brigade 10 WP is 0.017 mg/kg/day. The annual exposure is 0.050 mg/kg/yr.

3.0 USE INFORMATION

The application by the State of Washington contains the proposed use requirements for the Section 18. The hops would be treated by ground application at a maximum application rate of 0.08 lbs ai/acre. A maximum of three applications would be permitted during the use season which would occur between 15 May and 15 September. The three applications would permit not more than 0.24 lbs ai/acre to be applied during the year. A 14 day preharvest interval would also be required. A total of 24,500 acres of hops will be treated in the two counties. Based on information obtained by J. Thompkins, Emergency Response Section/RD, a typical hops field consists of 20 acres. NDEB will assume that the same individual does both the mixing/loading and application of Brigade 10 WP to hops since this occurs 50% of the time. The mixer/loaders will wear long pants, long sleeve shirts, chemical resistant gloves, and a face shield or goggles. The applicators will wear long pants and long sleeve shirts. These requirements are consistent with FMC's protective clothing statements on their bifenthrin products.

4.0 MIXER/LOADER/APPLICATOR EXPOSURE

NDEB does not have available any exposure studies in which bifenthrin wettable powder formulations were used. Therefore surrogate studies will be utilized to estimate exposure. One study is available in which mixer/loader exposure to wettable powders was determined. Everhart, L.P. and Holt, R.F. (Potential Benlate Fungicide Exposure During Mixing/Loader Operations, Crop Harvest, and Home Use, J. Agric. Food Chem., 30:222-227, 1982) measured the exposure to mixer/loaders handling Benlate, a wettable powder containing 50% benomyl. Dermal exposure was measured using surgical pads and cotton undertaker's gloves for the hands. The mean dermal exposure for the eight replicates was calculated to be 0.26 mg/lb ai handled. The exposure estimates are based on the assumption that chemical resistant gloves and long sleeve shirts provided 90% protection to covered areas. Since the study did not monitor exposure to the legs, the exposure estimates assume no exposure to the legs.

Bifenthrin is applied to hops by ground boom application. NDEB has evaluated six ground boom applicator exposure studies available in the published literature (Lunchick, et al., The Environmental Protection Agency's Use of Biological Monitoring Data for the Special Review of Alachlor, Biological Monitoring for Pesticide Exposure, ACS Symposium Series 382, pg 327-337, 1989). Based on that evaluation, the geometric average exposure to ground boom applicators was estimated to be 4.6 mg/hr normalized to an application rate of 1.0 lb ai/acre. Brigade 10 WP is applied at 0.08 lbs ai/acre so that the adjusted ground boom applicator exposure to Brigade 10 WP is estimated to be 0.37 mg/hr.

5.0 MIXER/LOADER/APPLICATOR EXPOSURE TO BRIGADE 10 WP APPLIED TO HOPS

The average acreage of hops treated is 20 acres. The mixer/loader would handle a total of (0.08 lbs ai/acre x 20 acres) 1.6 lbs ai/day. At the maximum annual application rate for three applications/acre, the mixer/loader would handle 4.8 lbs ai/yr. The exposure to the mixer/loader handling a wettable powder and wearing chemical resistant gloves, long sleeve shirt, and long pants was estimated to be 0.26 mg/lb ai. Based on these estimates, the daily and annual exposure to the mixer/loader is as follows:

Daily Exposure - $0.26 \text{ mg/lb ai} \times 1.6 \text{ lbs ai/day} \times$
 $1/70 \text{ kg} = 0.0059 \text{ mg/kg/day}$

Annual Exposure - $0.26 \text{ mg/lb ai} \times 4.8 \text{ lbs ai/yr} \times$
 $1/70 \text{ kg} = 0.018 \text{ mg/kg/yr}$

The ground applicator was estimated to receive an exposure of 0.37 mg/hr at the 0.08 lbs ai/acre label maximum rate. Seven hours are required to treat 20 acres of hops. The actual spray time in which the applicator is actually spraying the hops is about two hours. Based on these estimates, the daily and annual exposure to the ground applicator is as follows:

Daily Exposure - $0.37 \text{ mg/hr} \times 2 \text{ hrs/day} \times 1/70 \text{ kg} =$
 0.011 mg/kg/day

Annual Exposure - $0.37 \text{ mg/hr} \times 6 \text{ hrs/yr} \times 1/70 \text{ kg} =$
 0.032 mg/kg/yr

The combined exposure from mixing, loading, and applying Brigade 10 WP to hops is estimated to be 0.017 mg/kg/day and 0.032 mg/kg/yr. The exposure estimates assume the use of chemical resistant gloves during mixing/loading and the use of long sleeve shirt and long pants at all times. The exposure estimates have not been adjusted for the dermal absorption of bifenthrin. NDEB defers the adjustment of the exposure estimates for dermal absorption to the Herbicide/Fungicide Toxicology Branch.

cc: B. Backus/Toxicology-HFAS
SACB
Bifenthrin File
Circulation
Correspondence File