

US EPA ARCHIVE DOCUMENT

5-26-88

Shaughnessy Number: 103301
Date Out of EAB: MAY 26 1988

TO: M. Mautz
Product Manager 3
Registration Division (TS-767C)
FROM: Michael P. Firestone, Chief *Michael P. Firestone*
Special Review Section #2
Exposure Assessment Branch/HED (TS-769C)
THRU: Paul F. Schuda, Chief *Paul F. Schuda*
Exposure Assessment Branch/HED (TS-769C)

Attached, Please find the EAB review of:

Reg./File #: 239-2471
Chemical Name: Acephate
Type Products: Insecticide
Company Name: Chevron
Purpose: Greenhouse Exposure Study

Date Received: 3/17/88 Action Code: 660
Date Completed: 26 May 88 EAB #(s): 80537
Monitoring study requested: x Total Reviewing Time: 4 days

Monitoring study volunteered:

Deferrals: Ecological Effects Branch
 Residue Chemistry Branch
 Toxicology Branch

1/5

CHEMICAL NAME:

Deephote

45005

SHADGRESSY NO. 214636

Identifying Number	Action Code	Reference Number	Record Number	Study Guideline or Narrative Description	Reg. Std. Review Submission Criteria (SEE BELOW)	Accession Number	(HED/BUD/TSS Complete) Study found to be Acceptable (A)/ Unacceptable (U) for review or reviewer comment
239-2471	660	26 26	216901	Applicator Exposure - Greenhouse	2	405048	25
<i>EAB: Route to m. Finestone</i>							

PRODUCT MANAGER (PM) or REVIEW MANAGER (RM) AND NUMBER:
W. N. Miller (16)

PM/RM TEAM MEMBER AND NUMBER:
M. MAVIZ (3)

DATE RECEIVED (EPA): 2/3/88

RD BRANCH CHIEF INITIALS: *HIV*

CHECK APPLICABLE BOX:

- Adverse 6(a)(2) Data (405,406)
- Suspect Data (415,416)
- IBT Data (485,486)
- Product Specific Data (Reregistration) (655,656)
- Generic Data (Reregistration) (660,661) *As per agreement with EAB*
- Special Review Data (870,871)

NUMBER OF INDIVIDUAL STUDIES SUBMITTED: 1
HAVE ANY OF THE ABOVE STUDIES (in whole or in part) BEEN PREVIOUSLY SUBMITTED FOR REVIEW? (circle: yes or no) If yes, please identify the study(ies):

TO BE COMPLETED BY RSERB

DATE SENT TO HED/BUD/TSS: 3-17-88

PRIORITY NUMBER: 23

PROJECTED RETURN DATE: 6/30/88

DATE RETURNED TO RD (HED/BUD/TSS PROVIDE):

RELATED ACTIONS: Refer to record # 215345

INSTRUCTIONS: EAB already has data. This is transcript of clean sheet only

REVIEWS SENT TO:

HED: SIS TB RCB EAB EEB RD: TSS BUD: EAB SSB

TO:	TYPE OF REVIEW	NUMBER OF ACTIONS			FOR DATA SUBMITTED UNDER A REGISTRATION STANDARD: Review Submission Criteria.
		Reregistration	Special Review	Other	
	Toxicology				Policy Note #31 1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria 2 = data of particular concern 3 = data necessary to determine tiered testing requirements NOTE TO TSS: Return 1 Copy To RSERB
	Ecological Effects				
	Residue Chemistry				
X	Exposure Assessment	✓			
	Product Chemistry				
	Efficacy				
	Precautionary Labeling/Acute Tox.				
	Science Support				
	Economic Analysis				

INCLUDE AN ORIGINAL AND FOUR (4) COPIES OF THIS COMPLETED FORM FOR EACH BRANCH CHECKED FOR REVIEW.

- I. Study Type
Exposure Study-Surrogate Greenhouse
- II. Citation
Orthene: Greenhouse Worker Exposure, Ford, J.E., Chevron
Chemical Company, 7 October, 1987, Assession No.
40504825.
- III. Reviewer *Curt Lunchick*
Curt Lunchick
Special Review Section
Exposure Assessment Branch/HED (TS-769C)
- IV. Approval *Michael P. Firestone*
Michael P. Firestone, Chief
Special Review Section
Exposure Assessment Branch/HED (TS-769C)

V. Conclusions

Based on the Sumagic [(E) (p-chlorophenyl-4,4-dimethyl-2-(1,2,4-triazol-1-yl)-1-pentene-3-ol)] exposure data submitted by Chevron, the dermal exposure to a mixer/loader/applicator handling a liquid formulation of acephate and applying acephate by low pressure hand-held sprayer is 160 mg/lb a.i. The mixer/loader portion of the exposure is 87 mg/lb a.i. and the application portion is 74 mg/lb a.i. The exposure estimates assume that protective gloves are not worn but that long sleeve shirts and long pants are worn. Airborne levels of Sumagic were below detectable levels. For similar applications of acephate, comparable airborne levels would be expected. Postapplication residue levels were nondetectable on surface areas. Post-application acephate air concentrations are partially dependent on vapor pressure and may be different from Sumagic postapplication air concentrations.

VI. Methods

Chevron used an exposure study in which Sumagic Plant Growth Regulator was applied in greenhouses as a surrogate to determine exposure to greenhouse mixer/loader/applicators to acephate. According to the Orthene risk assessment submitted by Chevron, acephate is applied in greenhouses until runoff using a 1000 ppm spray solution.

The actual exposure study submitted, "Assessment of Worker Exposure to Sumagic during Greenhouse Application Using Low Pressure Handheld Sprayers" (Merrick, D.L., Laboratory Project No. 2203, 17 August 1987), used Sumagic PGR that was a liquid formulation with a concentration of 500 ppm active ingredient. Assuming a specific gravity of 1.0 g/ml, each liter bottle of Sumagic PGR will contain 500 mg or 0.05% active ingredient. Each participant in the study mixed and sprayed 1.51 l of Sumagic PGR

in 2 gallons of finished spray. Based on the use of 1.5/1, a total of 755 mg or 0.0017 lb a.i. were handled by each participant. A total of nine workers were monitored as they filled the spray tank with 1.5 l Sumagic PGR, diluted the spray to 2 gallons finished spray, and then sprayed the plants by hand to run-off (approximately 200 sq ft/gal spray). The foliage consisted of hibiscus, petunia, ageratum, easter lily, geranium, purple moses, true boston fern, vinca, shasta daisy, fuchsia, impatiens, begonias, snap dragon, and dahlia. The greenhouse was 20' x 100' with double poly over aluminum bows. Exhaust fans were set at one end of the greenhouse to provide an air exchange of 16,000 cfm.

Inhalation exposure was monitored by placing a personal air sampler in the breathing zone of the study participants. The sampler contained two polyurethane foam plugs through which air was drawn at the rate of 2.0 l/min. Dermal exposure was monitored using dosimeters placed outside the clothing worn by study participants. Two types of dosimeters were used. The first type consisted for a 10 x 10 cm² alpha-cellulose patch backed by aluminum foil which was used to estimate exposure to skin areas not covered by clothing. The second type consisted of the 10 x 10 cm² foil backed alpha-cellulose patch that was loosely covered by shirt material on the upper body dosimeters and denim on the lower body dosimeters. The residues on the alpha-cellulose portion of the dosimeter represented residues on skin covered by clothing. The unprotected dosimeters were placed on the shoulder, chest, back, head, chest, forearms, upper arms, thighs, and shins. The protected dosimeters were placed adjacent to the unprotected dosimeters with the exception of the head which had only an unprotected dosimeter. Hand exposure was monitored using white cotton gloves. Separate sets of dosimeters were used during mixing/loading and application.

Postapplication residues of Sumagic in the greenhouse were monitored by placing eight alpha-cellulose patches on work benches at a 3' height and another eight patches at 5'. The patches were placed one hour after the end of application near the end of the greenhouse containing the exhaust fan. An air sampler similar to the personal air samplers, was placed at a 5' height at the exhaust fan end of the greenhouse. Postapplication samples were taken at 4 hours, 1, 2, and 4 days post application. The air sampler was run for four hours during sampling.

Quality assurance sampling was done in the field during the study. For each collection matrix a blank sample was exposed to the environmental conditions. In addition, two replicates of each matrix were spiked with 10, 100 and 1000 ug acephate. Triplicate samples of each of the nine spray solutions were taken to compare actual spray concentrations to nominal values. Laboratory fortification of 36 alpha-cellulose pads at 2 ug and four pads at 100 ug was done. Laboratory fortification of six cotton gloves at 2 ug and four gloves at 100 ug, and five foam filters at 1 ug and four filters at 50 ug was also done. Storage

stability over 18 days was measured by spiking the matrices with 100 ug Sumagic.

Sumagic in the matrices was extracted with hexane/acetone, evaporated to dryness, and redissolved in hexane. The extracts were analyzed for Sumagic by gas chromatography with an EC detector. The detection limits were 1.0 ug/foam plug, 0.01 ug/cm² on the patches, and 2.0 ug per pair of gloves.

VII. Results

Analysis of the glove storage stability samples indicated that Sumagic was stable over 18 days of storage. The 18-day alpha-cellulose and polyurethane foam filter samples showed slight decreases compared to the zero day samples. The zero-day alpha-cellulose and foam filters contained a mean of 107.5% and 101% of the 100 ug fortification, respectively, while at 18 days, the percent recovery was 79.5% and 86.5% respectively. The percent recovery of the field spiked matrices were generally between 80 and 105% at the 10, 100, and 1000 ug fortifications. The exceptions were the 10 ug fortification of the alpha-cellulose patches on the first day of study which had recoveries of 73 and 79%. The percent recovery on the second day of study was in the upper eighties. The white cotton gloves fortified at 10 and 100 ug on the second day of study were extremely variable in the amount of Sumagic recovered. The recoveries at 10 ug were 106% and 71% and at 100 ug the recoveries were 116% and 67%. The laboratory fortification recoveries of the alpha-cellulose patches averaged 102% with almost all of the 40 samples ranging foam 80 to 120% recovery. The overall mean recovery for the lab fortified cotton gloves was 106% and for the foam filters 101%. Despite the good overall mean recoveries the precision at the 100 ug fortification level was poor. The recoveries for the cotton gloves were 77, 97, 101, and 142% and for the foam filters they were 73, 75, 82, and 131%. The percent of Sumagic in the spray mix as compared to the nominal concentration was 80.7% on the first day of the study and 101% on the second day of the study.

EAB calculated dermal exposure for mixer/loaders and applicators assuring that they wore long pants and long sleeve shirts. The dermal exposure for each body area was determined by multiplying the value of the Sumagic residue on a given patch by the surface area for the representative body part as given in Subdivision U of the Pesticide Assessment Guidelines.

Dermal exposure to the nine mixer/loader replicates for all dosimeters except the hands was less than the 0.01 ug/cm² detection limit. The total surface area for the face, limbs, (except the hands), and torso is 18,330 cm². Assuming the residue on the alpha-cellulose patches was half of the detection limit, the dermal exposure would be (0.005 ug/cm² x 18,330 cm²) 92 ug. The amount of Sumagic found in the white cotton gloves and total dermal exposure were as follows for the mixer/loaders:

	Dermal Exposure (ug)								
	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9
Hands	52	18	53	11	283	99	43	50	18
Body	92	92	92	92	92	92	92	92	92
Total	144	110	145	103	375	191	135	142	110

The geometric mean exposure for the nine mixer/loaders is 148 ug. Since each mixer/loader handled 0.0017 lbs a.i. the exposure per pound a.i. is 87 mg/lb a.i. All foam plugs contained Sumagic at levels below the 1.0 ug detection limit.

Table 1 presents the dermal exposure for the nine study participants during application. Almost all of the alpha-cellulose dosimeters were below the detection limit of 0.01 ug/cm². Hand exposure was at detectable levels with eight of the nine replicates and ranged from 2.0 to 275 ug. The geometric mean dermal exposure was 74 mg/lb a.i. As with the mixer/loaders, all foam plugs contained Sumagic residues at less than the 1.0 ug detection limit. The combined dermal exposure for mixing, loading, and applying Sumagic was 160 mg/lb a.i.

The postapplication monitoring of the greenhouse for residues of Sumagic showed non-detectable residues at 4 hours and 1, 2, and 4 days postapplication.

VIII. Discussion

The use of Sumagic exposure data as a surrogate for acephate is acceptable. The Sumagic study involved the use of low pressure hand-held sprayers. The use of hand-held sprayers that operate at higher pressures or produce a fine spray droplet would be expected to produce a higher exposure than was observed in their study. Because the exposures were low in this study, almost all of the non-hand dosimeters were below the detection limit. For this reason, the non-hand dermal exposure estimates presented are largely artifactual and are based on an assumed residue level of half of the detection limit. The failure to detect residues is not unexpected since the amount of Sumagic or acephate used in a small greenhouse operation is minimal.

A review of the analytical chemistry results indicate that some problems may exist with the analysis of Sumagic on some matrices. The variation in the percent recovery for a given matrix at a given fortification level was large at times. Cotton gloves fortified in the laboratory at 1000 ug are an example where the recoveries for the four samples ranged from 73 to 131%. This variability in recovery was by no means universal, however.

IX. CBI Information Addendum

The registrant, Chevron, made no claim of confidentiality for any information submitted as defined in FIFRA Section 10(d)(1). The information provided in the study may not be used to support the registration of another company's pesticide without data compensation, as defined in FIFRA Section 3.

TABLE 1. DERMAL EXPOSURE TO GREENHOUSE APPLICATORS

Body Area	Dermal Exposure (ug)								
	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9
Face	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Front of neck	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Back of neck	0.6	3.3	0.6	0.6	0.6	0.6	0.6	2.2	0.6
Chest	18	18	18	18	18	18	18	18	18
Back	18	18	18	18	18	18	18	18	18
Upper arms	15	15	15	15	15	15	15	15	15
Forearms	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Thighs	19	19	19	19	19	19	19	19	19
Shins	12	12	12	12	12	12	12	12	12
Hands	2.5	2.6	74	2.0	6.0	275	2.4	53	1.0
Total	95	98	167	95	99	386	101	147	94
LBS a.i. Handled	0.0017	0.0017	0.0017	0.0017	1.0017	0.0017	0.0017	0.0017	0.0017
Dermal Exposure (mg/lb a.i.)	56	58	98	56	58	227	59	86	55
Log Dermal Exposure	1.75	1.76	1.99	1.75	1.76	2.36	1.77	1.93	1.74
Geometric Mean Dermal Exposure (mg/lb a.i.)	74 mg/lb a.i.								
Arithmetic Mean Dermal Exposure (mg/lb a.i.)	84 mg/lb a.i.								