2-19-88 EEB

Shaughnessy No.: 103301

Date Out of EAB: FEB 18 1988

TO: W. Miller/M. Mautz, PM Team 16
Insecticide-Rodenticide Branch
Registration Divison (TS-767C)

FROM: Thomas Dixon Harold K. Dyg for T.D.
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)

THRU: Paul F. Schuda, Chief Thomas E. Dixon for
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)

Attached, please find the EAB review of:

Reg./File No.: 239-2471

Chemical Name: Acephate

Type Product: Insecticide

Product Name: Orthene

Company Name: Chevron Chemical Company

Purpose: Review Droplet Size Spectrum and Drift Field Evaluation as Registration Standard Followup

Action Code: 660 EAB No.: 70997

Date Received: September 28, 1987

Date Completed: 5 Feb 1988 Total Reviewing Time: 6 days

Monitoring Study Requested: No

Due Date: 19 Feb 1988

Deferral to: _____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

(1) 18

1. Chemical:

Common Name: Acephate
Product Name: Orthene
Chemical Name: O, S-dimethylacetylphosphoramidothioate

2. Test Material:

To conduct the droplet size spectrum test the author substituted 470.3 g. sugar, 132.45 g. Hi-Sil 262, and 3.02 g. aerosol OT-B in 2 gal. water for a 7.4% Orthene spray mix. Dr. Akesson presents measurements indicating that the Orthene spray mix and the sugar mixture are similar with regard to viscosity, surface tension, and density.

Drift Field Evaluation

Dr. Akesson presents field data for an unidentified powder and an unidentified "ec" formulation as surrogates for acephate formulations.

3. Action Type:

Review Droplet Size Spectrum Study (Guideline Reference No. 201-1) and Drift Field Evaluation Study (Guideline Reference No. 202-1).

4. Study ID: Akesson, Norman B. (1986) Droplet Size Spectrum Study. Agricultural Engineering Department. University of California, Davis. Project No. 8702437-A. Completed December 30, 1986.

Akesson, Norman B. (1986) Drift Field Evaluation. Agricultural Engineering Department. University of California, Davis. Project No. 8702437-B. Completed 30 December 1986.

5. Reviewed By: Robert K. Hitch
EAB/HED

Signature: Robert K. Hitch
Date 2/17/88

6. Approved By: Thomas E. Dixon, Chief
Monitoring Section
EAB/HED

Signature: Harold K. Dogg for T.D.
Date: 2/17/88

7. Conclusions:

Droplet Size Spectrum Study

This study, while not currently acceptable, can be upgraded to fully acceptable. The combinations of air speed, nozzle types, direction to airstream, and simulated formulation are consistent with expected aerial application techniques. However, the record number for the last trial shown in Dr. Akesson's table 2 is missing. This should be submitted to fully document this study.

Drift Field Evaluation

Generally the Drift Field Evaluation must be conducted with the pesticide for which registration application is being made. However, Dr. Akesson's use of surrogates received prior approval when he notified Dr. Robert W. Holst (Deputy Branch Chief of the Exposure Assessment Branch) via telephone that it was impossible to find a site where acephate could be used.

Overall the study is not acceptable, but it can be upgraded to fully acceptable with the submission of the items noted in the Recommendations section.

8. Recommendations:

Droplet Size Spectrum Study

The record number for the last trial was omitted. Apparently this is a typographical error (See table 2 on page 9 of the Akesson study). This record number must be submitted in order to complete the documentation for this study.

Drift Field Evaluation

To fully support this study the the raw measurements of pesticide residue at each downwind station must be submitted together with scale drawings of the experimental plots showing north, swath widths, swath orientation, prevailing wind direction, locations of the collection stations, and locations and sizes of the treated areas.

9. Background:

The Droplet Size Spectrum tests and the Drift Field Evaluation tests were required by the September 1987 Registration Standard for acephate. The requirement was apparently triggered by several of the acephate use patterns rather than a specific concern expressed by the Toxicology or Ecological Effects Branch (personal communication with William Miller, Registration Division Product Manager).

3

Background (Cont.)

The registrant's protocol for the Droplet Size Spectrum study--including the substitution of a physically similar surrogate--was approved by the Exposure Assessment Branch. The registrant did not submit a Field Drift Evaluation protocol for evaluation.

10. Discussion:

Droplet Size Spectrum Study

The simulated acephate spray mix was tested against water at the University of California Agricultural Engineering Wind Tunnel Facility, University Airport, Yolo County, California. The date of the test was December 4, 1986. Air speed in the wind tunnel and tank pressure are kept constant throughout the trials at 100 mi/hr and 40 lb/in^2, respectively. Nozzle types, pressure, flow rates, and orientation are given in the excerpt from the December 30, 1986 Akesson report shown below:

a. Nozzle Type, Orifice Size, and Core Identification

Nozzle Type: D6-46 and D6-45 (Manufacturer: Spraying Systems Corporation).
Orifice Size: 6/64 inch dia.
Core ID: 45 & 46 whirlplates, S.S. Company. S.S. Company D6-46 and D6-45 nozzles were operated at 40 lb/in^2 pressure, which is standard (maximum) for applying acephate at 2 gal/A.

b. Nozzle Pressure and Flow Rate

Pressure: 40 lb/in^2
Flow Rate: D6-45, 0.58 gal/min/nozzle, D6-46 (Orthene), 1.1 gal/min/nozzle.

c. Nozzle Discharge Orientation to the Airstream

D6-46, 0 degrees (0°) or with the airstream and D6-45 90° or perpendicular to the airstream.

(end of excerpt from registrant's submission)

The results of the different tests as presented in Dr. Akesson's study are shown below in table 1. As noted by the authors, these data indicate a trend for the simulated acephate to produce a larger droplet size than does water alone. They also note, however, that with both nozzles potentially significant percentages of fine, drift-transportable droplets are produced. As a consequence, they conducted the Drift Field Evaluation. The "relative span" statistic in Table 1 is presented by the author in order to show the degree to which the spray volume is distributed among the possible range of spray droplet diameters. Arithmetically the relative span is calculated as follows:

$$\frac{D_{V0.9} - D_{V0.1}}{D_{V0.5}}$$

Where: $D_{V0.9}$ is the spray drop diameter exceeding that assumed by 90% of the spray mix volume* used in a trial. Etc.

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* Dr. Akesson notes the relative span statistic can also be based on the number of droplets formed during a trial rather than the volume of spray utilized during a trial. That is, the formula would stay the same but $D_{V0.9}$, for example, would be substituted with the diameter exceeding, 90% of the drops--in terms of the number of drops--formed during a trial.

Table 1. Results of the Spray Droplet Size Spectrum Study (from Akesson 1986)

Record No.	Nozzle	Direction to Airstream	Formulation	Vmd* (DVo.5)	0/0 Vol. < 122 um	Relative Span
81	D6-46	0°	Water	472.5	1.69	1.20
91	D6-46	0°	Water	494.8	1.53	1.18
101	D6-46	0°	Water	449.7	1.6	1.2
Average	D6-46		Water	472.3	1.6	1.19
111	D6-46	0°	Orthene Sim.	487	1.24	1.03
141	D6-46	0°	Orthene Sim.	500	1.38	1.23
151	D6-46	0°	Orthene Sim.	499.1	1.35	1.07
Average	D6-46	0°	Orthene Sim.	495.4	1.32	1.11
161	D6-45	90°	Water	242.3	8.9	1.14
171	D6-45	90°	Water	269.1	4.44	1.01
181	D6-45	90°	Water	246.2	9.32	1.26
Average	D6-45	90°	Water	252.5	7.55	1.14
191	D6-45	90°	Orthene Sim.	260	5.96	1.3
201	D6-45	90°	Orthene Sim.	258.4	7.16	1.14
Not given	D6-45	90°	Orthene Sim.	271.4	6.71	1.22
Average	D6-45	90°	Orthene Sim.	263.2	6.6	1.22

*Vmd = Volume mean diameter

Discussion (Cont.)

Drift Field Evaluation

Dr. Akesson presents graphs of the grams/hectare of pesticide versus distance downwind from an aerial application site. The information is from tests with pesticides other than acephate. Dr. Akesson presents the viscosities, densities, and surface tensions of the two unidentified pesticides noting that these physical properties are similar to those of acephate spray mixes.

11. Completion of One-Liner: N/A

12. CBI Appendix:

This review should be treated as CBI because raw data are cited.

REFERENCE

Holst, Robert W. (1986) Standard Evaluation Procedure. Pesticide Spray Drift Evaluation: Droplet Size Spectrum Test and Drift Field Evaluation Test. U.S. EPA. Publication No. EPA 540/9-86-131. June 1986. 15 pp.

Confidential Business Information—
Does Not Contain National Security Info. (E.O. 12065).

39565 Ltr

(RD PROVIDE) SHAUGNESSY NO. 103301

CHEMICAL NAME: Acephate 9/29/87

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	14	203930	Spray Drift	2	40323301	
						40323302	

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

PM/RM TEAM MEMBER AND NUMBER: M. MAUTZ - 3

DATE RECEIVED (EPA): 8/31/87

RD BRANCH CHIEF INITIALS: HH

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)
- ☐ Special Review Data (870,871)

NUMBER OF INDIVIDUAL STUDIES SUBMITTED: 2

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):

RELATED ACTIONS:

INSTRUCTIONS: This is data required under Acephate Registration Std and was identified in the Standard as data to be reviewed when rec'd

TO BE COMPLETED BY RSERB

DATE SENT TO HED/BUD/TSS: 9-28-87

PRIORITY NUMBER: 5C

PROJECTED RETURN DATE: 11-25-87

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

M. Mautz

REVIEWS SENT TO:

HED: ☐ SIS ☐ TB ☐ RCB (☒ EAB) ☐ EEB RD: ☐ TSS BUD: ☒ EAB ☐ SSB

TO:	TYPE OF REVIEW	NUMBER OF ACTIONS: Reregistration	Special Review	Other
	Toxicology			
	Ecological Effects			
	Residue Chemistry			
☒	Exposure Assessment	1		
	Product Chemistry			
	Efficacy	1		
	Precautionary Labeling/Acute Tox.			
	Science Support			
	Economic Analysis			

FOR DATA SUBMITTED UNDER A REGISTRATION STANDARD: Review Submission Criteria

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

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