Shaughnessy No.: 128501 (new number)

Date Out of EAB: 18 AUG 1983

To: Robert Taylor
Product Manager 25
Registration Division (TS-767)

From: Richard V. Moraski, Head (acting)
Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769c)

Attached please find the EFB review of...

Reg./File No.: 476-EUP-RNG, and -RNE

Chemical: trimethyl sulfonium carboxymethylaminomethyl phosphonate

Type Product: Post-emergent Herbicide

Product Name: SC-0224 or R-50224

Company Name: Stauffer

Submission Purpose: EUP for use of two different formulations in non-crop areas

ZBB Code: 3(c)(5)

ACTION CODE: 700

Date In: 6/1/83

EFB # 3393,3394

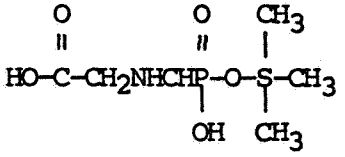
Date Completed: 8/18/83

TAIS (level II)	Days
63	4.0

1 0 INTRODUCTION

The registrant, Stauffer, has submitted data (in accession No. 249801) in support of a proposed EUP to apply two formulations of the nonselective foliar systemic herbicide SC-0224 (or R-50224) to a variety of non-crop areas

2.0 STRUCTURE



CHEMICAL NAME: Trimethylsulfonium carboxymethylaminomethylphosphonate
COMMON NAME: SC-0224 (or R-50224) Sulfosate

3.0 PHYSICAL/CHEMICAL PROPERTIES

Copies of the technical data sheets are appended to this review. A review of the information contained leads this reviewer to the following conclusions:

SC-0224 appears to be reasonably volatile, even at below-ambient temperatures, having a vapor pressure of 8.2 torr at 10°C. Based on this property, it is likely that the registrant will have to conduct one or more of the following studies prior to full registration: photolysis in air, human exposure analysis, reentry.

The stability data suggest no apparent degradation, even at elevated temperatures (52°C) or periods of up to 12 weeks. However, there appears to be a discrepancy between the concentration reported for the technical material (52.2% ai) and the data in this sheet [redacted] In addition to this apparent inaccuracy, and considering the controlled nature of this particular type of study, the range of reported values also seems imprecise [redacted] relative). These discrepancies should be explained.

4.0 DIRECTIONS FOR USE

The proposed labels for the SC-0224 CONCENTRATE (52.2% ai, 5.5 lb ai/gallon) and 4-LC (40.8% ai, 4 lb ai/gallon) were included with the submission, and are appended to this review. Precautions include avoidance of any and all direct contact with this product (inhalation, dermal, eyes).

Application rates range from 0.5 to 4 lb ai/A, depending on target weed and type of application.

SPRAY APPLICATION

The product is applied as a tank mixture of 2 parts SC-0224 to one part surface active agent in 10 to 30 gallons of water per acre (or in 1 to 2 gallons for low volume - controlled droplet - applications)

WIPER APPLICATION

The mixture consists of 2 parts SC-0224 to one part surface active agent to 6 parts water. Two passes in opposite directions at half concentration are recommended.

HAND-DIRECTED SPOT APPLICATION

The mixture consists of 2 parts SC-0224 concentrate to one part surface active agent to 60 - 300 parts water (CONCENTRATE) or 30 - 300 parts water (4LC). Spray plants until wet, but not until runoff.

5.0.1 EXPERIMENTAL PROGRAM : CONCENTRATE

Stauffer proposes to test the herbicide concentrate in 41 states applying a maximum of 4000 lb ai to a maximum of 8000 acres. Areas to be treated include predominantly railroads (50%) and highway rights-of-ways (30%) with the remaining 20% testing in other rights-of-way areas, industrial areas and so forth.

The program is proposed to run for two years (9/1/83 to 9/1/85).

A detailed distributional breakout of target sites/amounts to be applied, is appended to this review.

5.0.2 EXPERIMENTAL PROGRAM : 4LC

Stauffer proposes to test the 4LC formulation in 41 states applying a maximum of 10000 lb ai to a maximum of 20000 acres. Areas to be treated include predominantly railroads (50%) and highway rights-of-ways (32%) with the remaining 18% testing in other rights-of-way areas, industrial areas and so forth.

No detailed distributional breakout of target sites/amounts to be applied, was included with this submission.

The program is proposed to run for two years (9/1/83 to 9/1/85).

6.0 DATA REQUIREMENTS

Data required[1] to support the proposed EUP (non-crop use) include Hydrolysis (§161-1), Aerobic Soil Metabolism (§162-1) and Accumulation in Fish (§165-4)

6.1 Review of Supporting Data

6.1.1 Hydrolysis

Katague, D.B. 1982 Hydrolysis of R-50224. Interoffice Correspondence. Notebook:WRC-8066-12 to 23. de Guigne Technical Center Richmond. (CA?) December 17, 1983. 2 pp, 1 table, no references.

The hydrolytic stability of R-50224 at 25°C was evaluated for both the PMG anion (N-[phosphonomethyl]glycine) and TMS cation (trimethylsulfonium in buffers of pH 5, 7 and 9, at concentrations of 10 and 100 ppm.

Results suggest no observable hydrolysis of the PMC anion at all pH levels and both concentrations. The TMS cation appeared to be stable to hydrolysis at pH 7 and 9, but did appear to begin to hydrolyse at pH5 after 18 days with about 95% disappearance after 32 days.

Conclusions

This report is unacceptable. There is virtually no experimental detail and no raw data. The rational for evaluation of the anion and cation separately was not discussed. Analytical methodology used was not sufficiently detailed for evaluation.

Recommendation

The requisite detail must be provided for EAB review.

6.1.2 Aerobic Soil Metabolism

This study has not been submitted to EAB for review.

6.1.3 Accumulation in Fish

This study has not been submitted to EAB for review.

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1. Hitch, R.K. (coordinator). 1982. Pesticide Assessment Guidelines Pesticide Programs, Office of Toxic Substances. EPA-540/9-82-021. October 1982

6.2 Review of Additional Submitted Data

6.2.1 Spillner, C.J. and J.A. Ichien. (date?) Soil Mobility Studies Project 148193 - SC-0224. Stauffer Chemical Company, Mt. View, CA. 10 pp, 4 tables, 1 figure, 6 references.

Introduction

Soil TLC was used to evaluate the mobility of both the PMG anion and the TMS cation on 4 different soils.

Experimental

^{14}C-trimethylsulfonium glycine-N-methyl phosphonate (TMS-labeled) was synthesised and found to have a specific activity of 20 mCi/mM and a radiopurity of 94.4% by TLC. ^{14}C-trimethylsulfonium glycine-N-^{14}C-methyl phosphonate (PMG-labeled) was synthesized and found to have a specific activity of 30 mCi/mM and a radiopurity of 96% by TLC. The external R_f standard (^{14}C-2,4-D, carboxy label), was found to have a specific activity of 5.1 mCi/mmole and a radiopurity of 96.8% by TLC.

Soil characteristics are summarized in report table 2, appended to this review.

Soil TLC plates were prepared, to a soil thickness of 0.5 mm by a wet slurry technique, and allowed to air dry. Aliquots of TMS-labeled and PMC-labeled compounds were spotted at the origin, in duplicate (36 mg and 35 mg/20 ml, respectively), at concentrations equivalent to a field application rate of 4 3/8 lb ai/A (assuming that the spot on the plate had a diameter of 1 cm). Triplicate plates were prepared for each soil type. In addition, another plate was prepared as above for each soil type and spotted with 38 mg of the 2,4-D standard, to compare R_f values with established R_f values for 2,4-D. A total of 13 plates were thus prepared.

Plates were developed in distilled water until the solvent front reached 12 cm, or for 6 hours, whichever came first. After 0-2 hours air drying, spots were visualized by radioautography with Kodak SB-5 x-ray film.

Subsequently, selected spots were scraped from the plate, solvent extracted and quantified by combustion and LSC (this technique was not used for the 2,4-D plates).

Results and Discussion

Material balance on all plates was 91% +/- 5%, suggesting little volatilization from the plates during the period of the experiment. In addition, little, if any, degradation occurred for either of the labeled compounds tested. R_f values measured are summarized in report table III, appended to this review.

Results for the 2,4-D yielded data consistent with published R_f values for this compound, putting it into the mobile class. The TMS anion was found to fall into the immobile category (class 1, with R_f values between 0.0 and 0.09) while the PMG cation was found to fall into the low category (class 2, with R_f values between 0.10 and 0.34).

No correlation with any particular soil property was noted.

Comparing the results of the soil TLC with published data relating soil TLC R^f values to adsorption constants, the following equation was used to determine the adsorption coefficient for these two compounds.

$$K = \frac{p^{2/3}(1-R_f}{(R_f)(ds)(1-p^{2/3})}$$

where...

R_f = the R_f of the pesticide on the soil thin-layer plate.
K = Freundlichg adsorption coefficient
ds = density of the soil
p = soil pore fraction.

Calculated K values are summarized in report table IV, appended to this review, and are consistent with the conclusion that both the anion and cation are strongly adsorbed to soil, and will not be mobile.

Conclusion

This study was well done, and is acceptable in satisfaction of the soil mobility data requirement (§163-1).

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2. Hamaker, J.W., in "Environmental Dynamics of Pesticides", R. Hague and V.H. Freed, Eds., Plenum Press, New York, p. 115 (1975)

6.2.1 Chappell, W.E. (year??) SC-0224 Environmental Run-off Study. Department of Plant Pathology and Physiology, Virginia Polytechnic Institute and State University, Blacksburg, VA

Introduction

This study is not required for the EUP. It may be resubmitted along with the full registration package. At that time, it is requested that the study be separately "flagged" as a run-off study, since such studies are evaluated separately by our Modeling and Guidelines group.

7.0 EXECUTIVE SUMMARY

This is the first submission for SC-0224. No additional information could be found in EAB files. Based on the submitted studies the following conclusions may be drawn:

Neither the anion, nor the cation appears to undergo hydrolysis at any pH, even at elevated temperatures. The parent compound is fairly volatile, and may lead to significant human exposure during application and reentry into treated areas. Mobility in soil was reliably found to be very low, due to strong soil binding.

Runoff from treated areas as a result of particle movement in severe events may pose a significant threat to nearby water habitats, especially due to the extreme persistence in water.

The experimental program for the CONCENTRATE appeared to be complete, while that for the 4LC lacked the distributional summary.

The hydrolysis study submitted was found to be unacceptable. No studies were submitted in support of the aerobic soil metablism and fish accumulation data requirements.

8.0 RECOMMENDATION

EAB cannot concur with the EUP at this time due to the numerous deficiencies cited. The registrant should be notified of our findings.

Emil Regelman
Chemist
EAB/HED (TS-769c)
August 18, 1983

Sulfosate environmental fate/exposure assessment review

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Pages 8 through 21 are not included in this copy.

The material not included contains the following type of information:

___ Identity of product inert ingredients

___ Identity of product impurities

___ Description of the product manufacturing process

___ Description of product quality control procedures

___ Identity of the source of product ingredients

___ Sales or other commercial/financial information

X A draft product label

___ The product confidential statement of formula

___ Information about a pending registration action

___ FIFRA registration data

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Sulfosate environmental fate/exposure assessment review

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___ Identity of product inert ingredients

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Experime. , Program
State Distribution and Acreage
for SC-0224 Concentrate

REGION	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Midwest (J. W. DiVall)	300	600	200	400	160	320	660	1,320
Northcentral (K. M. Janzen)	300	600	100	200	80	160	480	960
Northeast (R. R. Libby)	300	600	200	400	260	520	760	1,520
Southeast (J. F. Saylor)	300	600	150	300	120	240	570	1,140
Southwest (C. R. Andress)	300	600	150	300	120	240	570	1,140
West (E. M. Rose)	300	600	100	200	60	120	460	920
Pacific Northwest (J. F. Saylor)	300	600	100	200	100	200	500	1,000
TOTAL	2,100	4,200	1,000	2,000	900	1,800	4,000	8,000

MIDWEST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Colorado			50	100	20	40	70	140
Iowa			50	100	20	40	70	140
Kansas	300	600			20	40	320	640
Minnesota					20	40	20	40
Nebraska					20	40	20	40
North Dakota					20	40	20	40
South Dakota			100	200	40	80	140	280
TOTAL	300	600	200	400	160	320	660	1,320

NORTH CENTRAL	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Illinois					20	40	20	40
Indiana			50	100	20	40	70	140
Michigan	300	600			20	40	320	640
Wisconsin			50	100	20	40	70	140
TOTAL	300	600	100	200	80	160	480	960

NORTHEAST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Connecticut					20	40	20	40
Delaware					100	200	100	200
Kentucky			50	100	20	40	70	140
Maine			50	100	20	40	70	140
New Jersey					20	40	20	40
New York			50	100	20	40	70	140
Ohio					20	40	20	40
Pennsylvania			50	100	20	40	70	140
Virginia	300	600			20	40	320	640
TOTAL	300	600	200	400	260	520	760	1,520

SOUTHEAST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Alabama			50	100	20	40	70	140
Florida	300	600			20	40	320	640
Georgia			50	100	20	40	70	140
North Carolina					20	40	20	40
South Carolina			50	100	20	40	70	140
Tennessee					20	40	20	40
TOTAL	300	600	150	300	120	240	570	1,140

SOUTHWEST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Arkansas			50	100	20	40	70	140
Louisiana	300	600			20	40	320	640
Mississippi			50	100	20	40	70	140
New Mexico			50	100	20	40	70	140
Oklahoma					20	40	20	40
Texas					20	40	20	40
TOTAL	300	600	150	300	120	240	570	1,140

WEST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Arizona			50	100	20	40	70	140
Nevada	200	400	50	100	20	40	270	540
Utah	100	200			20	40	120	240
TOTAL	300	600	100	200	60	120	460	920

PACIFIC NORTHWEST	Railroad Rights-of-Way		Highway Rights-of-Way		Other Proposed Uses		Total	
	Pounds	Acres	Pounds	Acres	Pounds	Acres	Pounds	Acres
Idaho			50	100	20	40	70	140
Montana	200	400			20	40	220	440
Oregon			50	100	20	40	70	140
Washington					20	40	20	40
Wyoming	100	200			20	40	120	240
TOTAL	300	600	100	200	100	200	500	1,000