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SHAUGHNESSY NO.

20
REVIEW NO.

EEB REVIEW

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RD ACTION CODE/TYPE OF REVIEW 660

TYPE PRODUCT(S): I, D, H, F, N, R, S Herbicide

DATA ACCESSION NO(S). 262228

PRODUCT MANAGER NO. Robert Taylor (25)

PRODUCT NAME(S) Metribuzin Herbicide Products: Sencor 50 WP (3125-305); Sencor 50WP (3125-277-AA); Sencor 70 WP (3125-294); Sencor 4 Flowable (3125-314); Sencor DF 75 Dry Flowable (3125-325)

COMPANY NAME Mobay Chemical Corporation

SUBMISSION PURPOSE Submission of data in response to Registration Standard

| SHAUGHNESSY NO. | CHEMICAL & FORMULATION | % A.I. |
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: EPA Accession Number: 262228: Avian Acute Dietary $LC_{50}$ Study; Mobay Chemical Corporation; Metribuzin Registration ~~Division~~ Std.

FROM: John L. Noles, Biologist
Ecological Effects Branch
Hazard Evaluation Division (TS-769-C)

John Noles 12/10/86

THRU: Henry T. Craven, Head-Section 4
Ecological Effects Branch
Hazard Evaluation Division (TS-769-C)

Henry T. Craven 12/11/86

THRU: Michael W. Slimak, Chief
Ecological Effects Branch
Hazard Evaluation Division (TS-769-C)

12/11/86

TO: Robert Taylor, PM 25
Fungicide/Herbicide Branch
Registration Division (TS-767-C)

EEB has reviewed the above data submitted by Mobay Chemical Corporation in response to the Metribuzin Registration Standard. The study report detailed an upland avian species (bobwhite quail) acute dietary $LC_{50}$, using technical metribuzin as the test material. EEB finds this data to be scientifically sound as Core Guideline Data. The Guideline Requirement for the Avian Acute Dietary $LC_{50}$ is fulfilled.

DATA EVALUATION RECORD

1. Chemical: Metribuzin

2. Test Material: Technical Metribuzin (92.6%)

3. Study Type: Subacute Avian Dietary $LC_{50}$

   Species Tested: Bobwhite Quail

4. Study ID: Subacute Dietary $LC_{50}$ of Technical Metribuzin (SENCOR®) to Bobwhite Quail. Report No. 91757, March 25, 1986. Study prepared and submitted by Mobay Corporation; EPA Accession No. 262228.

5. Reviewed by: John Noles
   Biologist
   EEB/HED
   Signature: John Noles
   Date: 12/10/86

6. Approved by: Henry T. Craven
   Section Head IV
   EEB/HED
   Signature:
   Date:

7. Conclusions:

   This study is scientifically sound and with a subacute dietary $LC_{50}$ = > 5000 ppm, the pesticide is considered practically nontoxic to the upland game species, bobwhite quail. The study fulfills the Guideline requirement as Core data.

8. Recommendations: N/A.

9. Background:

   This study was submitted in response to the data requirements of the Metribuzin Registration Standard.

10. Discussion of Individual Tests: N/A.

11. Materials and Methods:

a. Test animals: 10-day-old bobwhite quail, Colinus virginianus; eggs obtained from Sanders Quail Farm, Stuttgart; Arkansas; hatched at Mobay's Environmental Health Research Center; Weight - 16-27 g.

b. Test system: Galvanized steel brooders (90 x 70 x 23 cm); 100 + °F; 14L/10D photoperiod; commercial bird feed with analyzed toxicant and city water used throughout study.

c. Dose/Design: 10 unsexed birds assigned to each treatment group. Appropriate amounts of metribuzin, polyethylene glycol (PEG) and ethanol were combined in a 125 mL Erlenmeyer flask then added to the feed while mixing in a Hobart mixer. Compensation was made for the metribuzin percent active ingredient in calculating diet concentrations. The dietary ingredients and quantities of each were:

| Nominal Concentration (ppm) | Metribuzin (mg) | PEG (g) | Ethanol (mL) | Feed (kg) |
|---|---|---|---|---|
| Control | 0 | 80 | 400 | 7.920 |
| 156 | 506 | 30 | 150 | 2.969 |
| 312 | 675 | 20 | 150 | 1.979 |
| 625 | 2025 | 30 | 150 | 2.968 |
| 1250 | 2700 | 20 | 150 | 1.977 |
| 2500 | 5400 | 20 | 150 | 1.975 |
| 5000 | 16,199 | 30 | 150 | 2.954 |

d. Statistics: Dietary median lethal concentrations ($LC_{50}$) were calculated using a computer program modified from Stephan (1982), which estimated the $LC_{50}$ using one of three statistical techniques: moving average, probit, or binomial probability. The appropriate method was determined on the basis of data characteristics (Stephan 1977).

The control group means for body weight gains and feed consumption data were compared using a T-test (Sokal and Rohlf 1969). If no significant differences were noted ($p \leq 0.05$), control groups were combined for all additional analysis. Body weight gain and feed consumption data for all treatment groups were subjected

to analysis of variance (Sokal and Rohlf 1969). If ANOVA indicated significant treatment effects ($p \leq 0.05$), the means of the treatment levels were compared to that of controls using the Williams test (Williams; 1971, 1972). When a treatment mean was significantly different from the control means ($p \leq 0.05$), that treatment was considered a toxicant effect level. All statistical analyses, with the exception of $LC_{50}$ calculations, were conducted using software supplied by SAS Institute, Inc., Cary, North Carolina.

Reported Results: Analytical determinations of metribuzin concentrations in test diets indicate agreement with nominal concentrations (Table 1). Metribuzin containing diet preparations were homogeneous (< 4% variability) and stable (< 10% degradation) throughout the 5-day dosing period (Table 1).

Only two bird deaths were noted during this study; one in the lowest exposure group occurred as a result of an accident in handling, the other occurred in the highest dose group on day 6 (Table 1). No clinically observable signs of toxicity were noted in any of the treated or control birds.

Statistical analysis showed no significant differences between control groups in terms of feed consumption or body weight gain; therefore, control groups were combined for all statistical analysis. Feed consumption data showed no significant difference between control and treatment groups during both the treatment period and the 3-day recovery (Table 2). A significant difference was noted in body weights between controls and the 2500 and 5000 ppm groups on day 5 and in the 1250, 2500, and 5000 ppm groups on day 8 (Table 3; Appendix 3).

At study termination five of nine birds in the 5000 ppm dose level were found to have pale livers with multiple red, fluid-filled foci. Similar findings were noted in the high dose bird which died prior to study termination. No other gross lesions were observed. Microscopic examination of the livers showed unexplained, isolated hemorrhagic foci which were not associated with concomitant hepatocellular degeneration or necrosis, inflammation, or vascular lesions. No gross lesions were noted in the control or 2500 ppm exposure groups.

Although no control or 2500 ppm group quail had similar lesions, it is the opinion of the pathologists, after evaluating the tissues, that these lesions are incidental and may have occurred as a result of agonal anoxia or the necropsy procedure. Similar lesions have been observed in other studies and other species (chickens and ducks), and were unrelated to compound administration. Discussion with consulting pathologists support the conclusion that this finding is of equivocal biological significance.

The subacute dietary $LC_{50}$ of technical metribuzin in quail is > 5000 ppm. The highest no effect treatment level was 625 ppm based on body weight effects.

Table I. Metribuzin Diet Concentrations and Observed Mortalities in Quail Subacute Dietary Toxicity Study

| Nominal Diet Concentrations (ppm) | Measured Concentration (ppm) | | Mortalities |
|---|---|---|---|
| | Day 0 | Day 6[3] | |
| Control | BLD | BLD | 0 |
| 156 | 167 ± 6.4[2] | 146 | 1[1] |
| 312 | 329 | | 0 |
| 625 | 640 ± 4.0[2] | 592 | 0 |
| 1250 | 1305 | | 0 |
| 2500 | 2666 | | 0 |
| 5000 | 5291 ± 168.0[2] | 4916 | 1 |

BLD Below limit of detection (< 4 ppm).

1 Mortality attributed to accidental death in handling.

2 Mean ± Standard Deviation of three samples. Multiple samples taken for homogeneity analysis.

3 Samples taken on day 6 from initial feed mix. Values are concentrations obtained for stability determination.

Table II. Mean Feed Consumption Data (g/bird/day) for Quail Fed Metribuzin in the Diet for 5 Days

| Nominal Diet Concentrations (ppm) | Treatment Days | | | | | Observation Days | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Control | 6.3 | 5.3 | 6.0 | 6.3 | 3.3 | 6.3 | 5.8 | 7.7 |
| 156 | 6.0 | 5.0 | 6.0 | 6.5 | 3.0 | 7.5 | 6.1 | 6.7 |
| 312 | 8.0 | 5.5 | 6.5 | 6.0 | 3.5 | 8.5 | 7.5 | 8.5 |
| 625 | 7.0 | 5.0 | 6.0 | 5.5 | 4.0 | 8.0 | 6.5 | 7.5 |
| 1250 | 6.5 | 5.0 | 5.5 | 5.5 | 4.5 | 7.5 | 6.0 | 7.5 |
| 2500 | 8.0 | 5.5 | 5.5 | 8.5 | 5.5 | 10.0 | 7.0 | 7.5 |
| 5000 | 5.0 | 4.5 | 5.5 | 7.5 | 5.0 | 11.1 | 6.7 | 8.3 |

Table III. Mean Body Weights (g) for Quail Fed Metribuzin in the Diet for 5 Days ($\bar{x} \pm$ S.D.)

| Nominal Diet Concentration (ppm) | Study Days | | |
|---|---|---|---|
| | 0 | 5 | 8 |
| Control | 21.9 ± 2.5 | 34.5 ± 3.1 | 44.9 ± 3.2 |
| 156 | 18.6 ± 2.5 | 31.8 ± 3.7 | 38.9 ± 4.9 |
| 312 | 22.6 ± 2.5 | 35.8 ± 4.2 | 45.9 ± 5.6 |
| 625 | 23.1 ± 2.1 | 36.5 ± 3.5 | 45.1 ± 3.7 |
| 1250 | 21.1 ± 2.9 | 33.3 ± 4.4 | 40.8 ± 5.4* |
| 2500 | 20.8 ± 2.7 | 29.4 ± 3.6* | 37.9 ± 4.0* |
| 5000 | 23.6 ± 1.9 | 27.0 ± 3.4* | 37.7 ± 4.0* |

*Statistically significant decreases noted $p < 0.05$ using Williams test (Williams 1971).

13. Study Author's Conclusions/QA Measures:

$LC_{50}$ = 5000 ppm.

The NEL, based upon body weight effects, is 625 ppm.

14. Reviewer's Discussion and Interpretation of Study:

a. Test Procedures: The study was conducted according to acceptable protocol.

b. Statistical Analysis: No statistical analysis was performed because of the low mortality rate.

c. Discussion/Results: The reported $LC_{50}$ > 5000 ppm indicates that the pesticide is practically nontoxic to the upland avian species, bobwhite quail.

d. Adequacy of Study

1. Classification: Core.

2. Rationale: Guideline Fulfillment.

3. Repair: N/A.

15. Completion of One-Liner for Study

One-liner form completed December 1, 1986.

16. CBI Appendix: N/A.