Data Evaluation Record 122804

4/17/1986

1. Chemical: H-Avermectin

2. Test Material: Test concentrations are reported as micrograms of ^{3}H-Avermectin per liter

3. Study Type: Aquatic Invertebrate Life-Cycle ✓

   Species Tested: Daphnia magna

4. Study I.D.:

   Study Title: The Chronic Toxicity of ^{3}H-Avermectin to Daphnia magna.

   Laboratory: EG and G Bionomics

   Study No.: Bionomics Study #047-0583-H15-130

   Date of Study: November 1983, revised November 1984

   Study Sponsor: Merck Sharp and Dohme Research Laboratories

   Study Location: Acc #259364

5. Reviewed By:

   Daniel D. Rieder
   Wildlife Biologist
   EEB/HED

   Signature: Daniel Rieder

   Date: 1/31/86

6. Approved By:

   Norm J. Cook
   Supervisory Biologist
   EEB/HED

   Signature: Norman J. Cook

   Date: 4-17-86

7. Conclusions:

   This study is scientifically sound. Th is study showed that MD-936 is acutely toxic at >0.029 ppb ($\bar{x}$ measured with radio-labled chemical). All daphnids exposed to concentrations of 0.093 ppb ^{3}H-Avermectin were dead by exposure day 5. The number of offspring produced by daphnids exposed to the two lowest measured treatment levels (0.030 and 0.029 ppb), was unaffected when compared to the number of offspring produced by daphnids in the negative control. At the tests termination, all surviving daphnids in the two lowest treatment levels were small and had pale coloration as compared to daphnids in the negative control.

8. Recommendations: N/A

9. Background: This study was provided to support registration.

10. Individual Studies: N/A

11. Methods and Materials:

A. Test Material: The test material was Tritium labeled Avermectin (91.43% a.i.). Test concentrations are reported as micrograms of ^{3}H-Avermectin per liter of test solution (ppb).

B. Test Organisms: The test organisms were obtained for laboratory stock cultured at E.G. and G. Twenty Daphnia magna (≤ 24 hrs old) were placed in each aquarium at test initiation. Four aquaria, 80 organisms, were used per level.

C. Test Conditions: Flow-through, at a rate of 4.6 aquarium volumes per 24-hr. Four 1.75-liter glass aquaria per level (5 concentrations, nominal 0.021, 0.042, 0.085, 0.17, and 0.34 ppb) and a negative and solvent control (acetone). Lighting was 16 hrs light and 8 hrs darkness. Test temperature was 21±1°C. Food was provided at 0.5 ml yeast and 2 ml algal suspension 3 times daily (weekdays) and 2 times daily (weekends).

D. Test Solution: Fortified/filtered well water.

A 48-hr acute study was conducted to determine what levels should be used in a chronic study.

Statistics: Weekly survival data, transformed to arc sign$\sqrt{\text{percentage}}$ and the determination of cumulative production of offspring per female derived during the chronic toxicity test, where subjected to analysis of variance according to Steel and Torrie (1960)*. If significant differences were observed, the Dunnett's procedure was used to determine which treatments, if any, were significantly different from the controls.

* Steel, R.G.D. and J.H. Torrie. 1960. Principles and Procedures of Statistics. McGraw-Hill, New York: 481 pp.

12. Reported Results:

48-hr acute toxicity test results:

LC_{50} = 0.31 ppb (95% conf limits = 0.25 - 0.37 ppb)
See Table 1 for acute mortality data.
See Table 2 for water quality analysis. The Do remained sufficiently high throughout the test.

All organisms died in the three highest levels by day 5. See Table 3. The cumulative offspring per female was not significantly less at 0.043 and 0.021 ppb, but there was 64% mortality at 0.042 ppb, and 11% mortality at 0.021 ppb. Surviving daphnids at these lower levels were small and pale in color compared to those in the negative and solvent control. See Table 5 for results of test solution analysis.

13. Study Authors Conclusions:

MK-936 is acutely toxic at <0.042 ppb.
MK-936 does not affect reproduction at 0.042 ppb or lower.

He explained the discrepancy between the nominal concentrations and measured concentrations at the 2 lower test levels as possibly caused by the solubility of the test material in the dilution water and the possible interaction between the test material and the added food suspension (absorption).

14. Reviewers Discussion:

A. Test Procedures: The test procedure was acceptable.

B. Statistical Analysis:

The statistics performed on the data are appropriate and the results match the raw data.

C. Discussion of Results:

The measured concentrations are shown in Table 5. They averaged 0.030, 0.029, 0.093, 0.19, and 0.38 ppb for the nominal levels of 0.021, 0.042, 0.085, 0.017, and 0.34 ppb respectively. Therefore, I consider the highest level that did not cause reproductive effects to be 0.030 ppb. However, there was an observed effects to the daphnids at these levels compared to the controls, the daphnids in the 0.030 and 0.029 ppb appeared smaller and had pale coloration. On the basis of statistically significantly differences, the reproductive MATC is >0.030 <0.093 ppb. The NOEL is <0.029 ppb, however. Furthermore, ^{3}H-Avermectin is acutely toxic to daphnids at $\geq$ 0.030 ppb.

D. Adequacy of the Study:

The study fulfills the 72-4 guideline requirement for an aquatic invertebrate life-cycle study.

15. Completion of One Liner for Study: Done

16. CBI Appendix: The attached tables are CBI.

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