8-31-92

MRID No. 417480-01

DATA EVALUATION RECORD

1. **CHEMICAL:** Monosodium methanearsonate (MSMA). Shaughnessey No. 013803.

2. **TEST MATERIAL:** MSMA arsonate liquid blend; Notebook No. 20338-96-37; 51% active ingredient; a brown liquid.

3. **STUDY TYPE:** Freshwater Fish Flow-Through Acute Toxicity Test. Species Tested: Bluegill Sunfish (Lepomis macrochirus). 72-1a

4. **CITATION:** Graves, W.C. and G.T. Peters. 1991. A 96-Hour Flow-Through Acute Toxicity Test with the Bluegill (Lepomis macrochirus). Laboratory Project No. 296A-102. Prepared by Wildlife International Ltd., Easton, MD. Submitted by MAA (MSMA/DSMA) Research Task Force Three, Luxemborg Industries (PAMOL), Ltd., Tel Aviv, Israel. EPA MRID No. 417480-01.

5. **REVIEWED BY:**

Richard C. Petrie
Agronomist
EEB/EFED/OPP

Signature: Richard C. Petrie
Date: 8/06/92

6. **APPROVED BY:**

Daniel R. Rieder
Head, Section 3
EEB/EFED/OPP

Signature: Daniel Rieder 8-31-92
Date:

7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for a flow-through acute freshwater fish toxicity study. The highest concentration tested (93.2 ppm) did not produce an effect on the organism. The LC50 was determined as >47.5 mg ai/L mean measured concentration (>93.2 mg/L formulated test material) of MSMA. The NOEC value is 93.2 mg/L based on the lack of sublethal effects.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Juvenile bluegill sunfish (Lepomis macrochirus) from the same year class were obtained 21 days prior to the test from a commercial supplier in Brady, NE. The fish were maintained in well water and fed frozen brine shrimp and flake food. The temperature in the holding unit was 16.2°C to 18.5°C and changes in water temperature did not exceed 3°C in any 72-hour period. The holding water had a pH of 6.6 to 9.2, an alkalinity of 128-140 mg/L as $CaCO_3$ and a hardness of 128-140 mg/L as $CaCO_3$. The fish were free from signs of stress and disease during the holding period.

The fish were acclimated to the test conditions for 48 hours prior to the test. Feeding was discontinued during the acclimation period. No mortality occurred during acclimation.

Mean weight and length of 10 control fish were 0.86 (0.71-1.03) g and 34 (31-37) mm.

B. **Test System:** The test chambers were Teflon®-lined, 25-L polyethylene aquaria filled with 15 L of test solution. The test solution depth was approximately 17 cm. The test aquaria were immersed in a temperature-controlled water bath set to 22°±1°C. The laboratory environment was maintained on a 16-hour daylight photoperiod with 30-minute dawn and dusk simulations. Medium-hard well water was aerated and filtered (0.2 µm) before use. A typical batch of water had a hardness of 136-152 mg/L as $CaCO_3$, an alkalinity of 188-190 mg/L as $CaCO_3$, a conductivity of 320-340 µmhos/cm, and a pH of 7.7 to 8.4.

Test solutions were prepared by direct addition of the MSMA formulation to the dilution water. A continuous-flow, proportional diluter was used to provide each concentration of the test substance and a negative (dilution water) control. A syringe pump was used to inject the test substance stock into a delivery line where the test substance was mixed with dilution water to form a concentrated solution. The test substance delivery line and a diluent delivery line fed a series of rotameters that regulated the flow of test substance and diluent to mixing tubes assigned to each treatment.

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was determined as 47.5 mg ai/L (mean measured concentration) based on the lack of sublethal effects.

D. **Adequacy of the Study:**

(1) **Classification:** Core.

(2) **Rationale:** The concentration levels tested were less than 100 ppm but not high enough to produce an effect on the organism. However, the difference between the highest dose tested and the 100 ppm guideline test level is not significant in this case.

(3) **Repairability:** N/A.

15. **COMPLETION OF ONE-LINER FOR STUDY:** Yes, 7-26-91.

Dissolved oxygen ranged from 7.9 to 9.2 mg/L. The pH values ranged from 7.6 to 8.4. The temperature was 21.6°-22.3°C throughout the test.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No conclusions were made by the authors.

Quality Assurance and Good Laboratory Practice Regulation Statements were included in the report, indicating that the study was conducted in accordance with FIFRA Good Laboratory Practice Standards set forth in 40 CFR Part 160.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the guidelines, but deviated from the SEP as follows:

The fish were acclimated to the test conditions for 48 hours. The SEP recommends an acclimation period of at least two weeks.

The period between test solution preparation and the initiation of the test was not stated in the report. Tests should be initiated within 30 minutes of solution preparation.

Concentrations tested were less than 100 ppm ai and did not produce an effect on the test organism.

The test chambers were Teflon®-lined polyethylene aquaria. The SEP recommends the use of glass or stainless steel but the Teflon® liner is probably a more than adequate substitute.

Results of preliminary tests, if any, were not reported.

B. **Statistical Analysis:** The reviewer did not perform analysis due to the non-variance of the data. Upon review of the results, it is obvious that the LC_{50} value is greater than the highest rate tested and that the NOEC is the highest rate tested (i.e., 93.2 mg of MSMA formulation/L).

C. **Discussion/Results:** This study is scientifically sound but does not meet the guideline requirements for a flow-through acute freshwater fish toxicity study. The concentrations tested were less than 100 ppm ai and did not produce an effect on bluegill sunfish. The NOEC

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After mixing, the test solutions were split into each replicate chamber. All tubes and fittings that came into contact with the test substance were made of Teflon® or nylon. The diluter was adjusted so that each test chamber received 5 volume additions every 24 hours. The diluter was checked twice daily.

C. **Dosage:** Ninety-six-hour flow-through test. Five nominal concentrations (13, 22, 36, 60, and 100 mg/L), and a dilution water control were used. The concentrations made were based on the formulation (i.e., mg MSMA formulation/L).

D. **Design:** Ten bluegill were impartially distributed to each aquarium, two aquaria per concentration, for a total of 20 fish per concentration. Biomass loading rate was 0.57 g/L. The fish were not fed during the test. Observations of mortality and sublethal responses were made every 24 hours.

The dissolved oxygen (DO) and pH were measured in one replicate of all concentrations and the controls every 24 hours, and alternated replicates each sampling period. The temperature of one of the control aquaria was monitored continuously and each replicate of the test concentrations and the controls was measured at the beginning and end of the test.

MSMA concentrations were measured by gas chromatography or atomic absorption from samples taken at test initiation and termination. Analysis was conducted by PTRL East, Inc., Lexington, KY.

E. **Statistics:** No mention of statistical analysis was presented in the report.

12. **REPORTED RESULTS:** The mean measured concentrations were 8.6, 16.6, 37.4, 66.0, and 93.2 mg MSMA formulation/L. These values represent 66 to 110% of nominal concentrations (Table 3, attached).

The responses of bluegill are given in Table 4 (attached). The 96-hour LC_{50} based on measured concentrations was >93.2 mg MSMA formulation/L. No confidence limits were able to be calculated. No sublethal or lethal effects were observed at any test concentration. The no-observed-effect concentration (NOEC) was therefore given as 93.2 mg MSMA formulation/L.