D165455 (9-2-92)

MRID No. 417473-01

DATA EVALUATION RECORD

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

2. **TEST MATERIAL:** MSMA; CAS No. 124-58-3; 51% active ingredient; a brown liquid.

3. **STUDY TYPE:** Freshwater Fish Flow-Through Acute Toxicity Test. Species Tested: Rainbow Trout (Oncorhynchus mykiss).

4. **CITATION:** Graves, W.C. and G.T. Peters. 1991. MSMA: A 96-Hour Flow-Through Acute Toxicity Test with the Rainbow Trout (Oncorhynchus mykiss). Laboratory Study No. 296A-104A. 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. 417473-01.

5. **REVIEWED BY:**

Mark A. Mossler, M.S.
Associate Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: Mark Mossler
Date: 8/19/91

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Senior Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: P. Kosalwat
Date: 8/19/91

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: Richard C. Petersen 8/06/92
Date: Henry T. Craven 9/2/92

7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for a flow-through acute freshwater fish toxicity study. The 96-hour LC_{50} of >167 mg/L (based on mean measured concentrations of formulated product) classifies MSMA as practically non-toxic to rainbow trout. The NOEC was determined as 167 mg/L of MSMA formulation.

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

6 hrs.

1

9. **BACKGROUND:**

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

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Juvenile rainbow trout (Oncorhynchus mykiss) were raised from eyed eggs obtained from a supplier in McMillin, WA. After hatching, the fish were raised for 125 days before testing. The fish were maintained in well water and fed salmon mash and salmon starter. The temperature in the holding unit was 10.4 to 12.2°C. The holding water had a pH of 7.3 to 8.2, an alkalinity of 160-192 mg/L as $CaCO_3$ and a hardness of 124-136 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 51 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 2.50 (1.91-3.19) g and 60 (56-66) mm.

B. **Test System:** A continuous-flow, proportional diluter was used to provide each concentration of the test substance and a negative (dilution water) control. A diluent delivery line fed a series of rotameters that regulated the flow of test substance and diluent to mixing chambers assigned to each treatment. A peristaltic pump was used to inject the appropriate stock into the corresponding mixing chamber. 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 6 volume additions every 24 hours. The diluter was checked twice daily.

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 placed in a temperature-controlled water bath set to 12°±1°C. The laboratory environment was maintained on a 16-hour daylight photoperiod with 30-minute dawn and dusk simulations.

The dilution water was medium-hard well water which was aerated and filtered (25 and 0.2 µm) before use. A

2

typical batch of water had a hardness of 132-140 mg/L as $CaCO_3$, an alkalinity of 156-200 mg/L as $CaCO_3$, a conductivity of 340-452 µmhos/cm, and a pH of 7.4 to 8.2.

Stock solutions were prepared by addition of the MSMA formulation to reverse-osmosis water.

C. **Dosage:** Ninety-six-hour flow-through test. Five nominal concentrations (21.1, 33.4, 55.7, 92.9, and 155 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 trout were impartially distributed to each aquarium, two aquaria per concentration, for a total of 20 fish per concentration. Biomass loading rate was 1.7 mg/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 from samples taken at test initiation and termination.

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

12. **REPORTED RESULTS:** The mean measured concentrations were 16.0, 30.3, 56.4, 85.8, and 167 mg MSMA formulation/L (Table 5, attached). The values are higher than the desired nominal concentrations due to an error in stock preparation.

The responses of rainbow trout are given in Table 6 (attached). There was one fish mortality at the 85.8 mg MSMA formulation/L concentration, but this was due to the fish jumping between the liner and the aquaria. Therefore, this mortality was not considered when reviewing the results. The 96-hour LC_{50} based on measured concentrations was >167 mg MSMA formulation/L. No sublethal or lethal effects were observed at any test concentration. The no-observed-effect concentration (NOEC) was therefore given as 167 mg MSMA formulation/L.

3

Dissolved oxygen ranged from 8.2 to 9.8 mg/L. The pH values ranged from 7.9 to 8.2. The temperature was 12.0-12.4°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 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:

Inert ingredients were not included as a control in the test design.

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

B. **Statistical Analysis:** No statistical analysis was performed. 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., 167 mg of MSMA formulation/L).

C. **Discussion/Results:** This study is scientifically sound and meets the guideline requirements for a flow-through acute freshwater fish toxicity study. The 96-hour LC_{50} of >167 mg/L (based on mean measured concentrations of formulated product) classifies MSMA as practically non-toxic to rainbow trout. The NOEC was determined as 167 mg/L of MSMA formulation.

D. **Adequacy of the Study:**

(1) **Classification:** Core for a formulated product.

(2) **Rationale:** N/A.

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

15. **COMPLETION OF ONE-LINER FOR STUDY:** Yes, 7-29-91.