

07

9/10/91

MRID No. 418872-02

DATA EVALUATION RECORD

- 1. **CHEMICAL:** Sodium Chlorate.
Shaughnessey No. 073301.
- 2. **TEST MATERIAL:** Sodium Chlorate; Lot 29-A/PAL A-113; >99% active ingredient; a white powder.
- 3. **STUDY TYPE:** Freshwater Fish Flow-Through Acute Toxicity Test. Species Tested: Bluegill Sunfish (Lepomis macrochirus).
- 4. **CITATION:** Ward, T.J. and R.L. Boeri. 1991. Acute Flow-Through Toxicity of Sodium Chlorate to the Bluegill Sunfish, Lepomis macrochirus. EnviroSystems Study Number 90142-AW. Prepared by EnviroSystems Division, Resource Analysts, Inc., Hampton, NH. Submitted by Sodium Chlorate Reregistration Task Force. EPA MRID No. 418872-02.

5. **REVIEWED BY:**

Louis M. Rifici, M.S.
Associate Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: *Louis M Rifici*
Date: *9/9/91*

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Senior Scientist
KBN Engineering and
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Signature: *P. Kosalwat*
Date: *9/9/91*

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

Signature:
Date:

7. **CONCLUSIONS:** This study is scientifically sound but does not meet the guideline requirements for a flow-through acute freshwater fish toxicity study. The concentration of the test material should have been measured to verify the actual test concentrations. Under the conditions of the test, the 96-hour LC₅₀ value was >1000 mg/L (based on nominal concentrations). Therefore, sodium chlorate is classified as practically non-toxic to bluegill sunfish. The NOEC was determined as 1000 mg/L nominal concentration.

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

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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 from the Aquatic Research Organisms Division of Resource Analysts, Inc. The fish were maintained in test dilution water under flow-through conditions and fed a commercially available fish food once or twice daily. Feeding was discontinued 48 hours prior to test initiation. The fish were acclimated at the laboratory for more than 14 days and were free from signs of stress and disease at the beginning of the test.

Mean wet weight of the control fish (measured at the end of the test) was 0.77 g resulting in a loading of 0.51 g/L.

- B. Test System: An intermittent-flow proportional diluter was used. A stock solution was delivered to the diluter and mixed with dilution water using a high-shear pump with a Teflon head. The diluter was calibrated before and after the test. Flow into the test chambers resulted in 6.3 volume replacements per day.

The test chambers were 20-L glass aquaria filled with 15 L of test solution. The test solution depth was approximately 18 cm. The test aquaria were randomly positioned in a temperature-controlled water bath set to $22 \pm 1^\circ\text{C}$. The laboratory environment was maintained on a 16-hour daylight photoperiod with a light intensity of $10 \mu\text{Es}^{-1}\text{m}^{-2}$.

Well water with the characteristics listed in Table 1 (attached) was aerated before use as dilution water.

- C. Dosage: Ninety-six-hour flow-through test. Based on the results of a preliminary test, five nominal concentrations (150, 240, 380, 600, and 1000 mg/L) and a dilution water control were used.
- D. Design: Bluegill sunfish were randomly and equally distributed to each aquarium, two aquaria per concentration, for a total of 20 fish per

concentration. The fish were not fed during the test.

Observations of mortality and sublethal responses were made every 24 hours. The dissolved oxygen concentration (D.O.), pH, conductivity, and temperature were recorded in each test chamber daily. The temperature of an aquarium was recorded continuously.

E. Statistics: No statistics were required for this data set.

12. REPORTED RESULTS: No insoluble material was observed at any concentration. "The concentration of sodium chlorate in test media could not be determined because of naturally occurring interference in the dilution water." The concentration of sodium chlorate in the 600,000 mg/L (nominal) stock solution was 620,000 mg/L.

The test material had no effect on the bluegill. The 96-hour LC₅₀ value was greater than 1000 mg/L nominal concentration. The no observed effect concentration (NOEC) was 1000 mg/L.

Dissolved oxygen ranged from 8.3 to 9.4 mg/L. The pH values ranged from 8.0 to 8.7 and the conductivity was 900-2000. The temperature was 21.1-22.9°C.

13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

The authors made no conclusions.

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 test was performed in a flow-through system but the concentration of the test material was not verified by analytical measurement. The concentration of the test material must be verified when a flow-through system is used.

The length of the test fish was not measured. The SEP states that the length of the largest test fish should not be more than twice that of the smallest.

No transitional period between light and dark was used in the test.

- B. Statistical Analysis: No statistics were required for this data set.
- C. Discussion/Results: This test probably could have been performed in a static system. There is no evidence from the water quality data that lowered D.O. would have been encountered in a static test. In addition, no precipitates were encountered at concentrations as high as 1000 mg/L, so constant renewal of the test solutions was not warranted. It cannot be assumed that the diluter functioned properly during the test. Because a flow-through system was used, measured concentrations are required.

The quality of the water used in this test is questionable. The conductivity and pH of the dilution water decreased from 1500 to 900 $\mu\text{mhos/cm}$ and 8.7 to 8.0, respectively, during the course of the study. Changes in dilution water quality of this magnitude during the test may cause undue stress in test fish and should be avoided. If the fish would have been challenged by a more toxic compound than the one used in this test, significant effects on survival and behavior due to changes in water quality might have been observed.

In the three tests using this chemical and fresh water organisms (MRID Nos. 418872-02, 418872-03, and 418872-04), the initial pH, hardness, and conductivity of the test water ranged from 6.8-8.7, 48-180 mg/L as CaCO_3 , and 490-1500, respectively. The reports state that the water was drawn from a well located at the EnviroSystems laboratory and was aerated and stored in a 500-L polyethylene tank prior to use. The variable water quality for this single source of dilution water is unexplained by the authors and may have implications concerning the proper acclimation of the test organisms and the inability of the laboratory personnel to provide a consistent water supply. The water supply, storage and handling of the water, technical expertise of the technicians, and/or the functioning of the meters should be evaluated as soon as possible.

This study is scientifically sound but does not meet the guideline requirements for a flow-through acute freshwater fish toxicity study. The concentration of the test material should have been measured to verify the actual test concentrations. Under the conditions of the test, the 96-hour LC₅₀ value was >1000 mg/L (based on nominal concentrations). Therefore, sodium chlorate is classified as practically non-toxic to bluegill sunfish. The NOEC was determined as 1000 mg/L nominal concentration.

D. Adequacy of the Study:

- (1) **Classification:** Supplemental.
- (2) **Rationale:** The actual concentrations in this flow-through test were not verified analytically.
- (3) **Repairability:** No.

15. COMPLETION OF ONE-LINER FOR STUDY: Yes, 08-26-91.

RIN 2906-01

DER/MRID NO. 418872-02

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Pages _____ through _____ are not included in this copy.

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Study/Species/Lab/
MRID # _____ Chemical
% a.i. _____ Results _____ Reviewer/ Validation
Date _____ Status _____

48-Hour EC₅₀ _____
EC₅₀ - _____ pp (_____) 95% C.L. _____ Control Mortality (%) - _____
Solvent Control Mortality (%) - _____
Species: Slope - _____ # Animals/Level - _____ Temperature - _____

Lab: _____
MRID # _____ 48-Hour Dose Level pp / (% Effect) _____
(_____), (_____), (_____), (_____)

Comments: _____

96-Hour LC₅₀ _____
LC₅₀ - >1000 ppm (N/A) 95% C.L. _____ Control Mortality (%) - 0
Solvent Control Mortality (%) - N/A

Species: Lepomis macrochirus
Slope - N/A # Animals/Level - 20 Temperature - 22°C

Lab: Emulcor Systems Division
Resource Analysts Inc.
MRID # 418872-02
150 (0), 240 (0), 380 (0), 600 (0), 1000 (0)
96-Hour Dose Level ppm / (% Mortality) _____
Temperature - 22°C
LR Supplemental
8/26/91

Comments: Nominal concentrations.

