

1-7-91

Data Evaluation Report  
Ecological Effects Branch

- 1. Chemical: Arsenic Acid
- 2. Test Material: Arsenic Acid, 76.1% ai, received on 5/2/90, lot no. 203
- 3. Study Type: 96 Hour Static Acute Toxicity Test with sheepshead minnow, Cyprinodon variegatus

4. Study Identification:

Study Director: LeLievre, Maura  
 Study Laboratory: Springborn Laboratories, Wareham, Mass.  
 Study Dates: July 21-25, 1990  
 Study Identification: Study No. 10823.0490.6127.500  
 Sponsor: Chemical Manufacturers Assoc., Washington, D.C.  
 EPA Identification: MRID 416200-04

- 5. Reviewed by: Brian Montague, Fisheries Biologist  
 Ecological Effects Branch  
 Environmental Fate and Effects Division

*Brian Montague*  
 1/2/91

- 6. Approved by: Les Touart, Acting Supervisory Biologist  
 Ecological Effects Branch  
 Environmental Fate and Effects Division (H7507C)

*Les Touart*  
 1/7/91

- 7. Conclusions: The reported LC<sub>50</sub> of arsenic acid to sheepshead minnows at 30 to 34 ppt salinity levels is approximately 28 (22-35) mg A.I./L, indicating slight toxicity to this species. The NOEC is below 13 mg AI/L.

- 8. Recommendations: N/A

9. **Submission Purpose:** Submitted to satisfy reregistration guideline requirements.

10. **Protocol and Study Design:** Springborn protocol no. 01090/FIFRA 72-3 SM-SA was employed and is based on FIFRA 72-3 guidelines for acute toxicity testing of estuarine fish species.

**Test Organisms:** Sheepshead minnows were obtained from Aquatic Biosystems, Inc. in Ft. Collins, Co. The fish were acclimated for 14 days (minimum) in 500 liter fiber glass tank with closed system circulation. Temperature was maintained at 21-22°C, pH ranged from 7.4-7.5, and salinity as 31-33 ppt. A commercial pellet food was provided up to 24 hours prior to testing. No mortality is reported for the 48 hour period prior to testing. Thirty fish were wet weighed and measured for length. Mean weight was 0.27 gm (0.12-0.60 gm) while mean length was 24 mm (20-32 mm).

**Dilution Water and Test Solution Preparation:** Natural seawater obtained from Cape Code Canal, core filtered to 5 microns, and passed through activated carbon, was used as dilution water. The water had a salinity of 30 ppt and a pH of 8.3. No pesticide residues or PCBs were detected in water analysis procedures.

A 100 mg A.I./ml (10,000 ppm) stock solution was prepared by addition of 6.5704 grams ( 5.0 gms ai) of test material to a volume of 50 ml with distilled water. The test solutions were prepared using appropriate aliquots of the stock solution added to 15 liters of dilution water. Solutions were mixed for 30 seconds. Selected nominal concentrations were 100, 60, 36, 22, and 13 mg ai/L.

**Test Materials and Methods:** Test solutions were added to 18.9 liter glass aquaria to a 15 L volume level. The aquaria were randomly distributed in a temperature control water bath. Ten sheepshead minnows were randomly placed in each of the 6 test aquaria (1 control vessel). Solutions were unaerated and illuminated for 16 hours daily at 16 footcandles intensity. The fish were not fed during exposure and observation for behavior stress or mortality was made every 24 hours. Water quality parameters were also measured every 24 hours. Water samples for atomic absorption spectroscopy analysis of test material concentration were removed at 0 hour and at termination.

11. **Reported Test Results:** Water quality parameters remained acceptable for the 96 hour period with temperature ranging from 22-23°C, pH from 6.7 to 8.3 (lowest pH in higher concentrations of the acid), and dissolved oxygen from initial levels of 7.6 mg/L to 96 hour levels of 4.9 to 6.1 mg/L (above 69% saturation.) Salinity remained between 30

and 34 ppt. Recovery of arsenic acid from samples gave mean measured concentrations of 110, 65, 39, 24, and 13 mg ai/L.

Mortality was rapid at 110 and 65 mg/L with 100% mortality seen before 24 hours. A 40% mortality was seen at 39 mg/L after 24 hours. By 48 hours a 90% mortality was observed in the 39 mg/L concentration. By 96 hours 20% mortality was seen at 24 mg ai/L and other concentrations remained the same. No mortality was seen at 13 mg/L, however, darkening coloration was observed in two of the minnows at this lower concentration. Other behavior effects seen during testing included lethargy, loss of equilibrium, and erratic swimming patterns. These results correlate favorably with earlier range tests in which 100% mortality was seen at 100 ppm but no mortality was seen at 10 ppm or less.

12. **Study Director's Conclusions:** "The 96 hour LC<sub>50</sub> (95% confidence interval) was calculated by probit analysis to be 28 (22-35) mg A.I./L.... The No observed Effect Concentration (NOEC) through 96 hours was determined to be 13 mg A.I./L Arsenic Acid."
13. **Reviewers Discussion:** Though protocol was modeled after FIFRA guidelines the salinity used in testing was marine, not estuarine. A salinity level of 10-17 ppt is suggested for estuarine species such as sheepshead minnows. This might more accurately reflect the behavior of the toxicant in an estuarine environment. The salinity variation (4 pt) was also more than would be expected in such testing procedures, though this could be expected in an estuary. The study has, however, achieved a good dose response to the test material and other water quality parameters remained within acceptable limits. The arsenic acid concentrations remained stable as well.

**Adequacy of Study:**

**Classification:** Core

**Rationale:** Study has generally conformed to Agency guidelines and the results confirm study author's conclusion.

**Repairability:** N/A