1-7-91

Data Evaluation Report
Ecological Effects Branch

1. **Chemical:** Arsenic Acid, Arsenic Pentoxide

2. **Test Material:** Arsenic Acid, 76.1% ai received by the Laboratory 5/2/90 - lot no. 203

3. **Study Type:** 96 Hour Acute toxicity testing of mysid shrimp, Mysidopsis bahia under static conditions

4. **Study Identification:**
   Study Author: LeLievre, Maura
   Study Laboratory: Springborn Laboratories,
   Study Dates: July 19-23, 1990
   Study Identification: Study No. 10823.0490.6128.510
   Sponsor: Chemical Manufacturers Assoc., Washington,D.C.
   EPA Identification: MRID 416200-02

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

   Brian Montague 1/2/91

6. **Approved by:** Leslie Touart, Acting Supervisory Biologist
   Ecological Effects Branch
   Environmental Fate & Effects Division(7507C)

   LT 1/7/91

7. **Conclusions:** The LC_{50} level based on this study is estimated to be 2.0 mg ai/L (CL's 0.85-4.8 mg ai/L) placing this material in the highly to moderately toxic range in it's affects on estuarine shrimp.

8. **Recommendations:** N/A

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

10. **Study Design and Protocol:** The Springborn Protocol #010189 was based on FIFRA 72-3 procedural guidelines for acute toxicity testing of estuarine shrimp.

Test Organisms: Mysid shrimp were obtained from laboratory culture stocks and were ≤ 24 hours old at test initiation. They were raised in natural seawater obtained from the Cape Cod Canal in Massachusetts which had been subjected to 20 and 5 micron core filtration as well as activated carbon treatment. Temperature of the culture/holding water was 25 • 2°C and salinity was 31 ppt. A 16D/8N photoperiod at a 20-100 foot candle intensity was provided. Brine shrimp nauplii were provided once per day. Ten mysids were used in each replicate vessel.

Test Solution and Dilution Water: Initially the test dilution water had an TOC level of 2.0 mg/L (tested in June), a pH of 7.7, and a dissolved oxygen level of 6.7 mg/L. The test solutions were prepared to nominal concentrations of 0.39, 0.65, 1.1, 1.8, 3.0, 5.0, and 8.3 mg ai/L by addition of proper aliquot of a 20 mg ai/ml stock solution (0.201 gms ai added to 10 ml of distilled water) to 2 liters of dilution water. This preparation was then stirred by magnetic stirrer for 30 seconds and added in 1 liter aliquots to each of the 1.6 liter replicate glass test vessels used for each concentration group. Control replicates contained only dilution water, as no solvents were employed.

Test Procedures: Observations of behavior and survival were made at 24, 48, 72, and 96 hours. Physical water quality parameters were measured at 0, 24, 48, 72, and 96 hours in all test vessels. Water samples were removed for analysis of test material concentrations on day 0 and day 4 using atomic absorption spectroscopy and hydride generation measurement. Method validation prior to test initiation showed a 107 • 13.9% recovering level for this technique.

11. **Reported Test Results:** Preliminary range finding tests produced 10-20% mortality at concentrations of 0.01 to 2.0 mg/L. Based on this the definitive test concentration range was established at 0.39 - 8.3 mg/L. The water quality parameters during testing remained within the following ranges: pH, 7.6 - 8.3, dissolved O_2, 5.3 - 7.1 mg/L, temperature, 22-24°C, and salinity 33 to 34 ppt. Measured concentrations were initially close to nominals in the 0 hour samples but were analyzed at slightly higher levels by day 4. Average measured concentrations were 9.0, 5.2, 3.0, 1.7, 1.2,

0.63, and 0.32 mg/L.

Mean mortality levels were 65%, 15%, 10%, for the 9.0, 5.2, and 3.0 mg/L concentration levels after 24 hours. At 48 hours 10% and 5% mortality was seen in the 1.7 and 1.2 mg ai/L test levels. By 96 hours mortality was 95% in 9.0 mg/L, 85% in 5.2 mg/L, 85% in 3.0 mg/L, 2% in 1.7 mg.L, and 5% in the 0.39 mg/L and control level groups.

Behavioral observations included erratic swimming and lethargy in several surviving mysids within each of the 6 highest test concentrations.

12. **Study Author's Conclusions:** "Throughout the exposure period no visible sign of undissolved test material (e.g. film on solutions' surface) was observed. At test termination, 95%, 85%, and 85% mortality was observed among mysids exposed to the three highest treatment levels tested; 9.0, 5.2, and 3.0 mg/L, respectively. Mortality of 20%, 10%, 30%, and 5% was observed among mysids exposed to the remaining treatment levels...The 96 hour LC_{50} was estimated by non linear interpolation to be 2.0 mg AI/L with a 95% confidence interval calculated by binomial probability to be 0.85 - 4.8 mg/AI/L.... The No Observed Effect Concentrations (NOEC) through 96 hours was determined to be < 0.32 mg AI/L Arsenic Acid."

13. **Reviewer's Discussion:** The study appears to have been generally performed with sound scientific methodology, however several points of deviation from EPA guidelines are noted as follows:

    1. Oxygen levels rose on different occasions (24-48 hours and 72-96 hours), despite the fact that this was a static test in which aeration was supposedly not employed. Despite this fact the levels remained above the 60% saturation minimum. The study author should have noted this discrepancy and offered some explanation.

    2. Salinity varied from 2 - 4 ppt during the test and the 31 ppt salinity level more generally reflects marine salinities not estuarine salinity.

    3. A clear NOEL was not established. However, a clear dose response has been achieved.

Adequacy of Study:
Classification: Core
Rationale: The Agency calculations of LC_{50} levels confirm the study author's computations.
Repairability: N/A

3