# DATA EVALUATION RECORD

1. CHEMICAL: Avermectin $B_1$

2. FORMULATION: Technical Avermectin $B_1$ (91.43% purity)

3. CITATION: EG&G Bionomics. 1981. Acute toxicity of L-676, 863-00V50 to the water flea (Daphnia magna). Report # BW-81-6-938 Submitted to Merck Sharp & Dohme, Rahway, N.J. Accession No. 246358 in 618-EUP-10.

4. REVIEWED BY: Mary L. Gessner
   Fishery Biologist
   HED/EEB

5. DATE REVIEWED: 12/18/81

6. TEST TYPE: 48-hour acute toxicity to aquatic invertebrates
   Test species: Daphnia magna

7. REPORTED RESULTS: The 48-hour $LC_{50}$ (and 95% C.I.) for the water flea exposed to L-676, 863-00V50 was 0.34 (0.28-0.41) ppb.

8. REVIEWER'S CONCLUSIONS: This study is scientifically sound and is adequate to fulfill the guideline requirement for acute toxicity testing with aquatic invertebrates. With an $LC_{50}$ of 0.34 ppb, Avermectin $B_1$ (technical) is very highly toxic to aquatic invertebrates.

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## Materials/Methods

### Test Procedure

Daphnia were obtained from Laboratory stocks cultured at the testing
laboratory. Culture water was reconstituted water with the following
chemical characteristics: total hardness - 165+ 15 mg/1, alkalinity -
120 + 10 mg/1, pH - 7.9 - 8.3, temperature - 21 + 1°C, D.O. > 5.4 mg/1
and specific conductance- 400-600 umhos/cm. Toxicity testing was
conducted in 2 1 glass jars each of which contained 500 ml of test
solution. The dilution water was reconsituted water and had the same
quality as the culture water mentioned above. Test material was
prepared in acetone. Two control jars were maintained, one dilution
water and one dilution water and acetone. Test solutions were
maintained at 21 + 1°C, with no aeration. Fifteen daphnids (<24 hours
old) were randomly distributed to each test concentration. Mortalities
were recorded at 24 and 48 hours. Biological observations were made
and recorded at 0, 24, and 48 hours.

### Statistical Analysis

The computer program utilized estimated $LC_{50}$ values using one of three
statistical methods in the following order of preference: moving average
angle, probit analysis, binomial probablity. In this case, the moving
average angle method was utilized.

### Discussion/Results

The 48-hour $LC_{50}$ and 95% C.I. for the Daphnia exposed to L-676,
863-00V50, were estimated by the moving average angle method to
be 0.34 (0.28-0.41) ug/1. The no effect concentration was
determined to be <0.31 ug/1.

### Reviewer Evaluation

A.  Test Procedure

Test procedure generally followed EPA-recommended protocol. Both
EPA and ASTM recommend using soft water for aquatic bioassays,
except when the intent is to study the effects of water quality
on results of toxicity tests. The water used in this study was
harder than recommended. Deviations from recommended water
quality parameters can elevate $LC_{50}$ values, which should be
taken into account when risk assessments are done using this
data. Reported pH was 8.1 for all concentrations at 48 hr.
and D.O. was 8.4 - 8.6 mg/1.

B.  Statistical Analysis

Data analysis was verified by the Stephan's program with the
following results:

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| CONC. | NUMBER EXPOSED | NUMBER DEAD | PERCENT DEAD | BINOMIAL PROB. (PERCENT) |
|---|---|---|---|---|
| 2 2 | 15 | 15 | 100 | 0.003051758 |
| 1.3 | 15 | 15 | 100 | 0.003051758 |
| 0.79 | 15 | 15 | 100 | 0.003051758 |
| 0.48 | 15 | 14 | 93.33333 | 0.04882813 |
| 0.31 | 15 | 5 | 33.33333 | 15.08789 |

THE BINOMIAL TEST SHOWS THAT O AND 0.48 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE $LC_{50}$ FOR THIS SET OF DATA IS 0.3457717

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

| SPAN | G | $LC_{50}$ | 95 PERCENT CONFIDENCE LIMITS | |
|---|---|---|---|---|
| 1 | 0.3047857 | 0.3457717 | 0.2783842 | 0.390189 |

RESULTS CALCULATED USING THE PROBIT METHOD

| ITERATIONS | G | H | GOODNESS OF FIT PROBABILITY |
|---|---|---|---|
| 7 | 0.3597124 | 1 | 0.999983 |

SLOPE    =    10.19518
95 PERCENT CONFIDENCE LIMITS = 4.080514      AND    16.30984

LC50 =        0.3417328
95 PERCENT CONFIDENCE LIMITS = 0.2853172 AND 0.3914333

LC10 =        0.256518
95 PERCENT CONFIDENCE LIMITS = 0.1516263 AND 0.3006829

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C.  Discussion/Results

      The reported $LC_{50}$ value is acceptable.

D.  Conclusions

      1.  Category: Core
      2.  Rationale: N/A