

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

1. Chemical: Metalaxyl (Shaughnessy #113501)
2. Formulation: CGA-48988 (Technical, 90.1% purity)
3. Citation: LeBlanc, Gerald A., et. al. 1980. The chronic toxicity of CGA-48988 to the water flea (Daphnia magna). [Report #BW-80-5-668]. EG & G, Bionomics, Wareham, MA. 23pp. (within accession #244183)
4. Reviewed by: James D. Felkel
Wildlife Biologist
Ecological Effects Branch/HED
5. Date Reviewed: 3/11/81
6. Test Type: Invertebrate Life-cycle
 - A. Test Species: Daphnia magna
7. Reported Results: Based on survival and reproduction at five test concentrations through two consecutive generations, the minimum threshold concentration was greater than 1.2 mg/l and less than 2.7 mg/l.
8. Reviewer's Conclusions: While the study appears to be scientifically sound, the data must be submitted in a format which would enable a confirmation of the statistics. The study will satisfy a guideline requirement for this study upon such confirmation.

Materials/Methods Reported

Methodology for this study was based on the EG & G, Bionomics "Protocol for conducting chronic toxicity tests with the water flea (Daphnia magna)".

Deionized well water, reconstituted to a total hardness of 175 ± 15 mg/l as CaCO_3 , a pH of 8.1 ± 0.2 , 500 ± 100 micromhos/cm and a total alkalinity of 120 ± 10 mg/l as CaCO_3 , was used for the dilution water. A 200 ml proportional diluter was calibrated to provide 50% dilutions. Five test concentrations in addition to controls were examined in quadruplicate. Four (4) 1.75l glass battery jars with 20 D. magna individuals (< 24 hours old) in each were used per test concentration. Dissolved oxygen and temperature were measured daily and other water quality parameters (total hardness, alkalinity, specific conductance and pH) weekly at each test level. All test solutions were sampled weekly for toxicant analysis.

The study was run for two generations (42 days) of daphnid exposure, 20 offspring being retained from each aquarium for the second generation exposure. Where no offspring were present at a treatment level, control offspring were transferred to the treatment to initiate the second generation's exposure.

Statistical Analyses Reported

Weekly survival data (transformed to $\text{arc sin} \sqrt{\text{percentage}}$) and cumulative production of offspring per female were examined by analysis of variance and Dunnett's procedure. A minimum threshold concentration (MTC) was defined as the minimum toxicant concentration to elicit an adverse response by D. magna.

Results Reported

Table #4 compares the nominal toxicant concentrations to the mean measured concentrations, the latter averaging 98 percent of the former. Water quality parameters varied minimally (Table 5).

Tables 6 and 7 present the weekly mean percent survival of 1st and 2nd generation D. magna, respectively. A significant number of daphnids exposed to the two highest concentrations (10 and 18 mg/l) died during both generations. Surviving daphnids at 10 mg/l in both generations were smaller than controls.

First generation offspring production at the highest four test levels was significantly reduced compared to controls on all days offspring were counted (Figure 1). Daphnids at the lowest test concentration produced significantly fewer young only on day 11. Second generation offspring production was also significantly reduced at all levels above 1.2 mg/l.

The only adverse effect seen at the 1.2 mg/l test level was the reduced offspring production on day 11. Young production at this time was very sparse at all test levels. In addition, reduced production on just one day was

considered insufficient to attribute it to the test material. Hence the MTC was considered to be greater than 1.2 mg/l and less than 2.7 mg/l.

Reviewer's Analysis

Test procedures were generally in compliance with accepted protocols. However, data was not provided in a format amenable to a check of the statistical analyses conducted.

Conclusions

1. Category: Supplemental (see notes below)
2. Rationale: Data was not provided in a format amenable to a check of the statistical analyses conducted.
3. Repairability: Repairable to Core when statistics can be confirmed.

5/27/81 - ^{Study} Has now been upgraded to Core - see
DER dated 5/13/81 and Review dated
5/13/81. JDF

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Table 4. Mean (standard deviation) concentrations of CGA-48988 measured during the chronic exposure to the water flea (Daphnia magna).

Nominal concentration (mg/l)	Mean measured concentration (mg/l)	Number of samples
control	<0.05	14
1.2	1.2(0.2)	14
2.5	2.7(0.5)	14
5.0	4.5(0.8)	14
10	10(2)	14
20	18(3)	13 ^a

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One sample was lost during preparation.

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Table 5. Water quality analysis of test solutions during the chronic exposure of the water flea (Daphnia magna) to CGA-48988.

Mean measured concentration (mg/l)	Dissolved oxygen (mg/l)	Temperature (°C)	Total hardness (mg/l CaCO ₃)	Total alkalinity (mg/l CaCO ₃)	Specific conductance (µmhos/cm)	pH range
control	8.5 (0.5)	22 (1)	170 (12)	129 (10)	390 (20)	8.0-8.2
1.2	8.5 (0.5)	22 (1)	172 (15)	130 (10)	390 (20)	8.0-8.2
2.7	8.4 (0.7)	22 (1)	171 (12)	130 (11)	390 (20)	8.0-8.2
4.5	8.5 (0.5)	22 (1)	172 (15)	128 (10)	390 (20)	8.0-8.2
10	8.6 (0.5)	22 (1)	172 (13)	128 (9)	390 (20)	8.0-8.2
18	8.7 (0.4)	22 (1)	171 (13)	127 (9)	390 (20)	8.0-8.2

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Table 6. Weekly mean (standard deviation) percentage survival of first generation water flea (Daphnia magna) continuously exposed to concentrations of CGA-48988.

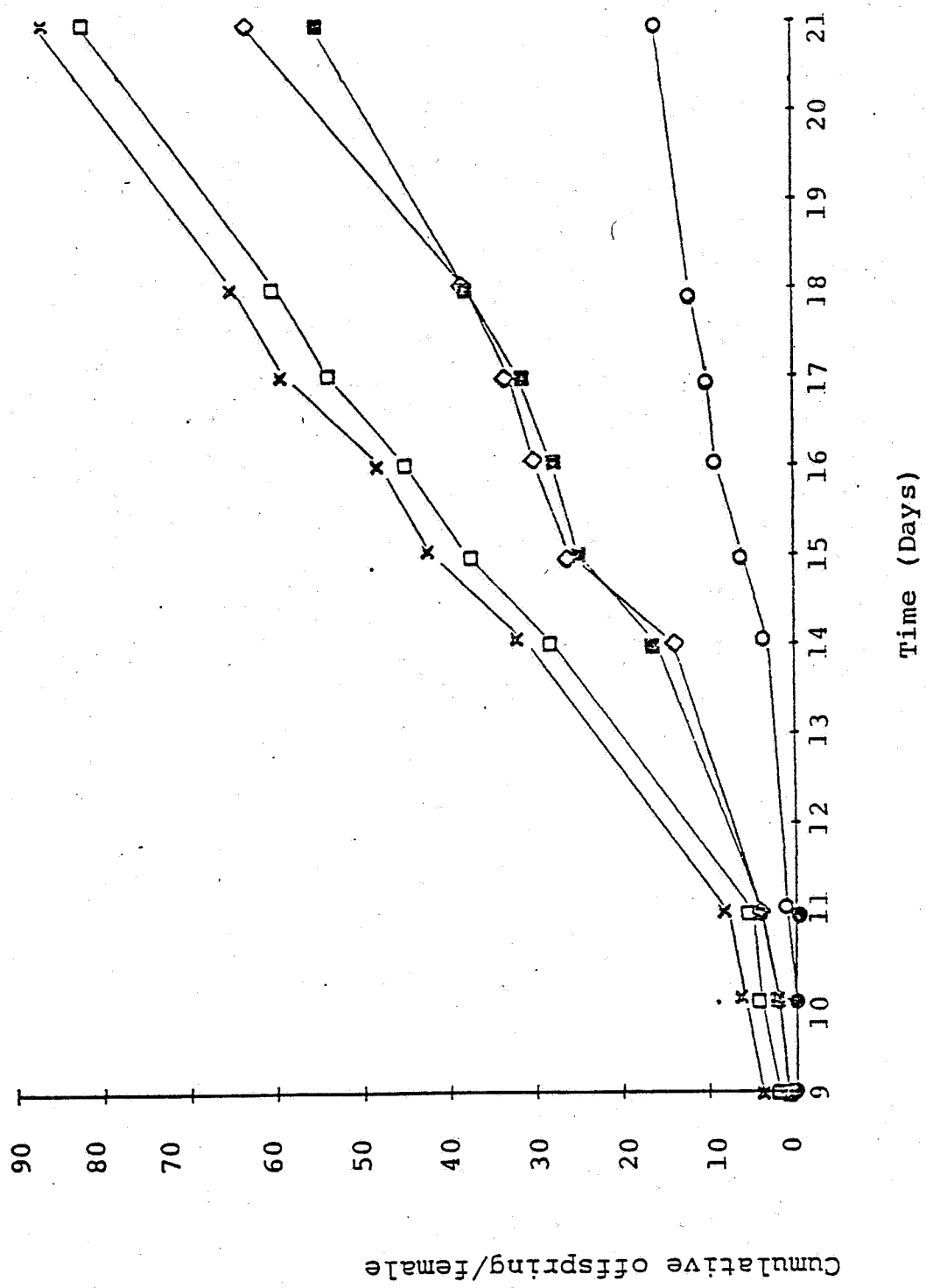
Mean measured concentration (mg/l)	Day/	Percentage survival		
		7	14	21
control		95(6)	94(5)	84(5)
1.2		90(4)	88(3)	85(6)
2.7		100(0)	98(3)	94(9)
4.5		99(2)	91(11)	84(10)
10		60(42)	52(41)	45(37)
18		5(4)	0(0)	0(0)

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Table 7. Weekly mean (standard deviation) percentage survival of second generation water flea (Daphnia magna) continuously exposed to concentrations of CGA-48988.

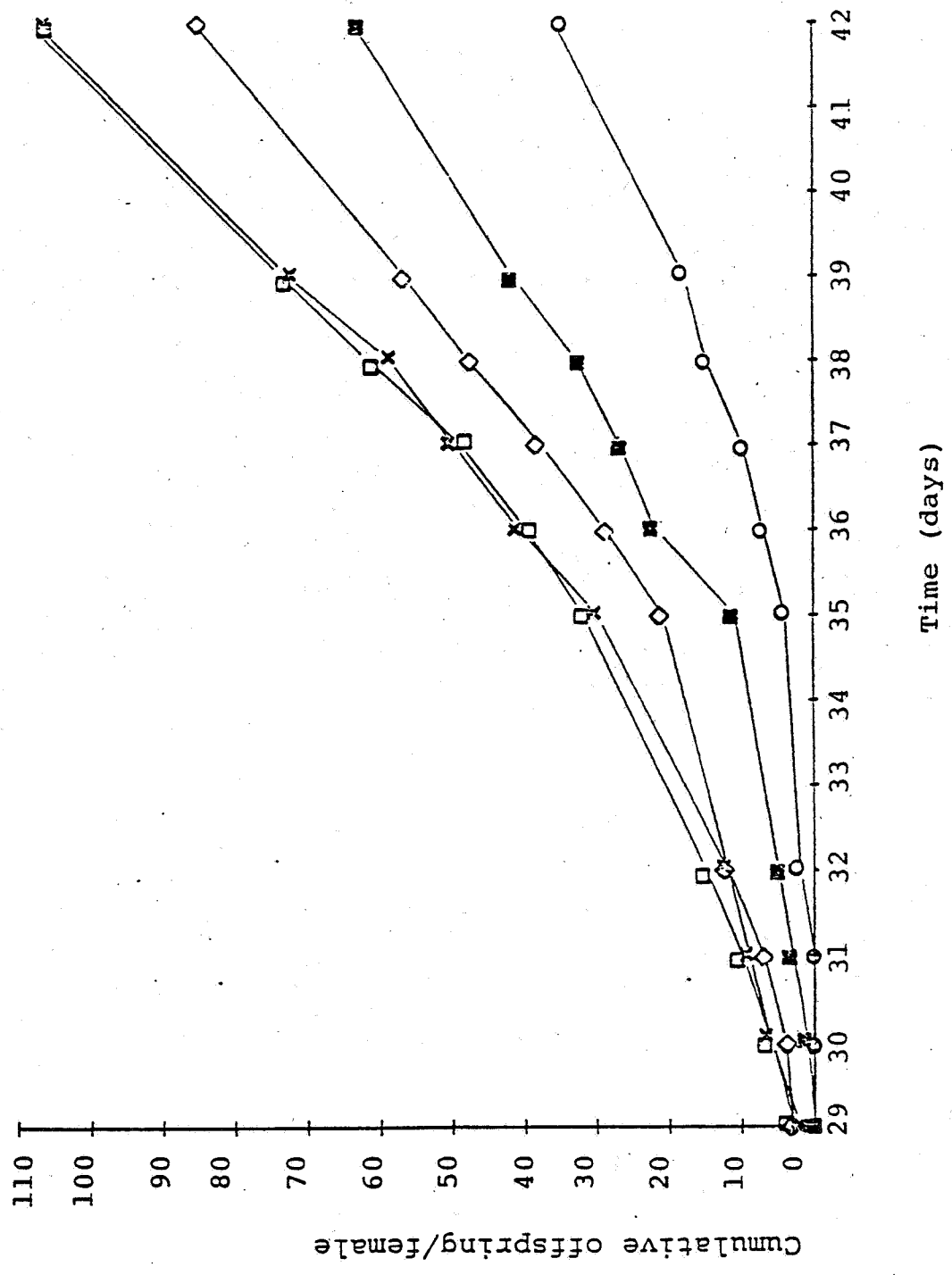
Mean measured concentration (mg/l)	Day/	Percent survival		
		29	35	42
control		96 (5)	91 (2)	86 (5)
1.2		95 (4)	90 (7)	82 (9)
2.7		96 (5)	80 (24)	75 (24)
4.5		94 (9)	88 (19)	86 (18)
10		66 (20)	49 (10)	31 (6)
18		0 (0)	0 (0)	0 (0)

FIGURE 1. Cumulative number of offspring produced by first generation *D. magna* exposed to concentrations of CGA-48988. Control = x, 1.2 mg/l = □, 2.7 mg/l = ◇, 4.5 mg/l = ●, 10 mg/l = ○, 18 mg/l = ●.



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FIGURE 2. Cumulative number of offspring produced by second generation *D. magna* exposed to concentrations of CGA-48988. Control = x, 1.2 mg/l = □, 2.7 mg/l = ◇, 4.5 mg/l = ■, 18 mg/l = ○.



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