

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

CASE: GS0103

PHORATE FRSTR

CONT-CAT: 01

GUIDELINES: 72-4

MRID: 158336

Surprenant, D. (1986) The Chronic Toxicity of [Carbon-14]-AC35,024 to Daphnia magna under Flow-through Conditions: Report No. BW-86-3-1966. Unpublished study prepared by Springborn Bionomics, Inc. 56 p.

REVIEW RESULTS:

VALID _____ INVALID _____ INCOMPLETE

GUIDELINE: SATISFIED _____ PARTIALLY SATISFIED _____ NOT SATISFIED

DIRECT RVW TIME = 8 START DATE: 6/24/88 END DATE: 6/27/88

REVIEWED BY: Ann Stavola
TITLE: Aquatic Biologist
ORG: HED / EEB
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SIGNATURE: Ann Stavola DATE: June 27, 1988

APPROVED BY:
TITLE:
ORG:
LOC/TEL:
SIGNATURE: Douglas J. [Signature]

DATE: 10/11/88

Text Searchable Document



1. Chemical: Phorate
2. Test Material: Technical Grade, 92.1% ai
3. Study/Action Type: Daphnia magna Chronic Toxicity
21-Day Flow-Through Study
4. Study ID: MRID 158336 Suprenant, D. (1986) The chronic toxicity of [Carbon-14] AC 35,024 to Daphnia magna under flow-through conditions. Report No. BW-86-3-1966. Unpublished study prepared by Springborn Bionomics, Inc.

5. Reviewed By: Ann Stavola
Aquatic Biologist
HED/EEB

Signature: *Ann Stavola*
Date: *7/25/88*

6. Approved By: Douglas Urban
Supervisory Biologist
HED/EEB

Signature: *Douglas Urban*
Date: *10/11/88*

7. Conclusions:

This study is incomplete and does not satisfy EPA guidelines requirements for a Daphnia chronic study as the raw data needed to analyze the study were not submitted.

8. Recommendations:

The raw data for mortality and reproduction for each replicate per day need to be submitted so the evaluation can be completed.

9. Background:

A Daphnia chronic toxicity was required in the Phorate Registration Standard, 1983.

*Later upgraded to core w. TK
submission of raw data
Bjorn 10/94*

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10. Materials and Methods:

- a. Test Animals - Species: Daphnia magna; Age at start of study: < 24 hours old; Source: Cultures at Springborn Bionomics.
- b. Dosage
- Nominal concentrations: 0.12, 0.25, 0.50, 1.0, 2.0 ug phorate/L plus control and solvent control.
 - Mean measured concentrations: On days 0, 6, 14, and 21: 0.12, 0.29, 0.44, 0.82, and 1.9 ug phorate/L.
 - Dilution water: Fortified well water filtered through carbon filter and resin column to remove potential organic contaminants. Water was hard quality. pH 7.9 to 8.3.
 - Stock solution: Labeled phorate (40 uCi/mg) mixed with nonlabeled phorate (92.1% ai) in acetone for a stock solution containing 278 ug ai/mL of phorate.
- c. Test System - A 200 mL Mount and Brungs proportional diluter, calibrated to provide 50 percent dilutions. Test solutions delivered to aquaria at the rate of 4 aquaria volumes per 24 hours to provide a test solution replacement rate of 15 hours.
- d. Study Design - Protocol followed:
- American Cyanamid Protocol #980-85-192.
 - Types of test chambers: glass battery jars with a volume of 1.8 L; covered with Nitex 40-Mesh screen.
 - Number of organisms per test concentration: 20 first instar daphnids were initially placed in each jar; 4 jars per concentration; 80 daphnids per concentration.
- Mortality and productivity measurements - every weekday from day 7 to day 21. Offspring were removed, counted, and discarded.
- Photoperiod: 16 L:8 D.
 - Test temperature: 20 ± 1 °C.
 - Diet: 0.5 mL yeast suspension and 2 mL algal suspension 2 to 3 times a day.
- e. Statistical Analyses - One-way ANOVA on each endpoint to compare controls and solvent controls. When no statistical differences were found between these groups, the

control data, for that endpoint were pooled. Otherwise, the solvent control data served as the point of comparison. Significant differences in survival were calculated after arcsine transformation of the data. Differences among treatment means were determined with Williams Procedure (1972).

The MATC was calculated by taking the geometric mean of the limits set by the LOEC that showed a statistically significant effect and the highest concentration that showed no effect.

11. Reported Results:

Mean DO in the test solutions ranged from 8.6 mg/L in the controls to 8.0 mg/L in the highest test concentration. PH ranged from 8.0 to 8.3 in all concentrations, and temperature was constant at 20 ± 0.6 °C.

The concentrations of phorate measured throughout the study are given below.

Table 2. Results of the analysis of test solutions for 14C-AC 35,024 during the chronic exposure of Daphnia magna.

Nominal Concentration (ug/L)	Day/	Measured Concentration (ug/L)					x (Standard deviation) ^b	
		0 ^a	6 ^a	14 ^a	21 ^a			
Control	<	0.031	<	0.033	0.040	<	0.032	---
Solvent control	<	0.032	<	0.032	0.041	<	0.033	---
0.12		0.18		0.096	0.10		0.096	0.12 (0.050)
0.25		0.28		0.26	0.46		0.18	0.29 (0.11)
0.50		0.48		0.42	0.54		0.33	0.44 (0.088)
1.0		1.1		0.88	1.0 ^c		0.34	0.82 (0.31)
2.0		2.1		2.0	1.9 ^c		1.7	1.9 (0.187)

^an = 2

^bn = 8

^cLess than 2 percent of the exposed adult organisms survived after day 12.

No insoluble material was observed in the test chambers.

Table 4 provides a summary of the percent survival on days 7, 14, and 21 of the chronic exposure period.

Table 4. Weekly mean percentage survival of daphnids (Daphnia magna) during the chronic exposure to 14C-AC 35,024.

Mean Measured Concentration (ug/L)	Mean Percentage Survival (standard deviation)			
	Day/	7	14	21
Control		100 (0)	99 (2.5)	99 (2.5)
Solvent Control		100 (0)	99 (2.5)	96 (4.8)
0.12		100 (0)	100 (0)	98 (2.9)
0.29		100 (0)	100 (0)	98 (2.9)
0.44		96 (4.8)	44 (40) ^a	30 (30) ^a
0.82		28 (31) ^a	1.2 (2.5) ^a	1.2 (2.5) ^a
1.9		18 (25) ^a	0 (0) ^a	0 (0) ^a

^aSignificantly (p = 0.05) less than the survival of control daphnids.

These data indicate that survival of daphnids at the two highest concentrations was significantly lower by day 7. By the end of the second week (day 14) survival had also significantly decreased at 0.44 ug phorate/L.

Reproduction data are presented in Table 5 (attached). Daphnids exposed to the highest test concentration, 1.9 ug phorate/L, did not reproduce. At the end of the study reproduction in daphnids exposed to 0.44 and 0.82 ug phorate/L was significantly lower compared to the controls and other treatment groups.

12. Study Author's Conclusions/Quality Assurance (QA) Measures:

The MATC for Daphnia magna exposed to phorate for 21 days was > 0.29 ug/L and < 0.44 ug/L (geometric mean MATC = 0.36 ug/L).

QA Statement: "The data contained in this report were audited by the QA unit to assure compliance with the protocols, standard operating procedures, and the pertinent EPA Good Laboratory Practice Regulations"

13. Reviewer's Evaluation:

- a. Test Procedures - The test procedures are appropriate and acceptable.
- b. Statistical Analysis - No statistical analyses were done as

the raw data, which are necessary, were not included in this report.

- c. Results/Discussion - As the statistical analyses could not be done, the reported results could not be validated.
- d. Conclusions
 - 1) Category - Incomplete
 - 2) Rationale - According to EEB's Standard Evaluation Procedure for Daphnia Magna Life-Cycle Test the following data are required: All raw data on mortality and reproduction for each replicated chamber for each day survival and number of offspring were observed.
 - 3) Reparability - The study can be evaluated in detail once the missing data are submitted and reviewed.

Table 5. Cumulative number of offspring produced per female *D. magna* during continuous exposure to 14C-AC35,024.

Mean Measured Concentration (µg/L)	Mean (standard deviation) cumulative number of offspring/female										
	Day/7	10	11	12	13	14	17	18	19	20	21
Control	2(1)	10(1)	24(1)	29(2)	34(1)	37(2)	46(2)	50(4)	53(6)	58(6)	66(4)
Solvent Control	1(1)	8(3)	19(4)	25(5)	29(5)	32(5)	41(4)	50(4)	56(6)	62(5)	70(7)
0.12	2(1)	11(12)	24(4)	29(3)	33(1)	38(4)	49(7)	57(9)	60(9)	66(10)	74(12)
0.29	2(1)	14(4)	27(6)	31(6)	34(4)	38(4)	48(2)	55(4)	61(2)	68(1)	75(3)
0.44	1(1)	9(6)	19(12)	24(16)	26(16)	29(14)	31(14)	33(12)	37(14)	38(15)	49(10) ^a
0.82	1(2)	17(12)	13(1)	16(-) ^c	16(-)	17(-)	17(-)	17(-)	20(-)	21(-)	22(9) ^a
1.9	0(0) ^a	NA ^b	NA	NA	NA	NA ^a	NA	NA	NA	NA	NA ^a

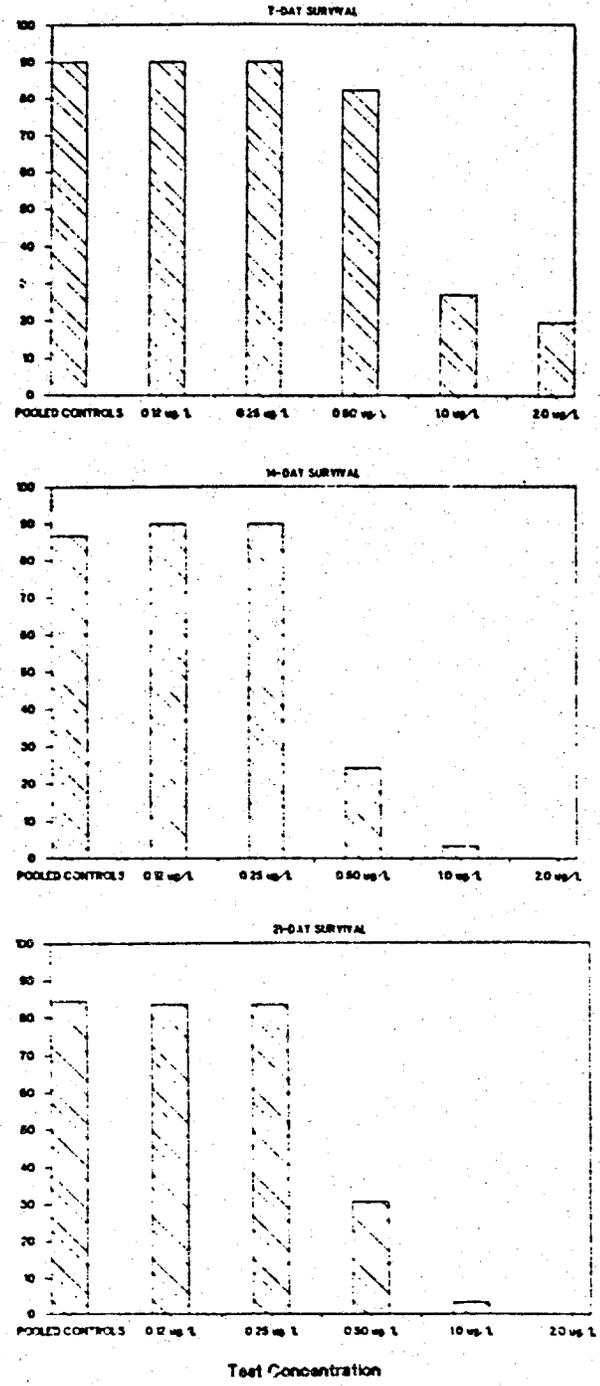
^aSignificantly (p=0.05) less than the number of offspring per female produced by the control daphnids. Statistical significance was calculated on test days 7, 14, and 21.

^bNo surviving adults after day 7.

^cOnly one replicate containing any surviving adults; therefore no standard deviation value.

FIGURE 1. Survival of *Daphnia magna* during a 21-day life cycle²⁹ test with 14C-AC35,024.

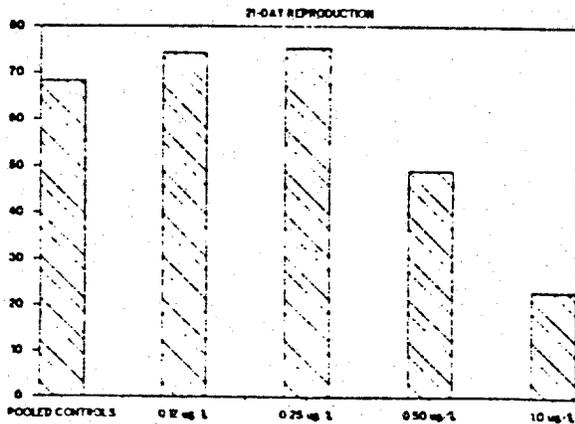
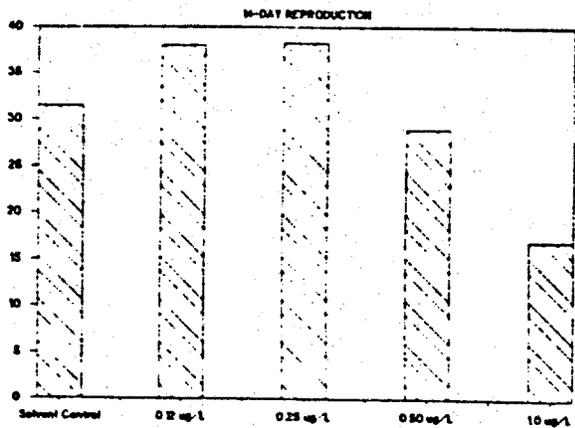
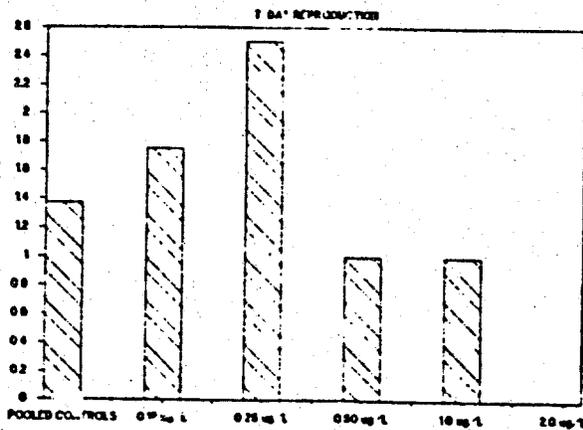
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DAPHNIA MAGNA CHRONIC TEST

FIGURE 2. Reproductive success of *Daphnia magna* during a 21-day life cycle test with 14C-AC35,024.

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Test Concentration

DAPHNIA MAGNA CHRONIC TEST