

US EPA ARCHIVE DOCUMENT

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MRID  
157352

DATA EVALUATION REPORT

- 1. Chemical: Methidathion
- 2. Test Material: Supracide® (97.2% ai)
- 3. Study Type: Aquatic Invertebrate Life Cycle

Species Tested: Daphnia magna

- 4. Study ID: Chronic Toxicity of Supracide® to Daphnia magna Under Flow-Through Test Conditions. ABC Final Report No. 31328 (March 7, 1984). Conducted by ABC Laboratories. Submitted by Ciba-Geigy. EPA Registration No. 100-530. EPA Accession No. 261874.

5. Reviewed By: John Noles  
Biologist  
EEB/HED

Signature: *John Noles*  
Date: 5/18/87

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6. Approved By: Henry T. Craven  
Section Head IV  
EEB/HED

Signature: *Henry T. Craven*  
Date: 5/17/87

7. Conclusion:

This study is scientifically sound. The MATC for aquatic invertebrates is reported to be 0.51 to 1.0 ug/L, based up on mean measured concentrations.

The study does not fulfill the Guideline requirement as supplemental data.

8. Recommendation:

This study is upgradable providing the registrant submits the raw data and statistical analysis for complete evaluation. Only the raw data used for the statistical analysis should be submitted.

9. Background:

This study was submitted in response to the Methidathion Registration Standard.

10. Discussion of Individual Tests:

Preliminary tests used to establish nominal test concentrations for the definitive test.

*John*



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11. Materials and Methods:

- a. Test Animals - Laboratory cultured Daphnia magna; holding period diet - algae (Selenastrum capricornutum) supplemented by trout chow suspension; 1st instar used for test.
- b. Test System - 1/2 L proportional diluter system; 6 sets of 4 replicate one-liter test chambers; aerated; aged ABC well water at 125 mL/chamber/55 minutes flow rate (equivalent to 1 liter test volume replacement 4X in 24 hrs); temperature 20 °C ( $\pm$  2 °C).
- c. Dose/Design - Nominal concentrations: 0.30, 0.55, 1.1, 2.0, and 4.6  $\mu\text{g/L}$  plus control. Forty daphnids per treatment level.
- d. Statistics - 2-way and 1-way ANOVA used to analyze length and pooled data.

12. Reported Results:

[Excerpted from Report]

The definitive flow-through Daphnia magna chronic toxicity study was successfully conducted for 21 days and was terminated on February 12, 1984. The test concentrations of Supracide<sup>®</sup> were measured on days 0, 4, 7, 14, and 21 of the study through the use of gas liquid chromatography. The mean measured Supracide<sup>®</sup> concentrations were 0.31, 0.51, 1.0, 1.8, and 4.4  $\mu\text{g/l}$  (Table 2). All results were based on the mean measured concentrations of Supracide<sup>®</sup>.

The two-way analysis of variance used to analyze the lengths of the surviving adults failed to identify any significant interaction or block effects. Therefore, the data were pooled and analyzed using a one-way analysis of variance. This analysis indicated that the daphnid lengths in the Supracide<sup>®</sup> mean measured concentration of 1.0  $\mu\text{g/l}$  were significantly different from the control (Table 4 and Figure 1). Length analysis of the 1.8 and 4.4  $\mu\text{g/l}$  concentration could not be performed, since no adults survived after 21 days.

Statistical analysis of survival for Daphnia magna after a 21-day exposure to Supracide<sup>®</sup> indicated that the mean measured test concentrations of 1.0, 1.8, and 4.4  $\mu\text{g/l}$  were significantly different from the control (Table 4 and Figure 2).

The mean young/adult/reproduction day after 21 days was significantly affected in the mean measured exposure levels

of 1.0, 1.8 and 4.4  $\mu\text{g}/\text{l}$  of Supracide<sup>®</sup> (Table 4 and Figure 3). No young were observed until 7 days into the study. The daphnids in the high concentration did not produce any young, since none remained after day 4 of the study.

Water quality parameters of temperature, dissolved oxygen and pH were measured at 0, 4, 7, 14 and 21 days with the results presented in Table 3. Temperature ranged from 20 to 21°C. The dissolved oxygen concentrations which ranged from 8.1 to 8.9 mg/L, representing 88 and 97% saturation at 20°C, were considered adequate for testing (2). The pH values were consistent with the control throughout the study, ranging from 8.2 to 8.4.

Table 2. Measured Concentrations of Supracide® During the 21-Day Chronic Life Cycle Toxicity Study with *Daphnia magna*

Concentration mg/L	Supracide® (µg/l)					Mean <sup>a</sup> (+ S.D.)
	Day 0	Day 4	Day 7	Day 14	Day 21	
Control	< 0.039 <sup>c</sup>	< 0.046	< 0.046	< 0.075	< 0.008	---
Spike (0.20 µg/l) <sup>a</sup>	0.21	0.19	0.21	0.15 <sup>d</sup>	0.20	0.19 <sup>b</sup> (+0.02)
Spike (1.0 µg/l) <sup>a</sup>	1.0	0.98	1.1	1.0	0.86	0.99 <sup>b</sup> (+0.09)
Spike (5.0 µg/l) <sup>a</sup>	5.2	4.9	5.3	4.9	4.2	4.9 <sup>b</sup> (+0.43)
Level 1 (0.30 µg/l) <sup>a</sup>	0.35	0.29	0.29	0.27	0.33	0.31 (+0.03)
Level 2 (0.55 µg/l) <sup>a</sup>	0.53	0.47	0.48	0.58	0.48	0.51 (+ 0.05)
Level 3 (1.1 µg/l) <sup>a</sup>	1.0	0.90	0.97	1.2	1.0	1.0 (+0.11)
Level 4 (2.0 µg/l) <sup>a</sup>	1.8	1.6	1.6	2.2	1.8	1.8 (+0.24)
Level 5 (4.6 µg/l) <sup>a</sup>	4.3	3.0	4.6	5.2	4.1	-2.2 (+0.51)
Stock (6000 µg/l) <sup>a</sup>	4600	4400	4000	5400 <sup>e</sup>	4500	4600 (+510)

<sup>a</sup>Nominal concentrations of Supracide®.

<sup>b</sup>Mean recovery for spikes were 95, 99 and 98%, respectively.

<sup>c</sup>The detection limit was 2 times the x-intercept.

<sup>d</sup>Low recovery due to partial sample loss during column cleanup.

<sup>e</sup>Because of concern for possible degradation of the initial stock solution, a second stock was prepared and used from Day 14 until the test termination. This change did not affect measured concentrations in treatment tanks.

Table 3. Water Quality Measurements During the Chronic Toxicity Test of Supracide to Daphnia magna

Study Day	Water Quality											
	Control			Level #1			Level #3			Level #5		
	Temp. °C	D.O. <sup>a</sup> mg/l	pH <sup>b</sup>	Temp. °C	D.O. mg/l	pH	Temp. °C	D.O. mg/l	pH	Temp. °C	D.O. mg/l	pH
0	20	8.7	8.2	20	8.6	8.3	20	8.6	8.3	20	8.7	8.4
4	20	8.4	8.4	20	8.6	8.4	20	8.5	8.4	20	8.6	8.4
7	20	8.8	8.3	20	8.8	8.3	20	8.7	8.4	20	8.9	8.4
14	20	8.1	8.2	20	8.2	8.3	20	8.2	8.3	20	8.3	8.4
21	21	8.4	8.2	21	8.4	8.3	21	8.3	8.3	21	8.3	8.3

<sup>a</sup>Dissolved oxygen concentrations - Dissolved Oxygen System (YSI Model 54).

<sup>b</sup>pH - pH Probe (Corning Model 476182) used with a Corning Model 125 pH and mV meter.

NOTE: Dissolved oxygen saturation of the test temperature of 20 °C is 9.2 mg/l.

Table 4: Percent Survival, Young/Adult/Reproduction Day and Adult Length of Daphnia magna Continuously Exposed to Supracide® During a 21-Day Life Cycle Study

<u>Chamber I.D.</u>	<u>Mean Measured Concentration (µg/l)</u>	<u>Adult Mean Length mm (+ S.D.)</u>	<u>Mean Percent Survival (+ S.D.)</u>	<u>Mean/Young/Adult Reproduction Day (+ S.D.)</u>
Control	--	3.9 (+0.12)	100	7.0 (+0.35)
Level #1	0.31	3.9 (+0.12)	100	7.3 (+0.08)
Level #2	0.51	3.9 (+0.12)	100	7.1 (+0.26)
Level #3	1.0	3.7* (+0.12)	40* (+12)	5.8* (+0.13)
Level #4	1.8	**	0*	2.7* (+ 0.39)
Level #5	4.4	**	0*	0*

\*Denotes values significantly different ( $\alpha = 0.05$ ) from the control using one-way analysis of variance (ANOVA) and Fisher's protected Least Significant Difference (LSD).  
 \*\*No adult available for analysis since all dead after 21 days.

Table 5: Analysis of Variance of Selected Parameters

Two-Way Analysis of Variance

Parameter: Day 21 Adult Length (Block)

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F-Ratio</u>	<u>F-Critical</u>
Concentration	38.5052	3	12.8351	3.60	~2.68
Block	11.1182	3	3.7061	1.04	~2.68
Interaction	24.4609	9	2.7179	0.76	~1.95
Error	<u>428.0334</u>	<u>120</u>	3.5669		
Total	<u>502.118</u>	<u>135</u>			

One-Way Analysis of Variance

Parameter: Day 21 Adult Length (pooled)

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F-Ratio</u>	<u>F-Critical</u>
Concentration	0.173	3	0.058	3.654	~2.68
Error	<u>2.081</u>	<u>132</u>	0.016		
Total	<u>2.254</u>	<u>135</u>			

One-Way Analysis of Variance

Parameter: Day 21 Survival

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F-Ratio</u>	<u>F-Critical</u>
Concentration	48.275	5	9.655	1026	~2.77
Error	<u>0.169</u>	<u>18</u>	0.009		
Total	<u>48.444</u>	<u>23</u>			

One-Way Analysis of Variance

Parameter: Day 21 Young/Adult/Reproduction Day

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F-Ratio</u>	<u>F-Critical</u>
Concentration	59.472	4	14.868	203	~2.93
Error	<u>1.098</u>	<u>15</u>	0.073		
Total	<u>60.570</u>	<u>19</u>			

13. Study Author's Conclusions/QA Measures:

MATC = 0.51 to 1.0 ug/L (based upon mean measured concentrations).

The report indicated that GLP were implemented and reviewed by the lab's quality assurance unit.

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14. Reviewer's Discussion and Interpretation of the Study:

- a. Test Procedure - The study was conducted according to acceptable protocol. The following items were observed to be inadequately reported.
  - Raw data and statistical analysis. The raw data should be only those data used for the statistical analysis.
- b. Statistical Analysis - EEB cannot fully evaluate the reported results without the raw data and statistical analysis.
- c. Discussion/Results - Additional information/data are required for further evaluation and verification of the reported results.
- d. Adequacy of Study
  - 1) Classification - Supplemental.
  - 2) Rationale - Inadequate reporting.
  - 3) Reparability - Additional information required for study upgrade considerations.

15. Completion of One-Liner for Study:

One-liner form completed 5 / 11/87.

16. CBI Appendix: N/A.