00131254

DATA EVALUATION RECORD

1. **CHEMICAL:** Methomyl

2. **FORMULATION:** >99% technical

3. **CITATION:** Britelli, M.R. (1982) Chronic Toxicity of methomyl to Daphnia magna. Unpublished report submitted by E.I. DuPont De Nemours and Co., Inc., Haskell Laboratory for Toxicology and Industrial Medicine. [Acc. No. 251424]

4. **REVIEWED BY:** Les Touart
   Fisheries Biologist
   EEB/HED

5. **DATE REVIEWED:** 6-14-84

6. **TEST TYPE:** Aquatic invertebrate life-cycle toxicity study

   A. **TEST SPECIES:** Daphnia magna

7. **REPORTED RESULTS:** Based upon reproductive effects (production of young), the MATC for Daphnia magna exposed for 21 days to methomyl is estimated to be >1.6 <3.5 ug/l.

8. **REVIEWERS CONCLUSIONS:**

The study is scientifically sound and, with revised conclusions, fulfills the guidelines requirement for an acceptable aquatic invertebrate chronic toxicity test. The MATC estimate is revised to be >0.4 <0.8 ug/l, based on onset of reproduction.

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Materials/Methods

Test Procedure

The test methods are generally consistent with current EPA guide-
lines for conducting an aquatic invertebrate life-cycle toxicity
test. Specifically: age – <24 hrs; test vessels – 250 ml glass
beakers; temperature – 20°C; levels – 0.4, 0.8, 1.6, 3.1, 6.2 and
12.5 ug/l with controls; number tested – 5 daphnids/replicate, 3
replicates/level for survival and growth measurements, 1 daphnid/
replicate, 7 replicates/level for reproductive measurements; test
design – static renewal.

Statistical Analysis

The 48-hour LC_{50} and 95% confidence limits were calculated by probit
analysis. The 21-day survival, growth and reproduction data for the
chronic test were subjected to analysis of variance. Survival data
were transformed to arc sin percentage prior to analysis.

Discussion/Results

Refer to tables attached.

All reproductive parameters investigated showed significant reductions.
These included reduced number of young, reduced number of young/adult
reproductive day, and first day of reproduction was delayed. Although
the delay in first day of reproduction was significant at the 0.8 ug/l
level it is not felt to be biologically significant until the 3.1 ug/l
level or higher where the number of young produced was affected. The
MATC was (estimated based on the number of young produced)   >1.6
<3.5 ug/l.

Reviewer's Evaluation

A. Test Procedure

The study was conducted according to recommended methods.

B. Statistical Analysis

The results were analyzed with appropriate statistical methods.

C. Discussion/Results

The use of the number of young produced parameter for estimating the
MATC is not entirely consistent with strict practices. The MATC is
generally estimated based on the highest no observable effect level

and the lowest effect level. Effects which delayed the onset of repro-
duction were observed and although "felt" not to be biologically signifi-
cant do indicate a level of probable adverse response. For this reason
the MATC should be reported as >0.4 <0.8 ug/l.

D. Conclusions

   1. Category: Core

   2. Rationale: Subject to revision of the MATC estimate to >0.4 <0.8 ug/l

   3. Repairability: N/A

TABLE I

RESULTS OF A 48-HOUR ACUTE TOXICITY TEST WITH
DAPHNIA MAGNA EXPOSED TO METHOMYL (H-13,905)

Nominal Test Concentrations µg/L (ppb)	Observed Mortality (%)[a]			
	24 Hours		48 Hours	
	Unfed	Fed	Unfed	Fed
Control	0	0	5	0
10	0	0	10	0
18	0	0	0	0
24	0	0	5	0
32	11	10	100	10
42	75	74	90	76
56	72	100	100	100
75	100	100	100	100
100	95	100	100	100
LC50, µg/L[b]	42.7[c]	38.3	28.7[c]	38.1
(95% Confidence limits)	–	(35.7-41.2)	–	(35.6-40.8)

[a] Average of duplicate chambers containing a nominal total of 10 daphnids each.
[b] Calculated by probit analysis.
[c] LC50 is estimated by the computer. Confidence limits could not be calculated because of nonsignificant regression.

TABLE IV

RESULTS OF ANALYTICAL MEASUREMENTS OF METHOMYL
FOR DAPHNIA MAGNA CHRONIC TOXICITY TEST (H-13,905)

Nominal Test Concentration µg/L	Mean Measured Concentration, µg/L (ppb)						
	Sample Date/(sample age, hours)						
	7/24 (0)	7/27 (72)	8/5 (0)	8/7 (48)	8/13 (0)	8/14 (24)	Average + S.D.
Control	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2[a]
0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7 + 0.0
0.8	NA[b]	0.8	1.1	0.9	1.0	1.0	1.0 + 0.1
1.6	1.0	1.7	1.5	1.2	1.7	2.4	1.6 + 0.5
3.1	2.7	3.3	4.0	2.9	8.4[c]	4.4	3.5 + 0.7
6.3	7.3	5.8	7.6	8.7	8.5	7.2	7.5 + 1.0
12.5	14.0	13.3	14.0	13.3	14.0	14.5	13.8 + 0.5

[a] Detection limit of HPLC
[b] Not analyzed
[c] Not included in average

TABLE V

SUMMARY OF 21-DAY MEAN SURVIVAL AND GROWTH DATA
FOR DAPHNIA MAGNA EXPOSED TO METHOMYL (H-13,905)[a]

Nominal Test Concentration µg/L (ppb)	Mean Measured Concentration µg/L (ppb)	Daphnid Survival (%)	Daphnid Length (mm)[b]
Control	<0.2[c]	100.0	3.7 (0.1)
0.4	0.7	100.0	3.8 (0.1)
0.8	1.0	93.3	3.8 (0.1)
1.6	1.6	93.3	3.8 (0.1)
3.1	3.5	93.3	3.8 (0.1)
6.3	7.5	93.3	3.8 (0.1)
12.5	13.8	93.3	3.8 (0.1)

[a] N = 15 (5 daphnids/beaker; 3 beakers/concentration)
[b] Mean ($\pm$ standard deviation)
[c] Detection limit of HPLC

TABLE VI

SUMMARY OF 21-DAY MEAN REPRODUCTION DATA FOR DAPHNIA MAGNA EXPOSED TO METHOMYL (H-13,905)[a]

Nominal Test Concentration µg/L (ppb)	Mean Measured Concentration µg/L (ppb)	Number of Young[b]	Number of Young/Adult Reproductive Day[b] *	First Day of Reproduction[b]
Control	<0.2[c]	149(22)	10.3 (1.7)	7.4 (0.8)
0.4	0.7	159(30)	10.4 (2.1)	7.6 (0.5)
0.8	1.0	143(39)	10.6 (3.0)	8.5 (0.5)[d]
1.6	1.6	162(18)	12.0 (1.0)	8.5 (0.8)[d]
3.1	3.5	105(24)[e]	8.2 (1.8)	8.4 (0.8)[d]
6.3	7.5	95(38)[e]	7.8 (2.2)[d]	9.6 (0.8)[e]
12.5	13.8	114(22)[d]	8.6 (0.6)	8.7 (0.8)[e]

[a] One daphnid per beaker
[b] Mean (+ standard deviation)
[c] Detection limit
[d] Significantly different (p<0.05) from control group by LSD.
[e] Significantly different (p<0.05) from control group by Dunnett Test and LSD.

* = No. young / Adult / Day / Days of Reproduction