

DATA EVALUATION RECORD

1. CHEMICAL: Guthion
2. TEST MATERIAL: 87.3% (technical a.i.), a brown waxy solid
3. STUDY TYPE: Early Life-cycle

Species Tested: Rainbow Trout

4. STUDY ID: Lamb, D.W. (1984) Toxicity of Azinphos-methyl
(Guthion Technical) to Rainbow Trout Early Life
Stage; Study #84-666-02; Prepared and submitted by
Mobay Chemical Corp., 17745 Metcalf, Stilwell,
Kansas 66085. *Carlisle, J.*
Acc No. 073605

5. REVIEWED BY:

Curtis E. Laird
Fishery Biologist
EEB/HED

Signature: Curtis E. Laird
Date: 10-16-85

6. APPROVED BY:

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Supervisory Biologist
EEB/HED

Signature: Norman Cook
Date: 10-24-85

7. CONCLUSIONS:

This study indicated the NOEL for mortality was 0.47 ug/l for the rainbow trout. The EC₁₀ or MATC is 0.29 ug/l. This study does not fulfill the requirement in support of registration for freshwater fish early life stage study. The mean values were submitted instead of the raw data.

8. RECOMMENDATIONS:

NOEC < 0.25
LOEC ~~0.25~~

This study can be upgraded, providing the raw data are submitted and found acceptable to support registration.

9. BACKGROUND:

EEB requested additional data to support the new uses on corn and sorghum.

10. DISCUSSION OF INDIVIDUAL TEST: N/A

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11. MATEREIAL AND METHODS:

- A. Test Animals: Rainbow trout (*Salmo gairdneri*) were purchased from commercial hatchery, Mt. Lassen Trout Farm, Red Bluff, CA. Each of the 12 test vessels (two per test concentration) consisted of a 20-liter stainless steel tank with a perforated stainless steel tray divided into 12 chambers. A cooled circulating water bath kept the temperature in each chamber within the range of 9.4 to 14.2°C. All materials in contact with test or stock solutions were stainless steel, glass, or fluorocarbon plastic. Dechlorinated tap water was used at a flow rate of 80 liters per test vessel. A flow-through exposure to water, at 9.4 to 14.2°C. Test duration was 47 days.
- B. Dose: Flow-through bioassay using nominal concentrations; no solvent used. 5 dose levels plus control (0, 0.25, 0.50, 1.0, 2.0, and 4.0 ug/l).
- C. Design: Fifty eggs per level; twelve test vessels (two per concentration consisted of a 20 liter stainless steel tank with a perforated stainless tray divided into 12 chambers.
- D. Statistical Analysis:
- The percent hatch, survival to the swimup stage, survival to term final mean weight and biomass in each concentration were compared with that in the control group using analysis of variance. Means were compared using the Waller-Duncan K-ratio Test. For dose-response analysis, Cumulative Mortality and biomass were analyzed as a function of log concentration by the probit method.

12. REPORTED RESULTS:

Chemical Analysis

Results of chemical analysis on the test solutions are given in Table 1. The mean concentrations ranged from 94-154% of the nominal concentrations. Reported exposure levels are mean measured concentrations, and toxicity endpoints are based thereon.

TABLE 1. Azinphos-methyl Analytical Results

(Concentrations in ug/l)

Nom. Conc.	WEEK								Mean	% Nominal
	1	2	3	4	5	6	7	8		
0.25	0.07	0.20	0.28	0.67	0.15	0.29	0.41	0.29	0.29	116
0.50	0.32	0.40	0.47	1.00	0.23	0.41	0.52	0.41	0.47	94
1.00	0.62	0.98	0.74	2.61	0.84	0.95	1.25	1.14	1.14	114
2.00	2.07	1.42	1.09	1.83	4.79	3.67	6.68	---	3.08	154
4.00	1.65	3.29	2.18	8.87	6.02	4.00	7.25	---	4.75	119

* Not analyzed; no animals remaining

Hatching, Survival, and Growth

There was no concentration-related effects of hatching success or survival to swimup (TABLE 2). Final survival was significantly less than control survival in the 1.14 to 4.75 ug/l exposure groups. Therefore, the highest no-effect concentration (NOEL) for survival was 0.47 ug/l. Median lethal concentration was 0.91 (0.48-2.48) ug/l. The slope of the mortality versus log concentration curve was 5.11. The LC₁₀ predicted by the probit equation, was 0.33 ug/l.

Final mean fish weight and biomass (the product of survival and mean weight) were reduced in the 0.29-4.75 ug/l exposure groups (TABLE 2). Only one replicate of the 0.29 ug/l exposure group was statistically separable from the controls, and the 13% difference in that group is considered a marginal or threshold effect. The EC₅₀ for biomass reduction was 0.67 (0.57-0.79) ug/l, and the slope of the curve was 3.52. The predicted EC₁₀ for biomass was 0.29 ug/l.

TABLE 2. Hatching and Mortality Summary

Nom. Conc. (ug/l)	Mean Mesured Conc. (ug/l)	Mean Percent Hatch	Mean Percent Swimups	Mean Percent Survivors	Mean Biomass (gm)	Mean Weight (mg)
0	----	98	98	88	1.70	388
0.25	0.29	100	97	89	1.48 ^{1,2}	336 ^{1,2}
0.5	0.47	98	96	78	1.11 ¹	287 ¹
1.0	1.14	98	94	54 ¹	0.42 ¹	157 ¹
2.0	3.08	98	94	0 ¹	0.0 ¹	---
4.0	4.75	99	94	0 ¹	0.0 ¹	---

¹ Statistically different from control

² Only one replicate differed significantly from the controls. The values for the individual replicates were: biomass, 1.57 and 1.40 gm; mean weight, 335 and 317 mg.

Clinical Signs

Clinical signs included spinal deformities, general weakness, pallor, tremors, anal prolapse, loss of equilibrium, edema, hemorrhage, two heads, erratic swimming, swollen yolk sac, and hyperventilation. These signs were generally pre-lethal, so that while they may have been earlier indicators of impending death, they were not more sensitive indicators. One fish in the 1.14 ug/l group was showing clinical signs when the study was terminated.

Endpoints and Significance

Since there was decreased growth in one replicate of the 0.29 ug/l level, it is considered a threshold effect concentration, and is a reasonable estimate of the maximum acceptable toxicant concentration (MATC). Another approach to the MATC determination is the EC₁₀ for the most sensitive endpoint. In this case biomass was the most sensitive endpoint, and its EC₁₀ of 0.29 ug/l agreed with the MATC as determined by hypothesis testing.

13. STUDY AUTHOR'S CONCLUSION/QA MEASURES

This study was conducted in accordance with the Good Laboratory Practice Standards (40 CFR Part 160) and the final report was reviewed by Mobay Chemical Corporation Quality Assurance Unit. Raw data, a frozen sample of the test material and the final report will be filed at Mobay Chemical Corporation in Stilwell, KA 66085.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF THE STUDY

A. Test Procedures:

The test procedures followed the recommended EPA protocol of July 1978, except the mean values were reported instead of the raw data.

B. Statistical Analysis:

No statistics were performed by this branch because EEB needs the raw data. The statistics look to be sound and easy to read, but EEB needs the raw data in order to make this determination.

C. Discussion/Results:

The mean concentration ranged from 94-154% of the Nominal Concentrations. There were no concentration-related effects on hatching success or survival to swimup. Final survival was significantly less than control survival in the 1.14 to 4.75 ug/l exposure groups. Final mean fish weight was reduced in the 0.29 to 4.75 ug/l dosage levels. The MATC was 0.29 ug/l after seven weeks of exposure.

D. Adequacy of Study:

1. Category: Supplemental

2. Rationale: Although there was no mention of test chamber cleaning procedures or how often the test chambers were cleaned per week, the study is not acceptable and does not fulfill the requirements for a fish early life stage study, using a freshwater species. *The no-effect level was ^{NOT} established.*

3. Repairability: *This study is not* Repairable to Core, ~~if the registrant submits the raw data and the data is found to be acceptable to support registration~~ *because the no-effect level was ^{NOT} determined and the mean values were submitted instead of the raw data.*

C.F.L. 4-7-86