A N

DATA EVALUATION RECORD PAGE 1 OF

CASE: GS0333 FENAMIPHOS

CONT-CAT: 01 GUIDELINES: 72-1

MRID: 114012

Lamb, D.; Roney, D. (1972) Acute Toxicity of Nemacur Technical and Nemacur 15% Granular to Fish: Report No. 34014. (Unpublished study received May 1, 1973 under unknown admin. no.; submitted by Mobay Chemical Corp., Kansas City, MO; CDL:120301-W).

REVIEW RESULTS:

VALID X INVALID _____ INCOMPLETE _____

GUIDELINE: SATISFIED X PARTIALLY SATISFIED ___ NOT SATISFIED ___

DIRECT RVW TIME = START DATE: END DATE:

REVIEWED BY: Richard W. Felthousen

TITLE: Wildlife Biologist

ORG: EEB/HED

LOC/TEL: 557-1392

SIGNATURE: R. W. Felthousen DATE: 12/04/86

APPROVED BY: O. Gutenson

TITLE: Acting Registration Standard Coordinator

ORG: EEB/HED

LOC/TEL:

SIGNATURE: Otto Gutenson DATE: 12/21/87

The deficiencies noted with the studies are not considered significant enough to drastically have altered the toxicity of fenamiphos to fish. As such the four tests reported are considered scientifically sound and acceptable for use in a hazard assessment. The Guideline requirement for the technical material and 15% formulated product has been satisfied.

10 pages

DATA EVALUATION RECORD

1. Chemical: Nemacur

2. Test Material: Technical (81% ai)
15% Granular

3. Study Type: 96-hour Acute Study on a Warmwater and Coldwater Fish Species.

Species Tested: Bluegill Sunfish
Rainbow Trout

4. Study ID: Lamb, D.W. and D.J. Roney. June 1, 1972. Acute Toxicity of Nemacur Technical and Nemacur 15% Granular to Fish. Prepared by Chemagro Division of Baychem Corp. Submitted to Mobay Chemical Corp. Stilwell, Kansas. EPA Accession No. 256004.

5. Reviewed By: Elizabeth E. Zucker
Wildlife Biologist
Ecological Effects Branch/
HED
Signature:
Date:

6. Approved By: David Coppage
Supervisory Biologist
Ecological Effects Branch/
HED
Signature:
Date:

7. Conclusions:

These studies relating the acute toxicity of technical and 15G Nemacur to freshwater fish are scientifically sound and acceptable for use in a hazard assessment.

8. Recommendations:

Reviewers should consider further freshwater fish acute testing for registration actions where a significant aquatic exposure is anticipated. The chemical/physical characteristics of the diluent were not described during the study period. D.O., pH, and hardness can significantly alter the toxicological properties of a compound. Nemacur is very highly toxic to fish and acute information must be reliable.

9. Background

These studies were reviewed in EEB, Review Out: November 25, 1977, by T. O'Brian. The 1977 DER's are brief, therefore studies were reevaluated under current standards.

10. Discussion of Individual Test - N/A

11. Materials and Methods

A. Test Procedures (from Test Report)

Preliminary range findings tests were conducted. For the definitive test a minimum of five concentrations of each formulation were prepared. To reach the desired concentration, aliquots of a stock solution were added to bioassay water. Water was used as a solvent for the formulation while acetone was used as a solvent for the technical material. A reference chemical, p, p'DDT, was tested concurrently.

Fish were obtained from commerical hatcheries. Fish were 35 to 75 mm in length and weighed 0.5 to 2.0 gm upon arrival. The fish were acclimated to reconstituted deionized water used for the bioassay. Each liter of deionized water was reconstituted with 30 mg of calcium sulfate, 30 mg of magnesium sulfate, 48 mg of sodium biocarbonate and 2 mg of potassium chloride to yield a pH of 7.0 to 7.4. Vessels consisted of 5 gallon wide-mouth glass jars which contained 15 liters of water. Ten fish were placed in each vessel and each vessel represented one concentration. The loading factor was approximately 1 gm of fish per liter of water. By means of a water bath, temperatures were maintained at 13°C for the rainbow trout and 22°C for the bluegill. During the 96-hour experiment, the fish were not fed, the water was not aerated, and mortality data was recorded at 24-hour intervals.

B. Statistical Analysis

Approximate LC_{50} values and 95% confidence limits were calculated according to the method of Weil [Carrol S. Weil: Biometrics, 8, 249-263, 1952].

12. Reported Results

Technical

Species	Dose Level (ppb)	Cumulative Mortality 24 Hour	48 Hour	72 Hour	96 Hour
Bluegill	Control	0	0	0	0
	6.1	0	0	0	1
	10.4	0	0	0	0
	17.5	1	3	5	6
	29.8	6	9	9	9
	50.6	10	10	10	10
Rainbow Trout	Control	0	0	0	0
	17.5	0	0	0	0
	29.8	0	0	0	1
	50.6	0	0	0	0
	86.2	6	7	8	8
	146.4	10	10	10	10

15% Granular Formulation

Species	Dose Level (ppb)	Cumulative Mortality 24 Hour	48 Hour	72 Hour	96 Hour
Bluegill	Control	0	0	0	0
	49	0	0	0	0
	84	0	0	1	1
	142	1	4	5	6
	241	7	7	7	7
	410	10	10	10	10
Rainbow Trout	Control	0	0	0	0
	142	0	0	0	0
	241	0	0	0	0
	410	1	2	2	2
	698	4	7	7	7
	1186	10	10	10	10

13. Study Author's Conclusions

The 96-hour LC_{50} values and 95% confidence limits with Nemacur Technical are 17.7 (14.4 to 21.6) ppb for bluegill and 72.1 (61.2 to 84.7) ppb for rainbow trout. Nemacur 15% Granular formulation had 96-hour LC_{50} values and 95% confidence limits of 151 (114 to 201) ppb for bluegill and 563 (454 to 698) ppb for rainbow trout. Based on active ingredients, the formulation was less toxic than the technical material to both species.

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

A. Test Procedures

These studies were performed under conditions that generally comply with current testing standards with the following notable exceptions:

1. D.O., pH, and continuous temperature measurements were not reported for the testing period.
2. Hardness, alkalinity, conductivity of diluent were not recorded.
3. Trout were tested in water 1°C higher than recommended.
4. It is not specifically stated in the report whether concentrations of the 15 G material are based on active ingredient or total formulation.
5. The scientific names of test organisms were not reported.
6. Acclimation procedures were not described.

B. Statistical Analysis

The author's 96-hour calculations were through the use of the computer program developed by Stephans. Results are appended. The 96-hour LC_{50}'s determined by the author varied only slightly from the LC_{50}'s calculated by Stephans program.

C. Discussion/Results

Nemacur is very highly toxic to fish, therefore it is important to have complete information from acute testing. The chemical/physical characteristics of the diluent used in these studies were not described. D.O., pH, and hardness can significantly alter the toxicological properties of a chemical. Reviewers should consider requiring additional acute testing to support future registrations where a significant aquatic exposure is anticipated.

The bird studies were performed with a 90% technical, thus the technical product can have a purity higher than 81%. Extrapolation of the LC_{50} from the 81% active technical product to an LC_{50} expected with 100% active would provide the following values:

Rainbow Trout - 59.04 ppb (based on 100% ai)
Bluegill - 13.27 ppb (based on 100% ai)

The author does not specifically state that nominally designated concentrations for the 15 G test material were based on total formulation. However, it is implied by the concluding test report statement that concentrations are total formulation. Based on the above extrapolations for 100%, the following values would be expected for 15% active.

Rainbow Trout = 393.6 ppb
Bluegill = 88.5 ppb

The granular material is less toxic than would be expected based on direct active ingredient extrapolation.

The LC_{50} values determined for bluegills exposed to the DDT control were slightly lower than the LC_{50} of 8.6 (6.2 - 12.0) ppb found by Johnson and Findley (1980). The LC_{50} determined for trout exposed to DDT were similar to values determined by Johnson and Finley 8.7 (6.8 - 11.4) ppb.

C. Adequacy of Study

1. Classification: Supplemental for all four studies

2. Rationale: The physical/chemical characteristics of diluent were not described. D.O., pH, and hardness can significantly alter the toxicological properties of a compound. Because of Nemacur's very highly toxic effects, it is imperative that acute testing be thoroughly evaluated. The granular testing cannot be used to support registration of the technical product.

3. Repairability: None

ZUCKER NEEMACUR RAINBOW TROUT 96 HR LC50 15% GRANULAR (ppb)

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1186	10	10	100	.0976563
698	10	7	70	17.1875
410	10	2	20	5.46875
241	10	0	0	.0976563
142	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 241 AND 1186 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 566.681

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.114286	558.566	453.478	695.718

NO CONVERGENCE IN 25 ITERATIONS. THE PROBIT METHOD
PROBABLY CANNOT BE USED WITH THIS SET OF DATA.

****

ZUCKER NEEMACUR BLUEGILL 96 HR LC50 15% GRANULAR (ppb)

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
410	10	10	100	.0976563
241	10	7	70	17.1875
142	10	6	60	37.6953
84	10	1	10	1.07422
49	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 84 AND 410 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 129.044

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.114994	150.256	117.456	195.091

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.203835	1	.501188

SLOPE = 4.58022
95 PERCENT CONFIDENCE LIMITS = 2.51234 AND 6.64809

LC50 = 151.016
95 PERCENT CONFIDENCE LIMITS = 115.653 AND 197.732

LC10 = 79.7521
95 PERCENT CONFIDENCE LIMITS = 43.3254 AND 106.158

****

81%

ZUCKER NEEMACUR BLUEGILL 96 HOUR LC50 TECHNICAL (ppb)

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
50.6	10	10	100	.0976563
29.8	10	9	90	1.07422
17.5	10	6	60	37.6953
10.4	10	0	0	.0976563
6.1	10	1	10	1.07422

THE BINOMIAL TEST SHOWS THAT 10.4 AND 29.8 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 16.3825

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.166084	17.7482	13.0105	24.3401

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.205999	1	.152003

SLOPE = 4.72155
95 PERCENT CONFIDENCE LIMITS = 2.57858 AND 6.86453

LC50 = 16.3839
95 PERCENT CONFIDENCE LIMITS = 12.5706 AND 21.3046

LC10 = 8.81939
95 PERCENT CONFIDENCE LIMITS = 4.81418 AND 11.689

ZUCKER NEEMACUR RAINBOW TROUT TECHNICAL 96 HR LC50 (ppb)

****

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
146.4	10	10	100	.0976563
86.2	10	8	80	5.46875
50.6	10	0	0	.0976563
29.8	10	1	10	1.07422
17.5	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 50.6 AND 146.4 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 72.8934

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.166896	74.2546	57.928	99.7584

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	1.78817	2.69792	.0441133

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 6.0592
95 PERCENT CONFIDENCE LIMITS =-2.04332 AND 14.1617

LC50 = 67.9008
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 41.906
95 PERCENT CONFIDENCE LIMITS = 0 AND 73.8386

****