8-17-83

~~250628~~
MRID
00128791

DATA EVALUATION REPORT

1. CHEMICAL: Penncap M

2. FORMULATION: 21.2% Methyl Parathion and technical
ACUTE and Chronic data contained in this study

Shaughnessy Number: 053501

3. CITATION: Bailey, Howard C. 1983. Chronic Toxicity of Penncap M to Rainbow Trout (Salmo gairdneri). An unpublished report prepared by SRI International for Pennwalt Corp. Data Acc#: 250628.

4. REVIEWER: Daniel Rieder
Wildlife Biologist
EEB/HED

5. REVIEW DATE: 8/17/83

6. TEST TYPE: Chronic Fish Study

A. Species: Rainbow Trout

B. Material: Penncap M (21.2% pure methyl parathion)
Methyl parathion technical (75.1% pure)

7. RESULTS: The 96-hour LC50 values were 6.44 and 7.51 ppm methyl parathion (measured), for Penncap M and technical methyl parathion respectively. The MATC for methyl parathion and rainbow trout is less than 0.1 ppm as Penncap M and less than 0.08 ppm as technical methyl parathion. The results do not show that Penncap M is not substantially more toxic than methyl parathion.

8. REVIEWERS CONCLUSION:

This study does not fulfill guideline requirements for a fish chronic study with Penncap M, a formulated product, because a no effect level was not determined. Neither does it fulfill guideline requirements for a chronic fish study with a technical product (methyl-parathion). Again, because a no-effect level was not determined. It does however, fulfill guideline requirements for a 96-hour acute study with both a formulated product and a technical grade product. The study shows methyl parathion to be moderately toxic to fish.

Supplemental

METHODS

Two test materials were used: Penncap-M which is a microencapsulated formulation with 21.2% methyl parathion; and technical methyl parathion which is 75.1% pure.

96-Hour Acute Study

Newly hatched rainbow trout fry were tested, 10 each, in 5-liter test jars containing 4 liters of test solution. There were 6 test concentrations, 0.56, 1.0, 1.8, 3.2, 5.6, and 10 ppm plus a control for both test materials. One test jar was used per concentration level. Nominal temperature was 12°C and the photoperiod was 16-hour light and 8-hour dark. Temperature, pH and DO were monitored.

64-Day Early-Life-Stage Study

Based on the results of the acute static studies, the following concentrations of Penncap-M were selected for testing: control; 0.2, 0.4, 0.8, 1.6, and 3.2 ppm. The positive control, technical methylparathion, was tested at 0.0, 0.2, and 3.2 ppm.

The flow-through test was performed with replicate 19 liter aquaria at each test level. Fifty eyed embryos, five to ten at a time, were distributed to each aquaria. Embryos were kept in the dark until they hatched.

After hatching, the light schedule became 16 hours light per day. Aquaria were inspected daily for dead fry which were removed as detected. Temperature, pH, DO and other water quality parameters were measured.

The test continued 64 days post hatch. At that time all surviving fry were weighed and measured.

RESULTS

Note that all reported concentrations are measured methyl parathion.

Acute Study

The results of the 96-hour study are presented in Tables 1 and 2. The 96-hour LC50's were 6.44 and 7.51 ppm measured methyl parathion for Penncap M and technical methyl parathion respectively.

Chronic Study

The results of the 64-day early-life-stage study are presented in tables 3,4, and 5. Based on the mortality data, the no effect level was between 0.2 and 0.4 ppm for Penncap M. The LC50 at 6 days post hatch was estimated at 0.6 ppm. Growth data, length and weight were significantly less than control at all test levels for both Penncap M and technical methyl parathion. So the no effect level was less than 0.1 ppm and 0.08 ppm measured methyl parathion for Menncap M and techinical methyl parathion.

DISCUSSION

Even though the chronic studies are not "core," they provide useful supplemental information. But they only partially fulfill the purpose they were intended, i.e., to determine if a microencapsulated product containing methyl parathion is substantially more toxic than technical methyl parathion. They show that both test materials are similar in their acute toxicity to rainbow trout. But these studies do not show that microencapsulated, methyl parathion (Penncap M) is not more chronically toxic than technical methyl parathion in the 64-day embryolarvae study.

CONCLUSION

Category:

96-hour toxicity test:	Core, for formulated Penncap M Core, for technical methyl parathion
64-day chronic study:	Supplemental, for formulated Penncap M
	Supplemental, for technical methyl parathion

Rationale: The 64-day chronic study is supplemental because the lowest test concentrations were not low enough to find a no effect level for growth of fry. Also, only 2 concentrations were used with the technical product.

Repairability: Not repairable.

TABLE 1

CHEMICAL ANALYSIS AND MORTALITY DATA FROM 96-HOUR STATIC TESTS ON PENNCAP M AND METHYL PARATHION WITH RAINBOW TROUT

Test Chemical	Measured Exposure Concentration (mg/L) Unfiltered T_0	Unfiltered T_{96}	Filtered T_0	Filtered T_{96}	Cumulative Deaths (n=10) 24 Hr	48 Hr	72 Hr	96 Hr
Penncap M	0.00	0.00	0.00	0.00	0	0	0	0
	0.58	0.70	0.69	0.57	0	0	0	0
	1.51	--	1.26	--	0	0	0	0
	2.82	--	2.44	--	0	0	0	0
	4.62	--	3.90	--	1	2	2	3
	7.95	--	6.32	--	0	3	3	6
	14.73	14.94	9.76	11.90	10	10	10	10
LC50					10.71	8.57	8.57	6.44
95% Confidence Interval					(8.74-13.38)	(6.96-10.79)	(6.96-10.79)	(5.16-8.19)
Methyl parathion	0.00	0.00	--		0	0	0	0
	0.56	0.51	--		0	0	0	0
	1.09	--	--		0	0	0	0
	1.91	--	--		0	0	0	0
	3.50	--	--		0	0	0	0
	6.77	--	--		0	1	2	4
	11.60	10.70	--		10	10	10	10
LC50					8.86	8.61	8.22	7.51
95% Confidence Interval					(7.62-10.31)	(7.19-10.31)	(6.83-9.93)	(6.18-9.15)

TABLE 2

WATER-QUALITY DATA ASSOCIATED WITH 96-HOUR BIOASSAYS ON PENNCAP M AND METHYL PARATHION WITH RAINBOW TROUT

Test Chemical	Parameter	x	SD	Range	n
Penncap M	Dissolved oxygen (mg/L)	9.3	0.53	7.4-9.9	32
	pH	7.4	0.11	7.2-7.5	14
	Temperature (°C)	12.0	0.00	--	35
	Hardness (mg/L)	60	--	--	1
	Alkalinity (mg/L)	53	--	--	1
	Acidity (mg/L)	5	--	--	1
	Conductivity (umhos)	130	--	--	1
Methyl parathion	Dissolved oxygen (mg/L)	9.2	0.91	5.8-9.8	32
	pH	7.4	0.15	7.1-7.7	14
	Temperature (°C)	12.0	0.00	--	35
	Hardness (mg/L)	60	--	--	1
	Alkalinity (mg/L)	53	--	--	1
	Acidity (mg/L)	5	--	--	1
	Conductivity (μohms)	130	--	--	1

TABLE 3

MEASURED CONCENTRATIONS OF PENNCAP M AND METHYL PARATHION ASSOCIATED WITH EARLY-LIFE-STAGE TESTS ON RAINBOW TROUT

ominal Concentration (mg/L)	Measured Concentration (mg/L)							
	Unfiltered				Filtered			
	X	SD	Range	n	X	SD	Range	n
enncap M								
Control	0	--	--	13	--	--	--	--
0.2	0.10	0.023	0.05-0.14	13	0.01	0.004	0.00-0.01	11
0.4	0.20	0.040	0.11-0.25	13	0.02	0.010	0.01-0.04	11
0.8	0.40	0.086	0.30-0.56	13	0.02	0.029	0.00-0.10	11
1.6	0.93	0.132	0.72-1.16	13	0.07	0.092	0.00-0.34	11
3.2	1.67	0.240	1.35-2.06	13	0.18	0.163	0.00-0.53	11
Methyl Parathion								
Control	0	--	--	14			--	
0.2	0.08	0.020	0.05-0.13	14			--	
3.2	1.91	0.336	1.47-2.38	14			--	

TABLE 4

MORTALITY OF RAINBOW TROUT AT 30 AND 60 DAYS POSTHATCH DURING EMBRYOLARVAL TESTS ON PENNCAP M AND METHYL PARATHION

Average Measured Concentration (mg/L)	30 Days No. Dead	30 Days Total† Fry	60 Days No. Dead	60 Days Total Fry
0.00	17	190	24	188
Pencap M				
0.10	7	93	10	93
0.20	13	92	18	92
0.40	13	94	31*	94
0.93	9	98	66*	87
1.67	3	39	39*	39
Methyl parathion				
0.08	3	93	9	92
1.91	5	31	30*	31
Series 2 (Started in Week 3)				
Control	2	94	3	94
Penncap M 1.67	10*	35	30*	35
Methyl parathion 1.91	6*	34	33*	34

* Significantly different from controls, $p < 0.05$.

† Total fry are fry that can be accounted for during each time period by comparing mortality and survival data.

TABLE 5

LENGTH AND WEIGHT OF TROUT FRY EXPOSED TO PENNCAP M AND METHYL PARATHION IN EARLY-LIFE-STAGE TESTS

(64 Days Post Hatch)

Average Measured Concentration (mg/L)		Length (cm) X	Length (cm) SD	Length (cm) n	Weight (g) X	Weight (g) SD	Weight (g) n
Penncap M							
0.00	A	4.2	0.5	37	0.74	0.27	37
	B	4.6	0.3	44	0.96	0.22	44
0.10	A	4.0*	0.4	37	0.66*	0.22	37
	B	4.2*	0.4	44	0.73*	0.23	44
0.20	A	3.7*	0.4	38	0.45*	0.15	38
	B	3.2*	0.4	34	0.31*	0.12	34
0.40	A	3.3*	0.3	22	0.35*	0.12	22
	B	3.1*	0.4	35	0.31*	0.12	35
0.93	A	2.5*	0.2	4	0.11*	0.05	4
	B	2.6*	0.2	9	0.15*	0.06	9
Methyl Parathion							
0.00	A	4.3	0.6	36	0.81	0.41	36
	B	4.4	0.4	46	0.83	0.27	46
0.08	A	4.1*	0.4	39	0.69*	0.24	39
	B	4.2*	0.5	43	0.73*	0.26	43

* Significantly different from controls, $p < 0.05$.