

US EPA ARCHIVE DOCUMENT

3/1/85

(TDRO3R)

DATA EVALUATION RECORD

PAGE 1 OF

CASE GS0187

PENDAMETHALIN

RM 801 02/15/85

CHEM 108501

Pendimethalin (N-(1-ethylpropyl)-5,4-d

BRANCH EEB DISC 40 TOPIC 05151543

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00058831

CONTENT CAT 02

Sleight, B.H., III (1976) Letter sent to John Wyckoff dated Apr 20, 1976 @Progress report on chronic exposure of fathead minnows to CL-92,5531. (Unpublished study received Jun 1, 1976 under 241-243; prepared by EG&G, Bionomics, submitted by American Cyanamid Co., Princeton, N.J.; CDL:224592-A)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS

SEC: TOX -40-10050043

DIRECT RVW TIME = 1

(MH)

START-DATE

7/10/84

END DATE

7/10/84

REVIEWED BY: Wayne C. Faatz, Ph. D.

TITLE: Wildlife Biologist

ORG: CM #2 Rm 801

LOC/TEL:

SIGNATURE:

DATE:

APPROVED BY:

TITLE:

ORG:

LOC/TEL:

SIGNATURE:

DATE:

This study is not pertinent to registration standards. It is a progress report letter and does not contain all the necessary data for a review.

CASE GS0187                      PENDAMETHALIN                      PM PHE 02/15/83

CHEM 108501                      Pendimethalin ( N-(1-ethylpropyl)-3,4-d

BRANCH EEB                      DISC 40 TOPIC 05151543

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00058833                      CONTENT CAT 02

Sleight, B.H., III (1976) Letter sent to John Wyckoff dated May 21, 1976. Raw data for water samples from fathead minnow chronic exposure study with Prowl. (Unpublished study received Jun 1, 1976 under 241-243; prepared by EG&G, Bionomics, submitted by American Cyanamid Co., Princeton, N.J.; CDL:224592-C)

SUBST. CLASS = S.

DIRECT RVW TIME = 1 (MH) START-DATE 7/10/84 END DATE 7/10/84

REVIEWED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:

DATE:

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:

DATE:

This study is not pertinent to registration standards. It is a progress report and does not contain sufficient information for a review.

CASE GS0187                      PENDAMETHALIN                      PM PM# 02/15/83

CHEM 108501                      Pendimethalin ( N-(1-ethylpropyl)-3,4-d

BRANCH EEB                      DISC 40 TOPIC 05151547

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00100504                      CONTENT CAT 01

Graney, R.L. (1981) The Chronic (21 Day) Toxicity of AC 92,553 to  
†"Daphnia magna" Straus; Project No. 5179. (Unpublished study  
received Apr 20, 1982 under 241-243; prepared by Biospherics,  
Inc., submitted by American Cyanamid Co., Princeton, N.J.; CDL:  
247299-A)

SUBST. CLASS = S.

DIRECT RVW TIME = 1 (MH) START-DATE 7/10/84                      END DATE 7/10/84

REVIEWED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:

DATE:

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:

DATE:

This test is scientifically sound and satisfies the requirement for an aquatic invertebrate reproduction study. The test showed the no effect concentration at 14 ppb. Reproductive impairment was found after 15 days at 22.1 ppb and at 17.2 ppb after 21 days.

CASE GS0187                      PENDAMETHALIN                      PM PM# 02/15/83

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CHEM 108501                      Pendimethalin ( N-(1-ethylpropyl)-3,4-d

BRANCH EEB                      DISC 40 TOPIC 05054543

FORMULATION 01 - TECHNICAL CHEMICAL

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FICHE/MASTER ID 00106764                      CONTENT CAT 01

Sleight, B. (1973) Acute Toxicity of AC-92553 to Bluegill (*Lepomis macrochirus*), Rainbow Trout (*Salmo gairdneri*) and Channel Catfish (*Ictalurus punctatus*). (Unpublished study received on unknown date under 5G1567; prepared by Bionomics, Inc., submitted by American Cyanamid Co., Princeton, NJ; CDL:094287-E)

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SUBST. CLASS = S.

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DIRECT RVW TIME = 1 (MH)                      START-DATE 6/26/84                      END DATE 6/26/84

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REVIEWED BY: Wayne C. Faatz, Ph.D.  
                    TITLE: Wildlife Biologist  
                    ORG: CM #2 Rm 801  
                    LOC/TEL:

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

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APPROVED BY:  
                    TITLE:  
                    ORG:  
                    LOC/TEL:

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

The tests are scientifically sound and fulfill the guideline requirements for a warm - and coldwater fish LC50. With LC50s from 0.138 to 0.418 ppm, Pendimethalin technical is considered highly toxic to fish.

DATA EVALUATION RECORD

1

1. CHEMICAL: Pendimethalin Technical

2. FORMULATION: Technical 93.2%

3. CITATION:

Sleight B. (1973) Acute Toxicity of AC-92553 to Bluegill (Lepomis macrochirus), Rainbow Trout (Salmo gairdneri) and Channel catfish (Ictalurus punctatus) unpublshed study, Bonomics, Inc. CDL: 094287-E)

4. REVIEWED BY: Wayne C. Faatz, Ph.D  
Wildlife Biologist

5. DATE REVIEWED: 6/26/84

6. TEST TYPE: Acute LC50

A. TEST SPECIES: Bluegill, Rainbow Trout, and Channel Catfish.

7. REPORTED RESULTS:

Bluegill	.199 (0.162 - 0.244) ppm	NEL 0.1
Rainbow	.138 (0.113-0.169)	NEL 0.075
Catfish	.418 (0.310-0.564)	NEL 0.32

8. REVIEWERS CONCLUSIONS:

The tests are scientifically sound and fulfill the guideline requirements for a warm-and coldwater fish LC50. With LC50s from .138 to .418, Pendimethalin technical is considered highly toxic to fish.

5

Material/Methods  
Test Procedure

The test methods are generally consistent with current EPA guidelines concerning acute LC<sub>50</sub> test on fish. The parameters are: Size; bluegill, mean 43 mm; trout, 59 mm, and catfish, 46 mm. Weight; bluegill, 1.2 gm; trout, 1.5 gm, and catfish, 1.5 gm. Test vessels, 5 gallon glass vessels at 18°C + 0.5 for bluegill, and 13°C + .05 for trout and catfish. Test levels; bluegill, 0.075, .10, .14, .18, .24, .32, .42, .56, .75, 1.0, 2.4; trout, .056, .075, .12, .14, .18, .24, .32, and catfish, .18, .24, .42, .56, .75, 1.0, 2.4 ppm. Ten fish per test level. Dissolved oxygen ranged from 9.6 mg/l initially to 4.9 mg/l at the end of the test. Positive and negative controls were used.

Statistical Analysis

The probit analysis was used.

Reviewer's Evaluation

A. Test Procedures

The procedures were adequate and followed established guidelines.

B. Statistical Analysis

Probit analyses is appropriate for this data.

C. Discussion/Results

The reported results are supported by the data base.

D. Conclusions

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A

6

WAYNE C. FAATZ PROWL RAINBOW TROUT ACUTE LC50 96 HR PPM

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
.32	10	10	100	.0976563
.24	10	10	100	.0976563
.18	10	6	60	37.6953
.14	10	4	40	37.6953
.12	10	4	40	37.6953
.075	10	0	0	.0976563
.056	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .075 AND .24 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 .158745

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
6	.120248	.14326	.120907	.172546

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.199822	1	.685713

SLOPE = 7.50573  
 95 PERCENT CONFIDENCE LIMITS = 4.15056 AND 10.8609

LC50 = .146231  
 95 PERCENT CONFIDENCE LIMITS = .125411 AND .168394

LC10 = .0990457  
 95 PERCENT CONFIDENCE LIMITS = .0678906 AND .117472

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WAYNE C. FAATZ PROWL CHANNEL CATFISH ACUTE LC50 96 HR. PPM

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2.4	10	10	100	.0976563
1	10	10	100	.0976563
.75	10	10	100	.0976563
.56	10	10	100	.0976563
.42	10	4	40	37.6953
.32	10	0	0	.0976563
.24	10	0	0	.0976563
.18	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .32 AND .56 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 .435604

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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WAYNE C. FAATZ PROWL BLUEGILL SUNFISH ACUTE LC50 PROWL PPM

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2.4	10	10	100	.0976563
1	10	10	100	.0976563
.75	10	10	100	.0976563
.56	10	10	100	.0976563
.42	10	10	100	.0976563
.32	10	9	90	1.07422
.24	10	7	70	17.1875
.18	10	5	50	62.3047
.14	10	1	10	1.07422
.1	10	0	0	.0976563
.075	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .14 AND .32 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 .18

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
7	.16293	.197927	.159425	.24025

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	.164448	1	.99862

SLOPE = 7.39314  
 95 PERCENT CONFIDENCE LIMITS = 4.39506 AND 10.3912

LC50 = .198524  
 95 PERCENT CONFIDENCE LIMITS = .170796 AND .23035

LC10 = .13367  
 95 PERCENT CONFIDENCE LIMITS = .0966977 AND .157859

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CASE GS0187      PENDAMETHALIN      PM 804 02/15/83

CHEM 108501      Pendimethalin (1-(1-ethylpropyl)-3,4-dihydro-2H-pyridin-2-one)

BRANCH EEB      DISC 40 TOPIC 05103043

FORMULATION 12 - EMULSIFIABLE CONCENTRATE (EC OR E)

FICHE/MASTER ID 00037927      CONTENT CAT 01

Bentley, R.E. (1974) Acute Toxicity of Prowl-(TM) 3E, Prowl-(TM) 4E, and Avenge 2A-S to Bluegill (*Lepomis macrochirus*) and Rainbow Trout (*Salmo gairdneri*). (Unpublished study received Nov 14, 1975 under 6F1703; prepared by Bionomics, EG&G, Inc., submitted by American Cyanamid Co., Princeton, N.J.; CDL: 094732-H)

SUBST. CLASS = S.

DIRECT RVW TIME = 3 (MH)      START-DATE 7/9/84      END DATE 7/9/84

REVIEWED BY: Wayne C. Faatz, Ph.D.  
TITLE: Wildlife Biologist  
ORG: CM#2 Rm 801  
LOC/TEL:

SIGNATURE:      DATE:

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:      DATE:

This study is scientifically sound but does not satisfy the guideline requirements for a fish acute LC50 test because the formulated product was used. The LC50 for the bluegill and rainbow trout for the formulated product range from 0.52 - 90.4 ppm. Formulated pendamethalin is considered slightly toxic to highly toxic to fish. If formulated product testing were required, this test would be acceptable.

DATA EVALUATION RECORD

1. CHEMICAL: Pendimethalin
2. FORMULATION: Formulation Prowl 3E, 4E, Avenge 2A-SI
3. CITATION:

Bentley, R.E. (1974) Acute Toxicity of Prowl 3E, Prowl 4E and Reveng 2A-S to Bluegill, Rainbow Trout. (Unpublished study received Nov 14, 1975 under 6F1703; prepared by Bionomics, EG&G, Inc., submitted by American Cyanamid Co., Princeton, N.J. CDL: 094732-H)

4. REVIEWED BY: Wayne C. Faatz, Ph.D.  
Wildlife Biologist  
7/10/84

5. DATE REVIEWED: 7/10/84

6. TEST TYPE: Fish acute, Formulated Product

A. TEST SPECIES: Bluegill Sunfish, Rainbow Trout

7. REPORTED RESULTS:

	Prowl 3E	Prowl 4E	Avenge-2S
Bluegill	1.04(0.69-1.57) ppm	0.92(0.71-1.2) ppm	90.4(68.7-119.0) ppm
NEL	.75		
Rainbow	1.0(0.78-1.29) ppm	0.52(0.39-0.69) ppm	86.6(75-100) ppm
NEL	.42	.21	75

8. REVIEWERS CONCLUSIONS:

This review is scientifically sound but does not satisfy the guideline requirements for a fish acute LC<sub>50</sub> test because the formulated product was used rather than technical grade. Tests were required for fish with the formulated product. These tests would be acceptable. Formulated products of pendimethalin are considered slightly toxic to highly toxic to fish.

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Material/Methods  
Test Procedure

The formulated products were used, percent active not given. Rainbow trout with a mean weight of 1.3g and length of 55 mm were tested in a static jar at 10°C + 1°C. Bluegill sunfish with a mean weight of 0.9 gm and a mean length of 33 mm were tested in a static jar at 20°C + 1°C. The test concentrations were:

3E	Bluegill (ppm)		trout (ppm)		
	4E	Avenge-23	3E	4E	Avenge-2S
2.8	2.4	180.	2.1	1.6	210
2.1	1.6	100	1.6	1.0	140
1.6	1.2	75	1.0	.75	100
1.0	.75	56	.75	.56	75
.75	.56	42	.56	.42	56
.56	.42		.42	.28	42
	.28		.28	.21	

Ten fish per concentration were used. Dissolved oxygen ranged from 8.9 initially to 4.3 mg/l. An acetone an dilution water control was used. Size of test vessels and volume were not given.

Statistical Procedure

Data were analyzed by the probit method.

Discussion/Results

The data supports the conclusions

## Reviewers Evaluation

- A. Test Procedure - The test generally follows the guidelines.
- B. Statistical Analysis - The probit analysis is appropriate for these data.
- C. Discussion/Results The data supports the conclusions
- D. Conclusions
  1. Category: Supplemental
  2. Rationale: The formulated rather than technical product was used.
  3. Repairability: None

WAYNE C. FAATZ PROWL 3E AQUATIC ACUTE LC50 BLUEGILL SUNFISH  
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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
2.8	10	10	100	.0976563
2.1	10	10	100	.0976563
1.6	10	10	100	.0976563
1	10	5	50	62.3047
.75	10	0	0	.0976563
.56	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .75 AND 1.6 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 1

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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WAYNE C. FAATZ PROWL 3E AQUATIC LC50 96 HR RAINBOW TROUT PPM  
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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
2.1	10	10	100	.0976563
1.6	10	8	80	5.46875
1	10	1	10	1.07422
.75	10	2	20	5.46875
.56	10	1	10	1.07422
.42	10	0	0	.0976563
.28	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .56 AND 2.1 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 1.31743

RESULTS CALCULATED USING THE PROBIT METHOD  
 ITERATIONS 5 G .16314 H 1 GOODNESS OF FIT PROBABILITY .37377

SLOPE = 5.81182  
 95 PERCENT CONFIDENCE LIMITS = 3.46439 AND 8.15924

LC50 = 1.16008  
 95 PERCENT CONFIDENCE LIMITS = .968209 AND 1.42205

LC10 = .701401  
 95 PERCENT CONFIDENCE LIMITS = .482847 AND .856712

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WAYNE C. FAATZ PROWL 3E FORMULATION AQUATIC LC50 RAINBOW TROUT PPM  
 \*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
2.1	10	10	100	.0976563
1.6	10	8	80	5.46875
1	10	1	10	1.07422
.75	10	2	20	5.46875
.56	10	1	10	1.07422
.42	10	0	0	.0976563
.28	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .56 AND 2.1 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 1.31743

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
5	.0927902	1.1136	.938921	1.37659

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.16314	1	.37377

SLOPE = 5.81182  
 95 PERCENT CONFIDENCE LIMITS = 3.46439 AND 8.15924

LC50 = 1.16008  
 95 PERCENT CONFIDENCE LIMITS = .968209 AND 1.42205

LC10 = .701401  
 95 PERCENT CONFIDENCE LIMITS = .482847 AND .856712

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WAYNE C. FAATZ PROWL 4E AQUATIC ACUTE 96 HR BLUEGILL SUNFISH PPM

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
2.4	10	10	100	.0976563
1.6	10	7	70	17.1875
1.2	10	9	90	1.07422
.75	10	4	40	37.6953
.56	10	1	10	1.07422
.42	10	0	0	.0976563
.28	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .56 AND 2.4 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 .817071

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
5	.331023	.932867	.726903	1.12922

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.144932	1	.290333

SLOPE = 5.15837  
95 PERCENT CONFIDENCE LIMITS = 3.19458 AND 7.12215

LC50 = .933443  
95 PERCENT CONFIDENCE LIMITS = .767573 AND 1.1471

LC10 = .529524  
95 PERCENT CONFIDENCE LIMITS = .354065 AND .660346

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WAYNE C. FAATZ PROWL 4E AQUATIC LC50 96 HR RAINBOW TROUT PPM  
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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1.6	10	10	100	.0976563
1	10	10	100	.0976563
.75	10	3	30	17.1875
.56	10	3	30	17.1875
.42	10	2	20	5.46875
.28	10	2	20	5.46875
.21	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT .21 AND 1 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 .800906

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.753305	.656773	.308568	1.00608

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.614186	2.26055	.0456965

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

SLOPE = 4.32854  
 95 PERCENT CONFIDENCE LIMITS = .936263 AND 7.72082

LC50 = .640444  
 95 PERCENT CONFIDENCE LIMITS = .365959 AND 1.2956

LC10 = .325897  
 95 PERCENT CONFIDENCE LIMITS = .0287645 AND .496706

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WAYNE C. FAATZ AVENGE 2A-S/ AQUATIC ACUTE LC50 96 HR BLUEGILL SUNFISH PPM  
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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
180	10	10	100	.0976563
100	10	4	40	37.6953
75	10	6	60	37.6953
56	10	0	0	.0976563
42	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 56 AND 180 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 100.399

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.122835	89.1148	77.4003	104.068

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	1.6608	2.61064	.0496166

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

SLOPE = 6.89098  
 95 PERCENT CONFIDENCE LIMITS = -1.98957 AND 15.7715

LC50 = 89.8592  
 95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 58.7846  
 95 PERCENT CONFIDENCE LIMITS = 0 AND 91.8477

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Rainbow Trout Avenge 2A-S/

~~RAINBOW TROUT~~ AVERAGE 2A-S/ AQUATIC LC50 96

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
210	10	10	100	.0976563
140	10	10	100	.0976563
100	10	10	100	.0976563
75	10	0	0	.0976563
56	10	0	0	.0976563
42	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 75 AND 100 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 86.6026

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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CASE GS0187                    PENDAMETHALIN                    PH P# 02/15/85

CHEM 108501                    Pendimethalin (N-(1-ethylpropyl)-3,4-d

BRANCH EEB            DISC 40 TOPIC 05050542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00059739            CONTENT CAT 01

Fink, R. (1976). Final Report: Acute Oral LD50--Mallard Duck: Proj-  
ect No. 100-110. (Unpublished study received 1976 under 241-  
243; prepared by Truslow Farms, Inc., submitted by American  
Cyanamid Co., Princeton, N.J.; CDL:228391-B)

SUBST. CLASS = S.

DIRECT RVW TIME = 1 (MH)    START-DATE 6/25/84    END DATE 6/25/84

REVIEWED BY: Wayne C. Faatz, Ph.D.  
          TITLE: Wildlife Biologist  
          ORG: CM#2 Rm 801  
          LOC/TEL:

SIGNATURE:

DATE:

APPROVED BY:  
          TITLE:  
          ORG:  
          LOC/TEL:

SIGNATURE:

DATE:

The study is scientifically sound and fulfills the guideline requirement for an acute LD50 of 1,421 (938-2152) ppm, technical Pendimethalin is considered slightly toxic to birds.

DATA REVIEW NUMBER: (ES) C-1

TEST: Avian acute oral LD<sub>50</sub>

CHEMICAL TESTED: PROWL Technical (AC-1984-793)

TEST SPECIES: Mallard

- RESULT:
- (1) LD<sub>50</sub> = 1,421 (938-2152) mg/kg
  - (2) No<sup>50</sup> effect level was 215 mg/kg
  - (3) 90% mortality at highest treatment dosage (4,640 ppm)
  - (4) Food consumption and weight gain of birds tested with PROWL Technical were comparable to untreated control birds.
  - (5) Symptoms of toxicity preceding death were depression, reduced reaction to external stimuli and loss of coordination.

EVALUATION CATEGORY: Core

CATEGORY REPAIRABILITY: N.A.

REGISTRANT: American Cyanamid Co. (Tested by Truslow-Farms, Inc.)

DATE DATA SUBMITTED: May 14, 1976

ADDITIONAL TEST DATA: Statistical analysis followed method of Litchfield and Wilcoxon.

EVALUATION CATEGORY RATIONALE: The methodology of this test included two major diversions from recommended EPA guidelines: (1) test birds were 14 days of age instead of adult birds; and (2) test birds were observed for only 8 days (instead of 14 days) after administration of oral doses of PROWL. The Environmental Safety Section presently requires strict adherence to the specification that young adult birds be used for the avian acute oral test. But our policy is that tests which were conducted with younger birds prior to July 1976 will not be rejected. Although the test birds were observed for only 8 days after dosing, the total mortality recorded for each treatment (at 8 days) had occurred by the fifth day after treatment. Hence, we assumed that no additional mortality would have occurred if the test birds had been observed for an additional 6 days.

Each of the discrepancies in test protocol described above represent serious departures from EPA guidelines. However, because test protocol was otherwise scientifically sound and the reported LC<sub>50</sub> indicated that PROWL herbicide is of relatively low toxicity to bobwhite quail, the Environmental Safety Section will not require the registrant to rerun the avian acute oral test.

CASE GS0187

PENDAMETHALIN

PM 217 12/15/83

CHEM 108501

Pendimethalin (N-(1-ethylpropyl)-3,4-d

BRANCH EEB

DISC 4J TOPIC 05100542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00026674

CONTENT CAT 01

Fink, R. (1973) Final Report: Eight-Day Dietary LC50--Mallard Ducks: Project No. 362-138. (Unpublished study received on unknown date under 4G1451; prepared by Hazleton Laboratories, Inc., submitted by American Cyanamid Co., Princeton, N.J.; CDL:09386M-x)

SUBST. CLASS = S.

DIRECT RVW TIME = 1

(MH)

START-DATE

END DATE

6/26/84

6/26/84

REVIEWED BY: Wayne C. Faatz, Ph.D.

TITLE: Wildlife Biologist

ORG: CM #2 Rm 801

LOC/TEL:

SIGNATURE:

DATE:

APPROVED BY:

TITLE:

ORG:

LOC/TEL:

SIGNATURE:

DATE:

This test is scientifically sound and satisfies the guideline requirement for an avian LC50 on a wild waterfowl. With an LC50 > 46 ppm, Pendimethalin is considered slightly toxic to birds. The reported LC50 of 10,338 ppm is not used because of insufficient number of test levels.

DATA REVIEW NUMBER: (ES) E-1  
TEST: Avian 8-day dietary LC<sub>50</sub>  
CHEMICAL TESTED: PROWL (Technical, AC 92553)  
TEST SPECIES: Mallard  
RESULT: (1) LC<sub>50</sub> = 10,388 (1,177 - 91,712) ppm  
(2) No mortality at 215, 464, 1,000 and 2,150 ppm.  
(3) 20% mortality at 4,640 ppm.  
(4) Food consumption and weight gain of test birds on PROWL treatment were comparable to birds on control diet.

EVALUATION CATEGORY: Core  
CATEGORY REPAIRABILITY: N.A.  
REGISTRANT: American Cyanamid Co. (Tested by Hazleton Labs)  
DATE DATA SUBMITTED: May 4, 1973  
ADDITIONAL TEST DATA: Statistical analysis followed method of Litchfield and Wilcoxon.

EVALUATION CATEGORY RATIONALE: Test protocol reported for this study was acceptable. However, the LC<sub>50</sub> value reported for this test was calculated from an insufficient number of mortality levels. Because only 20% mortality was observed at 4,640 ppm PROWL, the Environmental Safety Section will use LC<sub>50</sub> > 4,640 ppm (instead of LC<sub>50</sub> = 10,388 ppm) for hazard evaluation purposes.



WAYNE C. FAATZ PROWL ACUTE ORAL LC50 MALLARD DUCK

\*\*\*\*\*

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
4640	10	2	20	5.46875
2150	10	0	0	.0976563
1000	10	0	0	.0976563
464	10	0	0	.0976563
215	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 2150 AND +INFINITY 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 0

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

\*\*\*\*\*

TDMS  
CASE GS 0187PendimethalinPM 02/15/83CHEM 108501 PendimethalinBRANCH EEB DISC 40FORMULATION Technical, 92.2% and Formulation, 4EFICHE/MASTER ID FAOPEN04

CITATION: Ward, G.S. (1983) Acute Toxicity of AC 92, 553 technical and formulation to pink shrimp (*Penaeus Duorarum*). Unpublished report prepared by EG & G Bionomics for American Cyanamid Co. [Acc. No. 251601]

SUBST. CLASS = S

OTHER SUBJECT DESCRIPTORS  
PRIM:

DIRECT REVIEW TIME = 1 (MH) START DATE 6/25/84 END DATE 6-25-84

REVIEWED BY: Wayne C. Faatz, Ph.D  
TITLE: Wildlife Biologist  
ORG: CM#2 Rm 801  
LOC./TEL:

SIGNATURE: DATE: 6/25/84

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE: DATE:

This study is scientifically sound and fulfills the requirements for an acceptable estuarine invertebrate toxicity test. With an LC<sub>50</sub> of 1.6 ppm for technical material, pendimethalin can be characterized as moderately toxic to estuarine invertebrates.

The study with the formulated product is scientifically sound and would fulfill the guideline requirement for estuarine invertebrate test on the formulated product if one were required. With a LC<sub>50</sub> of 11 ppm the formulated Pendimethalin is considered moderately toxic to estuarine invertebrates.

DATA EVALUATION RECORD

1. CHEMICAL: Pendimethalin
2. FORMULATION: 92.2% A.I. Prowl 4E
3. CITATION: Ward, G.S. (1983) Acute toxicity of AC 92,553 technical and formulation to pink shrimp (*Penaeus Duorarum*). Unpublished report prepared by EG&G Bionomics for American Cyanamid Co. [Acc, No. 251601]
4. REVIEWED BY: Les Touart  
Fisheries Biologist  
EEB/HED
5. DATE REVIEWED: 4/27/ 84
6. TEST TYPE: Estuarine invertebrate acute toxicity
  - A. TEST SPECIES: Pink shrimp
7. REPORTED RESULTS: The 96-hour LC<sub>50</sub> was 1.6(1.2-2.2) ppm for technical and 11(8.9-16) ppm for formulated product.
8. REVIEWERS CONCLUSION: The study is scientifically sound and fulfills the requirements for an acceptable estuarine invertebrate toxicity test. With an LC<sub>50</sub> of 1.6 ppm for technical material, pendimethalin can be characterized as moderately toxic to estuarine invertebrates.

Materials/Methods  
Test Procedure

The test methods are generally consistent with current EPA guideline for for conducting acute toxicity tests with estuarine invertebrates. Specifically, Size- 55( $\pm$ 6) mm mean rostrum telson length, 1.4( $\pm$ 0.5) g mean weight; Test vessels - 19/glass; Levels - 1.0, 2.0, 4.0, 8.0, and 16 ppm for technical and 6.25, 12.5, 25, 50 and 100 ppm for formulated product, both with adequate controls; No. tested - 3/jar, 12/Level; Environmental conditions - 21°C, 18-29%.

Statistical Analysis

Stephan's computer program was used in estimating the LC<sub>50</sub>.

Discussion/Results

Also refer to attached tables.

The 96-hour LC<sub>50</sub> for technical = 1.6 (1.2-2.2) ppm.

The 96-hour LC<sub>50</sub> for formulated product = 11(8.9-16) ppm.

Reviewer's Evaluation

A. Test Procedures

The study was conducted according to recommended methods for conducting an acute toxicity test to an estuarine invertebrate.

B. Statistical Analysis

The results were analyzed with appropriate statistical methods.

C. Discussion/Results

The data support the conclusions drawn.

D. Conclusions

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A

TABLE 1. Mortality of pink shrimp (*Penaeus duorarum*) exposed to American Cyanamid Company's sample AC 92,553 Technical in static, aerated seawater. Test concentrations are based on active ingredient of the sample added to the test containers.

Nominal concentration (mg/l; ppm)	Cumulative mortality (%)			
	24 h	48 h	72 h	96 h
Seawater control	0	0	0	0
Acetone control	0	0	0	0
1.0	0	8	8	17
2.0	33	58	75	75
4.0	42	58	58	67
8.0	17	67	75	83
16	50	83	92	92

TABLE 2. Calculated LC50 values for pink shrimp (*Penaeus duorarum*) exposed to AC 92,553 Technical in static, aerated seawater. Values were calculated based on nominal concentrations of test material, as active ingredient, in seawater.

Hour	LC50 (mg/l; ppm)	95% confidence limits (mg/l; ppm)
24	16 ppm (estimated)	---
48	3.2	2.2-5.6
72	2.3	1.5-3.5
96	1.6	1.2-2.2

TABLE 3. Mortality of pink shrimp (*Penaeus duorarum*) exposed to American Cyanamid Company's sample AC 92,553 Formulation in static, aerated seawater. Test concentrations are based on whole material of the sample added to the test containers.

Nominal concentration (mg/l; ppm)	Cumulative mortality (%)			
	24 h	48 h	72 h	96 h
Seawater control	0	0	0	0
Monochlorobenzene plus emulsifier	100	100	100	100
6.25	0	0	25	25
12.5	33	42	42	50
25	75	83	92	92
50	100	100	100	100
100	100	100	100	100

TABLE 4. Calculated LC50 values for pink shrimp (*Penaeus duorarum*) exposed to AC 92,553 Formulation in static, aerated seawater. Values were calculated based on nominal concentrations of test material, as whole material in seawater.

Hour	LC50 (mg/l; ppm)	95% confidence limits (mg/l; ppm)
24	17	13-24
48	15	12-23
72	12	9.1-17
96	11	8.9-16

## DATA EVALUATION RECORD

Page 1 of

TDMS  
CASE GS 0187PendimethalinPM 02/15/83CHEM 108501 PendimethalinBRANCH EEB DISC 40FORMULATION Technical, 92.2% and Formulation, 4EFICHE/MASTER ID FAOPEN02

CITATION: Ward, G.S. (1983) Acute Toxicity of AC 92, 553 technical and formulation to sheepshead minnows (Cyprinodon variegatus). Unpublished study prepared by EG&G Bionomics for American Cyanamid Co. [Acc. No. 251601]

SUBST. CLASS = S

OTHER SUBJECT DESCRIPTORS  
PRIM:

DIRECT REVIEW TIME = 1

(MH) START DATE 6/25/84

END DATE 6-25-84

REVIEWED BY: Wayne C. Faatz, Ph.D  
TITLE: Wildlife Biologist  
ORG: CM#2 Rm 801  
LOC./TEL:

SIGNATURE:

DATE: 6/25/84

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE:

DATE:

This study is scientifically sound and fulfills the requirements for an acceptable estuarine fish toxicity study test. With an LC<sub>50</sub> of 707 ppb for technical material, pendimethalin can be characterized as highly toxic to estuarine finfishes.

The study on the formulated product, 4E, is scientifically sound and would fulfill a test with the formulated product if required.

DATA EVALUATION RECORD

1. Chemical: Pendimethalin
2. FORMULATION: 92.2% A.I.; Prowl 4E
3. CITATION: Ward, G.S. (1983) Acute Toxicity of AC 92, 553 technical and formulation to sheepshead minnows (Cyprinodon variegatus). Unpublished study prepared by EG&G Bionomics for American Cyanamid Company. [Acc. No. 251601]
4. REVIEWED BY: Les Touart  
Fisheries Biologist  
EEB/HED
5. DATE REVIEWED: 4/27/84
6. TEST TYPE: Fish Acute Toxicity (Estuarine)
  - A. TEST SPECIES: Sheepshead minnow
7. REPORTED RESULTS: The 96-hour LC<sub>50</sub> was 707(552-907) ppb for technical and 1700(1230-3560) ppb for formulated AC 92, 553.
8. REVIEWERS CONCLUSION: The study is scientifically sound and fulfills the requirements for an acceptable estuarine fish toxicity test. With an LC<sub>50</sub> of 707 ppb for technical material, pendimethalin can be characterized as highly toxic to estuarine finfishes.



Materials/Methods  
Test Procedure

The test methods are generally consistent with current EPA guidelines for conducting acute toxicity tests with estuarine fishes. Specifically, Size - 10 mm ( $\pm 2$ mm) mean standard length, 30 mg ( $\pm 16$  mg) mean weight; Test vessels - 3.8 l glass jars; Levels - 62.5, 125, 250, 500 and 1000 ppb for the test with technical material, for the test with formulated material identical concentrations were used with the addition of a 2000 ppb level, adequate controls were used in both cases; No. Tested - 10/Level; Environmental conditions - 21-23°C, 21%, ambient light during daytime hours.

Statistical Analysis

Stephan's computer program was used in estimating the LC<sub>50</sub>.

Discussion/Results

Also refer to attached tables.

The 96-hour LC<sub>50</sub> for technical = 707 (552-907) ppb.

The 96-hour LC<sub>50</sub> for formulated product = 1700 (1230-3560) ppb.

Reviewer's Evaluation

A. Test Procedure

The study was conducted according to recording to recommended method for conducting an acute to an estuarine fish.

B. Statistical Analysis

The results were analyzed with appropriate statistical methods.

C. Discuison/Results

The data support the conclusion drawn.

D. Conclusions

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A

TABLE 1. Mortality of sheepshead minnows (*Cyprinodon variegatus*) exposed to American Cyanamid Company's sample AC 92,553 Technical in static, unaerated seawater. Test concentrations are based on active ingredient of the sample added to the test containers.

Nominal concentration ( $\mu\text{g}/\text{l}$ ;ppb)	Cumulative mortality (%)			
	24 h	48 h	72 h	96 h
Seawater control	0	0	0	0
Acetone control	0	0	0	0
62.5	0	0	0	0
125	0	0	0	0
250	0	0	0	0
500	0	0	0	10
1,000	0	30	70	90

TABLE 2. Calculated LC50 values for sheepshead minnows (*Cyprinodon variegatus*) exposed to AC 92,553 Technical in static, unaerated seawater. Values were calculated based on nominal concentrations of test material, as active ingredient, in seawater.

Hour	LC50 ( $\mu\text{g}/\text{l}$ ;ppb)	95% confidence limits ( $\mu\text{g}/\text{l}$ ;ppb)
24	>1,000	---
48	>1,000	---
72	854	---
96	707	552-907

TABLE 3. Mortality of sheepshead minnows (*Cyprinodon variegatus*) exposed to American Cyanamid Company's sample AC 92,553 Formulation in static, unaerated seawater. Test concentrations are based on whole material of the sample added to the test containers.

Nominal concentration ( $\mu\text{g}/\ell$ ; ppb)	Cumulative mortality (%)			
	24 h	48 h	72 h	96 h
Seawater control	0	0	0	0
Monochlorobenzene plus emulsifier				
62.5	0	0	0	0
125	0	0	0	0
250	0	0	0	0
500	0	0	0	0
1,000	0	20	20	20
2,000	10	30	40	60

TABLE 4. Calculated LC50 values for sheepshead minnows (*Cyprinodon variegatus*) exposed to AC 92,553 Formulation in static, unaerated seawater. Values were calculated based on nominal concentrations of test material, as whole material, in seawater.

Hour	LC50 ( $\mu\text{g}/\ell$ ; ppm)	95% confidence limits ( $\mu\text{g}/\ell$ ; ppm)
24	>2,000	---
48	>2,000	---
72	>2,000	---
96	1,700	1,230-3,560

## DATA EVALUATION RECORD

Page 1 of

TDMS  
CASE GS 0187PendimethalinPM 02/15/83CHEM 108501 PendimethalinBRANCH EEB DISC 40FORMULATION Technical, 92.2% and Formulation, 4EFICHE/MASTER ID FAOPEN03

CITATION: Ward, G.S. (1983) Acute Toxicity of AC 92, 553 technical and formulated to embryo-larvae of eastern oysters (Crassostrea Virginica). Unpublished study prepared by EG&G Bionomics for American Cyanamid Co. [Acc. No. 251601]

SUBST. CLASS = S

OTHER SUBJECT DESCRIPTORS  
PRIM:DIRECT REVIEW TIME = 1 (MH) START DATE 6/25/84 END DATE 6-25-84

REVIEWED BY: Wayne C. Faatz, Ph.D  
TITLE: Wildlife Biologist  
ORG: CM#2 Rm 801  
LOC./TEL:

SIGNATURE: Wayne C. Faatz DATE: 6/25/84

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE: DATE:

This study is scientifically sound and fulfills the guideline requirements for an acceptable oyster embryo-larvae toxicity test. With a 48-hour EC<sub>50</sub> of 210 ppb, technical AC 92, 553 is highly toxic to oysters.

The study with the formulated product is scientifically sound and would fulfill the guideline requirement for an embryo-larvae toxicity test if one were required with a 48-hr EC<sub>50</sub> of 450 ppb formulated Pendimethalin is considered highly toxic to oysters.

DATA EVALUATION RECORD

1. CHEMICAL: Penimethalin
2. FORMULATION: 92.2% A.I.; Prowl 4E
3. CITATION: Ward, G.S. (1983) Acute Toxicity of AC 92, 553 technical and formulated to embryo-larvae of eastern oysters (Crassostrea Virginica). Unpublished study prepared by EG&G Bionomics for American Cyanamid Co. [Acc. No. 251601]
4. REVIEWED BY: Les Touart  
Fisheries Biologist  
EEB/HED
5. DATE REVIEWED: 4/27/84
6. TEST TYPE: Oyster embryo-larvae
7. REPORTED RESULTS: The calculated 48-hour EC<sub>50</sub> for embryos-larvae of eastern oysters exposed to AC 92, 553 technical was 210 (160-340) ppb. The calculated 48-hour EC<sub>50</sub> for embryos-larvae of eastern oysters exposed to AC 92, 553 formulated was 450 (330-710) ppb.
8. REVIEWERS CONCLUSION: The study is scientifically sound and fulfills the guideline requirements for an acceptable oyster embryo-larvae toxicity test. With a 48-hour EC<sub>50</sub> of 210 ppb, technical AC 92, 553 is highly toxic to oysters.

Materials/Methods  
Test Procedure

The test methods are generally consistent with current EPA guidelines, specifically: Age - newly fertilized (< 1 hr) embryos; Test water - natural seawater, 19% salinity, 21 C Temperature; Test vessels 0.95 l glass jars; Number exposed - 25, 376 embryo/container, 3 containers/level; Levels - 60, 120, 250, 500 and 4000 ppb for formulated product; Control - solvent and seawater controls (acetone for technical, blank formulation for formulated product).

Statistical Analysis

EC<sub>50</sub>'s were calculated using the moving average angle method. Effects were based on percentage reduction of normal larvae developing in 48 hours versus the control.

Discussion/Results

Also refer to attached tables.

48-hour EC<sub>50</sub> for AC 92, 553, Technical = 210 (160.-340) ppb

48-hour EC<sub>50</sub> for AC 92, 553, Formulated product = 450 (330-710) ppb

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 data support the conclusions drawn.

D. Conclusions

1. Category: Core
2. Rationale: N/A
3. Repairability: N/A

TABLE 1. Toxicity of American Cyanamid Company's sample AC 92,553 Technical to embryos-larvae of eastern oysters (*Crassostrea virginica*) exposed for 48 hours in static, unaerated seawater. The criterion for effect was the reduction of the number of normal larvae in test concentrations as compared to the number of normal control larvae. The initial inoculum was 25,376 embryos. Salinity was 19 ‰ and temperature was 21°C.

Nominal concentration ( $\mu\text{g}/\text{l}$ ; ppb)	Number of normal larvae		Reduction of normal 48-hour larvae (%)
	Mean	SD <sup>a</sup>	
Control	23,306	883	---
Solvent control	23,212	1,358	---
60	23,338	913	---
120	22,863	1,711	-2
250	4,560	4,427	-80 <sup>b</sup>
500	437	420	-98 <sup>b</sup>
1,000	76	87	-100 <sup>b</sup>

<sup>a</sup>Standard deviation.

<sup>b</sup>Significant ( $P < 0.05$ ) reduction in number of normal larvae.

TABLE 2. Toxicity of American Cyanamid Company's sample AC 92,553 Formulated to embryos-larvae of eastern oysters (*Crassostrea virginica*) exposed for 48 hours in static, unaerated seawater. The criterion for effect was the reduction of the number of normal larvae in test concentrations as compared to the number of normal control larvae. The initial inoculum was 25,376 embryos. Salinity was 19 ‰ and temperature was 21°C.

Nominal concentration ( $\mu\text{g}/\text{l}$ ; ppb)	Number of normal larvae		Reduction of normal 48-hour larvae (%)
	Mean	SD <sup>a</sup>	
Control	23,306	883	-3
Solvent control	24,067	1,290	---
120	23,782	2,550	-1
250	24,257	1,101	---
500	6,333	4,706	-74 <sup>b</sup>
1,000	594	622	-98 <sup>b</sup>
2,000	0	---	-100 <sup>b</sup>
4,000	0	---	-100 <sup>b</sup>

<sup>a</sup>Standard deviation.

<sup>b</sup>Significant ( $P < 0.05$ ) reduction in number of normal larvae.



## DATA EVALUATION RECORD

Page 1 of

TDMS  
CASE GS 0187PM 02/15/83CHEM 108501 PendimethalinBRANCH EEB DISC 40FORMULATION TechnicalFICHE/MASTER ID FAOPEN05

## CITATION:

EG&G Bionomics (1976) Acute toxicity of CL-92,553 to Daphnia magna. (Unpublished study received 1976 under 241-243; submitted by American Cyanamid Co. Princeton, MJ.)

SUBST. CLASS = S

## OTHER SUBJECT DESCRIPTORS

PRIM:

DIRECT REVIEW TIME = 1 (MH) START DATE 7/9/84 END DATE 7-9-84

## REVIEWED BY:

TITLE:

ORG:

LOC./TEL:

SIGNATURE:

DATE:

## APPROVED BY:

TITLE:

ORG:

LOC./TEL:

SIGNATURE:

DATE:

This study is scientifically sound and satisfies guideline requirements for an aquatic invertebrate LC<sub>50</sub>. The LC<sub>50</sub> for Daphnia with technical grade pendimethalin is 0.52 (0.42-0.63) ppm. Pendimethalin is characterized as highly toxic to aquatic organisms.

40

103.1.4 Aquatic Invertebrate

DATA REVIEW NUMBER: (ES) H-1

TEST: Aquatic invertebrate acute 48-hour LC<sub>50</sub>  
CHEMICAL TESTED: PROWL Technical (CL - 92,5533)

TEST SPECIES: Daphnia magna

- RESULT:
- (1) LC<sub>50</sub> = 0.28 (0.23 - 0.33) ppm.
  - (2) No effect level was 0.16 ppm.
  - (3) 100% mortality at 0.49 ppm.
  - (4) 24-hour LC<sub>50</sub> = 0.52 (0.42 - 0.63) ppm.

EVALUATION CATEGORY: Core

CATEGORY REPAIRABILITY: N.A.

REGISTRANT: American Cyanamid Co. (Tested by Bionomics, Inc.)

DATE DATA SUBMITTED: May, 1976

ADDITIONAL TEST DATA:

- (1) Protocol followed: EPA, 1975. Methods for acute toxicity tests with fish, macroinvertebrates and amphibians.
- (2) Test compound was dissolved in acetone for introduction into dilution water.
- (3) Water temperature was 21±1°C.
- (4) Total of 15 test organisms per treatment.
- (5) LC<sub>50</sub> calculated from regression equation after conversion of test concentration and percent mortality to logarithms and probits.

104.0 Hazard Assessment

104.1.1 Adequacy of Data:

- (1) Avian acute toxicity - Registrant has provided acceptable tests of avian acute oral LD<sub>50</sub> and avian 8-day dietary LC<sub>50</sub>.
- (2) Fish acute toxicity - Tests of acute 96-hour LC<sub>50</sub> for warmwater and coldwater fish were unacceptable because the registrant failed to either (1) properly identify the test material or (2) report the number of fish tested.
- (3) Aquatic invertebrate acute toxicity - Registrant has provided an acceptable test of acute 48-hour LC<sub>50</sub> for freshwater aquatic invertebrates.

104.1.3 Likelihood of Exposure to Non-target Organisms

Use of PROWL and SENCOR herbicides in tank mixtures or sequential application as either preplant incorporated or

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CHEM 108501 Pendimethalin  
BRANCH EEB DISC 40  
FORMULATION Formulation, 4E

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FICHE/MASTER ID FAOPENOL

CITATION Sousa, J.V. (1983) Acute Toxicity of AC 92, 553 to channel catfish (Ictalurus punctatus). Unpublished study prepared by EG&G Bionomics for American Cyanamid Company. [Acc. No. 251601] Cyanamid Company. (Acc. No. 251601)

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SUBST. CLASS = S

OTHER SUBJECT DESCRIPTORS  
PRIM:

---

DIRECT REVIEW TIME= 1 (MH) START DATE 6/25/84 END DATE 6/25/84

---

REVIEWED BY: Wayne C. Faatz, Ph.D.  
TITLE: Wildlife Biologist  
ORG: CM#2 Rm 801  
LOC./TEL:

SIGNATURE: Wayne C. Faatz DATE: 6/25/84

---

APPROVED BY:  
TITLE:  
ORG:  
LOC/TEL:

SIGNATURE: DATE:

DATA EVALUATION RECORD

1. CHEMICAL: Pendimethalin
2. FORMULATION: Formulated Product (Prowl 4E)
3. CITATION: Sousa, J.V. (1983) Acute Toxicity of AC 92, 553 to channel catfish (Ictalurus punctatus). Unpublished study prepared by EG&G Bionomics for American Cyanamid Company. [Acc. No. 251601]
4. REVIEWED BY: Les Touart  
Fisheries Biologist  
EEB/HED
5. DATE REVIEWED: 4/27/84
6. TEST TYPE: Fish acute toxicity test (warmwater)
  - A. TEST SPECIES: Channel catfish
7. REPORTED: The 96-hour LC<sub>50</sub> for channel catfish exposed to AC 92, 553 was 1.9 (1.3-2.6) mg/l.
8. REVIEWERS CONCLUSIONS: The study is scientifically sound and would fulfill the the requirement for an acceptable warmwater product. With an LC<sub>50</sub> of 1.9 mg/l, this formulation is moderately toxic to warmwater finfishes.

Materials/Methods  
Test Procedure

The test method are generally consistent with current EPA Guidelines for conducting acute toxicity tests with warmwater fishes on formulated product. Specifically, Size - 2.1 g (1.2 - 3.5 g) mean weight, 65 mm (54.77 mm) mean total length; Test vessels - 19.6 l glass jars; Levels - 0.78, 1.3, 2.2, 3.6, 6.0, and 10.0 mg/l with adequate controls; No. tested - 10 level; Environmental Conditions - 22 C, 16 hours light: 8 hrs dark photoperiod.

Statistical Analysis

Stephan (1978) computer program was used in estimating the LC<sub>50</sub>.

Discussion/Results

Also refer to attached table.

The 96-hour LC<sub>50</sub> 1.9(1.3-2.6) mg/l.

Reviewer's Evaluation

A. Test Procedure

The study was conducted according to recommended methods for conducting an acute toxicity test to fish with formulated product.

B. Statistical Analysis

The results were analyzed with appropriate statistical methods.

C. Discussion/Results

The data support the conclusions drawn.

D. Conclusions

1. Category: Supplemental.
2. Rationale: Formulated product test.
3. Repairability: To core, for specific requirement.

able 1. The 24-, 48-, 72- and 96-hour LC50 values and 95% confidence intervals for channel catfish (Ictalurus punctatus) exposed to AC 92,553.

24 hour	LC50 (mg/l) <sup>a</sup>			No discernible effect concentration through 96 hours (mg/l)
	48 hour	72 hour	96 hour	
4.1 (3.1-5.6)	2.6 (1.9-3.8)	2.0 (1.5-2.8)	1.9 (1.3-2.6)	<0.78

Estimated by moving average angle analysis.

Table 3. Concentrations tested and corresponding percentage mortalities of channel catfish (*Ictalurus punctatus*) exposed to AC 92,553 for 24, 48, 72 and 96 hours.

Nominal concentration <sup>a</sup> (mg/l)	Cumulative % mortality											
	24 hour			48 hour			72 hour			96 hour		
	A	B	$\bar{X}$	A	B	$\bar{X}$	A	B	$\bar{X}$	A	B	$\bar{X}$
10 <sup>b</sup>	100	100	100 <sup>c</sup>	100	100	100 <sup>c</sup>	100	100	100 <sup>c</sup>	100	100	100 <sup>c</sup>
6.0 <sup>b</sup>	20	80	50 <sup>cdefg</sup>	100	80	90 <sup>cdef</sup>	100	100	100 <sup>c</sup>	100	100	100 <sup>c</sup>
3.6	40	20	30 <sup>def</sup>	60	60	60 <sup>defh</sup>	80	80	80 <sup>cdefh</sup>	80	80	80 <sup>cdef</sup>
2.2	60	0	30 <sup>dfi</sup>	60	20	40 <sup>dfhi</sup>	60	20	40 <sup>dhj</sup>	60	40	50 <sup>dhj</sup>
1.3	20	0	10 <sup>dfhi</sup>	20	0	10 <sup>dij</sup>	40	20	30 <sup>hi</sup>	60	20	40 <sup>f</sup>
0.78	0	20	10	0	20	10 <sup>i</sup>	0	20	10	0	20	10 <sup>j</sup>
solvent control	0	0	0	20	0	10	20	0	10	20	0	10
control	0	0	0	0	0	0	0	0	0	0	0	0

<sup>a</sup>All test solutions of AC 92,553 were a yellow color in proportion to concentration throughout the exposure.

<sup>b</sup>The test solutions were cloudy at 0 hour.

<sup>c</sup>The test solutions were cloudy.

<sup>d</sup>All of the fish were lethargic.

<sup>e</sup>All of the fish exhibited a darkened pigmentation.

<sup>f</sup>All of the fish were respiring rapidly.

<sup>g</sup>Some of the fish exhibited a partial loss of equilibrium.

<sup>h</sup>Some of the fish were at the surface of the test solution.

<sup>i</sup>Some of the fish exhibited a darkened pigmentation.

<sup>j</sup>Some of the fish were respiring rapidly.

CASE GS0187

PENDAMETHALIN

PM PM# 02/15/83

CHEM 108501

Pendimethalin (N-(1-ethylpropyl)-3,4-d

BRANCH EEB

DISC 40 TOPIC 05054547

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00071123

CONTENT CAT 01

Thompson, C.M.; Griffen, J.; McAllister, W.A. (1980) Acute Toxicity of AC 92,755 to the Freshwater Crayfish (~Procambarus simu- #~lans~): Static Acute Bioassay Final Report # 25725. (Unpub- lished study received Jan 22, 1981 under 241-243; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Amer- ican Cyanamid Co., Princeton, N.J.; CDL:099889-B)

SUBST. CLASS = S.

DIRECT RVW TIME = 1 (MH)

(MH)

START-DATE

6/26/84

END DATE

6/26/84

REVIEWED BY: Wayne C. Faatz, Ph.D.  
TITLE: Wildlife Biologist  
ORG:

LOC/TEL: CM #2 Rm 801

SIGNATURE:

DATE:

APPROVED BY:

TITLE:

ORG:

LOC/TEL:

SIGNATURE:

DATE:

This test is scientifically sound but does not meet the guidance requirement for an aquatic LC50 study. The dissolved oxygen fell below 40% saturation and a precipitate formed at levels over 1.0 mg/l. The LC50 for crawfish is greater than 1.0 ppm. Pendimethalin is considered moderately toxic to aquatic invertebrates.



Data Evaluation Record

Reviewer: Robert K. Hitch. Ecological Effects Branch, CM #4, (703) 557-5600.

Chemical: 108501 Pendimethalin  
94.2%

Citation: ABC (Analytical BioChemistry Laboratories) Inc., 1980. Acute toxicity of AC 92,553 to the freshwater crayfish (Procambarus simulans). Static acute bioassay final report #25725.

EPA Accession #099889

Type of Study: 96 hr. LC<sub>50</sub> with an aquatic invertebrate.

Reviewer's Abstract of Study:

Test Organism  
Weight & Length      The crayfish averaged in length (The length measurement was made from tip of rostrum to tip of tail) 43.3 (+ 3.2) mm and in weight 2.46 (+ 0.90) grams.

Feeding Regime      Feeding of the crayfish was terminated 48 hrs. before study commencement.

Dilution  
Water                    The dilution water was soft reconstituted as described in Stephan (1975).

Temperature  
Loading                The test temperature was 22°C.  
The tests were conducted in 40 liter glass vessels containing 30 liters of soft reconstituted water.

Treatment  
Levels                    Ten crayfish were tested in a preliminary 72 hr. test. Mortalities in this test were 10, 20, and 10% after exposure at 1,000, 10,000 and 100,000 ppb, respectively.

In the definitive 96 hr. study, 20% mortality occurred at 56,000 ppb and among the triplicate 300,000 ppb test vessels, percentage mortalities were recorded as 10, 0, and 20.

Reviewer's Conclusions:

If the registrant is willing to accept the LC<sub>50</sub> as being greater than 1,000 ppb (1.0 ppm), then the study will be judged "supplemental" and capable of supporting the current registration. It was not judged "core" and capable of meeting general requirements for a freshwater invertebrate LC<sub>50</sub> in regard to basic study requirements because of deviations from standard test methods noted below. The reasons for still considering the study capable of supporting this rice registration in spite of the deviations are also noted below.

1. The dissolved oxygen level was less than 40% of saturation in some of the high concentrations (300,000 ppb). The study was still judged to be of value as these concentrations are orders of magnitude above the EEC and because, generally, a lower D.O. would tend to stress a test organism and make it succumb to a toxicant more readily.
2. DMSO was used as a solvent. This was acceptable to this reviewer, although not recommended by Stephan (1975) because this solvent would also tend to increase mortalities rather than decrease them.
3. The compound was noted to form a yellow precipitate at test levels over 1.0 mg/l. Even 1.0 mg/l is far higher than the EEC (7 ppb) so demonstrating that the LC<sub>50</sub> is higher than 1.0 mg/l was considered acceptable.

#### Registrant's Conclusions:

(Conclusions of Analytical BioChemistry Laboratories) LC<sub>50</sub> is greater than 300 mg/l (300 ppm)\*.

\*The EPA reviewer (R. Hitch) will ask that the registrant accept the LC<sub>50</sub> as being greater than 1 ppm as the pendimethalin came out of solution above this level.

#### Reference

Stephan, C. E., 1975. Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. EPA-660/3-75-009.

#### 104 Discussion

Propanil, as noted earlier in this review, is currently registered for rice use. Pendimethalin is of very low acute toxicity to terrestrial organisms. High quality acute fish pendimethalin studies have not been submitted to date but the tests that have been submitted indicate that the 96 hr. LC<sub>50</sub> might be around 1 ppm and that a warning statement regarding exposure to aquatic organisms would be necessary for this use pattern and in regard to disposal of unused pendimethalin.

The chronic toxicity of pendimethalin is a disputed issue at this point. A chronic study submitted by American Cyanamide showed statistically significant reductions in number of eggs, eggs per spawn, and eggs per female at 9.8 ppb when analyzed by EEB reviewer L. Windberg (see June 13, 1978 review).

Even if Mr. Windberg was correct, this would not trigger a concern as Joseph Reinert of the Environmental Fate Branch projects that pendimethalin concentrations should be in the range of about 7 ppb in waterways near rice fields which are flushed two days after the maximum application. On the other hand, chronic toxicity levels for aquatic invertebrates are often much lower than those for fish. The registrant is, therefore, asked in the conclusions to submit a life cycle study with Daphnia magna.

Further, the rice use pattern area lies within important wetland regions along the lower Mississippi River and the Texas-Louisiana Gulf coast (see figure 1). Catfish are harvested commercially in these areas and the acute exposure due to aerial drift of the prowl formulation would be an unreasonable hazard if the formulation proved to be acutely toxic to this and other important warmwater fish species. The registrant is therefore asked to submit acute toxicity information on the Prowl formulation.

Finally, because a very limited exposure to estuarine life is anticipated, tests with shrimp, oysters, and marine fish are required.