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EEE BRANCH REVIEW

DATE: IN 12/21/76 OUT 3/28/77 IN \_\_\_\_\_ OUT \_\_\_\_\_ IN \_\_\_\_\_ OUT \_\_\_\_\_

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 241-243

PETITION OR EXP. PERMIT NO. \_\_\_\_\_

DATE DIV. RECEIVED 12/20/76

DATE OF SUBMISSION 12/17/76

DATE SUBMISSION ACCEPTED \_\_\_\_\_

TYPE PRODUCT(S): I, D, (H) F, N, R, S Herbicide

PRODUCT MGR. NO. R. Taylor

PRODUCT NAME(S) Prowl Herbicide

COMPANY NAME American Cyanamid Company

SUBMISSION PURPOSE Progress Report - Chronic Fish Study

CHEMICAL & FORMULATION ([N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine])

## Environmental Safety

### 100.0 Pesticidal Use

Not submitted. Information submitted was a progress report on the chronic fish bioassay.

### 101.0 Chemical and Physical Properties

101.1 ([N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine])

101.2 Penoxalin

### 102.0 Behavior In The Environment

#### 102.1 Soil

- (1) 80% of applied  $^{14}\text{C}$  ( $^{14}\text{C}$ -Prowl labeled in 4-methyl group of the xylidine portion) is still present in field soil (Princeton sandy loam) at 180 days after soil incorporated treatment at 1# ai/acre and 64% of applied dose still present as parent compound. First 1/2-life of parent compound is greater than 6 months when soil incorporated.
- (2) 1/2-life of Prowl in soil appears to be in range of 12 to 16 months.
- (3) Anaerobic metabolism of parent occurs at a faster rate than aerobic metabolism but breakdown products are metabolized more rapidly aerobically than anaerobically.
- (4) Microbes do not degrade parent nor does Prowl affect microbe activities.
- (5) Photolysis: Soil TLC - 33-56% of applied activity lost in 8 weeks, while 87% of applied activity is lost from glass slides in 24 hours.
- (6) No significant  $^{14}\text{C}$  (from 4-methyl- $^{14}\text{C}$ -Prowl) found in runoff water.
- (7) Prowl and/or its metabolites do not leach significantly.
- (8) Tank mixtures of Prowl and Atrazine, Bladex, or Banvel do not result in extended persistence of any of the active ingredients.

102.2 Water

- (1) Hydrolysis: Prowl is stable at pH 5, 7, and 9 at 25°C in dark for 4 weeks. Hydrolysis is not expected to be mechanism of decline in the environment.
- (2) Photolysis: Parent compound is degraded in one week with only one minor metabolite identifiable.

102.3 Plant

- (1) No significant residues found in rotational crops.

102.4 Animal

- (1) Channel Catfish Accumulation Study:

- (a) Methodology:

Ring-<sup>14</sup>C-Prowl was applied to soil and aged for 35 days prior to addition of water. The mean concentration of Prowl in water over 42 days ranged from 4.13 micrograms per liter to 19.0 micrograms with an average of 11.19 micrograms per liter. The concentration increased gradually from 4.13 to 19.0 micrograms per liter through 35 days and then a decline of initially applied <sup>14</sup>C was found in water.

- (b) Results:

In catfish <sup>14</sup>C residues in edible tissues increased through 14 days, attaining 15.91 ppm or 1450 times the concentration in water, and then declined throughout the last 28 days of exposure to 0.73 ppm or 50 times the concentration in water. In viscera of catfish, <sup>14</sup>C residues ranged from 5.7 ppm at day 1 to a high of 21.67 ppm at day 21 and declined at day 42 to 3.26 ppm. The maximum uptake of visceral <sup>14</sup>C was at day 21 and this was 2044 times the concentration in water. At day 42 the uptake by viscera was 228 times the <sup>14</sup>C in water. During 14 days withdrawal, <sup>14</sup>C in edible tissue decreased to 0.07 ppm or less than 0.5% of the <sup>14</sup>C residues found in tissues at day 14. Visceral samples were not analyzed during withdrawal except at day one.

(c) Summary:

<u>Tissue</u>	<u>Maximum Accumulation Factor</u>
Edible	1450 X
Viscera	2044 X

Note: Plateau of residues in edible tissue occurred at day 14 and then a decline of residues through the final 28 days occurred.

(2) Uptake and Metabolism of  $^{14}\text{C}$ -Prowl by Guppies

(a) Methodology:

Guppies exposed for 48 hours to  $^{14}\text{C}$ -Prowl, with radiolabel in unspecified position. Level of  $^{14}\text{C}$  in water was equivalent to 0.605 ppm of parent compound.

(b) Results:

Whole body guppy residues were 54.55 ppm of  $^{14}\text{C}$  equivalent to parent compound. This amounts to a bioaccumulation factor of 90X the concentration in water. Note that the parent compound is less than 10% of the  $^{14}\text{C}$  in water due to metabolism by guppies or microorganisms in pond water.

(3) Isolation and Identification of Prowl in Catfish from Study (1) Above:

(a) The major  $^{14}\text{C}$  moiety present in catfish muscle tissue at 28 days exposure is parent Prowl.

(b) In water half of the  $^{14}\text{C}$  is due to parent compound, and remainder is in eight unknown metabolites.

(4) Rat Metabolism Study:

About 70% of  $^{14}\text{C}$  (radiolabel and dose unknown) was excreted in feces and 20% in urine in 24 hours. Principal material was parent compound. In muscle 95% of the extractable activity was parent compound, CL 202, 347; CL 99, 900; and CL 113, 072 [4-(1-ethyl-2-hydroxy-propyl) amino]-3,5-O-toluic acid.

102.5 Summary

The above information was taken from various Environmental Chemistry reviews. For more detailed information refer to the appropriate reports.

103.0 Toxicological Properties

103.3 Chronic Toxicity

A progress report containing Exhibits A, B, and C (see attached) was submitted for the Fathead minnow life-cycle study. A few general observations for each Exhibit are presented below:

(1) Exhibit A

Bioaccumulation factors were calculated by the reviewer for carcass, viscera, and whole body residues for day 168 of continuous exposure:

(Day 168)	Mean Measured Concentrations in Water ( $\mu\text{g/l}$ )				
	37	18	7.2	4.5	2.2
	(0.037 ppm)	(0.018 ppm)	(0.0072 ppm)	(0.0045 ppm)	(0.0022 ppm)
<u>Tissue:</u>	<u>(Bioaccumulation Factors)</u>				
Carcass	1378X	1222X	1181X	1067X	1364X
Viscera	8378X	7222X	5000X	3778X	5455X
Whole Body	2162X	1833X	1667X	1400X	1818X

(2) Exhibits B and C:

Exhibits B and C provide biological data for fathead minnows through day 220 (Exhibit B) and day 266 (Exhibit C) of exposure. From the data it appears that significant adverse effects are occurring only at the highest concentration level in the water: mean measured concentration of 38 ppb (nominal concentration of 50 ppb). The adverse effects (in these exhibits) at 38 ppb appear to be:

- (a) Reduced hatchability of eggs from first generation fathead minnows, and

(b) Reduced survival of second generation fry after 30 days continuous exposure.

Further, whole fish residue analyses were performed on second generation fry after 30 days continuous exposure. The following bioaccumulation factors were calculated by the reviewer:

(F1 Fry)	Mean Measured Concentration in Water ( $\mu\text{g/l}$ )				
	38	19	8.0	5.0	2.5
	(0.038 ppm)	(0.019 ppm)	(0.008 ppm)	(0.005 ppm)	(0.025 ppm)
Whole Fish	1158X	521X	562X	820X	600X

104.0 Hazard Assessment

104.1 Discussion

104.1.1 Adequacy of Toxicity Data:

The submitted progress report is acceptable.

104.1.2 Additional Data Required:

A review of the files indicates avian reproduction studies (mallard duck and bobwhite quail) are in order. A request for these studies should be made at an appropriate time (such as at an amendment to an use pattern).

105.0 Conclusions

The progress report is acceptable. Upon submission of the final report a complete evaluation of the chronic-fish bioassay will be made.

*NJ Cook*  
Norman J. Cook  
Environmental Safety Section  
Efficacy & Ecological Effects Branch  
March 28, 1977

Pendimethalin ecological effects review

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