1094401
SHAUGHNESSEY NO.

REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 3/18/82 OUT 5/12/82

FILE OR REG. NO. 707-149, 707-150

PETITION OR EXP.

DATE OF SUBMISSION March 11, 1982

DATE RECEIVED BY HED March 16, 1982

RD REQUESTED COMPLETION DATE May 15, 1982

EEB ESTIMATED COMPLETION DATE

RD ACTION CODE/TYPE OF REVIEW 575/Conditional Registration Follow-up--
long-term data

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

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. R. Mountfort (23)

PRODUCT NAME(S) Blazer 2S: 707-150
Blazer 2L: 707-149

COMPANY NAME Rohm and Haas Co.

SUBMISSION PURPOSE Submission of aquatic embryolarvae study for review.

SHAUGHNESSEY NO.	CHEMICAL & FORMULATION	% A.I.

CHEMICAL: Blazer

CITATION: Biospherics Inc., 1981, "Early Life Stage Study with the Farhead Minnow (Pimephales promelas) Exposed to Blazer Aqueous Technical", prepared for Rohm and Haas Co., Spring Road, Penn., by Biospherics Inc., Rockville, Maryland.

REVIEWED BY: Miachel Rexrode, Fishery Biologist
Ecological Effects Branch
Hazard Evaluation Division (TS-769)

DATE REVIEWED: April 23, 1982

TEST TYPE: Fish Early-Like Stage Study

A. Test Species: Fathead Minnow (Pimephales promelas)
Test Material: Blazer Aqueous 44.08% a.i.

REPORTED RESULTS: Fathead minnow eggs exposed to continuous flow Blazer concentration of 8.0 ppm and greater (analytical concentration) showed increased egg and fry mortality and decreased fry lengths and weights at 30-days post-hatch. The decrease in weight, but not the effect on survival or length, was evident in the 1.5 and 5.14 ppm groups.

REVIEWER'S CONCLUSIONS: This study appears scientifically sound and does meet the EPA guideline requirements for a formulation. Blazer (44.08% a.i.) appears to be toxic to fathead minnow eggs and larvae at the 8.0 ppm level. A reduction in larvae weight occured at the 1.5 ppm concentration level.

Materials/Methods

The objective was to evaluate the effects of continuous exposure to define levels of Blazer Aqueous Technical, 44.08% on the Fathead Minnow during a 35 day egg-larva exposure. An all-glass solenoid diluter system with a dilution factor of 0.5 was used to provide five concentrations and a control. Nominal toxicant levels were 2, 6, 10, 25 and 50 ppm. The dilutes provided replication with a two-way split to two 15-liter test chambers being used for each concentration and the control. Duplicate egg cups made of glass cylinders with Nitex screening on the bottom was used for hatchling of the eggs. Fifty eggs (less than 48 hours old) were randomly distributed to each replicate. Twenty-four hours after all the eggs have hatched, 25 larvae were released into each replicate. Fish were fed twice a day ad libitum. Daily observations for mortalities and abnormal behavior were conducted. At the end of 30-days post-hatch, all fish are weighed and measured.

Dilution water was aerated to maintain total dissolved oxygen concentration level $\geq$ 60% of saturation (water flow through the system is increased when oxygen level falls below 60%). Photoperiod was maintained at 16-hour daylight and 8-hour darkness periods. Temperature was maintained at 25 $\pm$ 2°C; water hardness at 100-150 mg/l as $CaCo_3$; pH at 7.0-7.5.

Statistical analysis was carried out using analysis of variance and multiple comparison techniques.

Reviewer's Evaluation

This study appears to comply with the recommended EPA protocol, 1978, for a formulation. Data on embryos hatched, larval survival, and embryo mortality were analysized using analysis of variance with arcsine transformation. Multiple comparisons among treatment means were conducted after analysis of variance had indicated significant differences between/among means. The Duncan multiple-range test was used for comparing treatment mean response to the control fish response. An alpha=.05 was used in each test to control the risk of concluding that an effect existed when it did not.

The data (Table 1 and 2) demonstrated that fathead minnow eggs exposed to continuous flow Blazer of 10.0 ppm (8.0 ppm^1) 25.0 ppm, (22.70 ppm^1) and 50.0 ppm (51.4 ppm^1) showed increased embryo and larval mortality. This is in agreement with the registrants results.

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An analysis of variance (non-parametric) was conducted upon data concerning fish weight at 30-day post-hatch. A significant decreased in weight (alpha=.05) was noted at 2.0 ppm (1.5 ppm[1]). These results confirm the registrants conclusions.

Blazer (44.08% a.i.) appears to be toxic to fathead minnow eggs and larvae at the 8.0 ppm and greater concentration levels. A significant decrease in larvae weight appears to occur at the 1.5 ppm concentration level and greater.

Category: Core

1> analytical concentration

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TABLE. 1

Summary of 28-Day Larval Growth Data for Fathead Minnows Exposed to Blazer (44.08% a.i.).

Nominal Test Concentration (ppm)	Analytical Concentration (ppm)	No. of Fish	Mean Standard Length (mm)	Mean Wet Weight (g)
50.0	(51.4)	0	--	--
		0	--	--
25.0	(22.70)	0	--	--
		0	--	--
10.0	(8.00)	11	.0169 ± .0057	12.36 ± 1.36
		11	.0199 ± .0066	13.64 ± 1.03
6.0	(5.14)	20	.0504 ± .0137	18.53 ± 1.19
		19	.0476 ± .0129	18.24 ± 1.65
2.0	(1.5)	20	.0625 ± .014	19.75 ± 1.21
		19	.065 ± .013	20.1 ± 1.45
CONTROL		20	.085 ± .028	21.09 ± 2.12
		22	.073 ± .019	19.68 ± 1.29

TABLE. 2

Summary of Embryo Hatch and Larval Survival Data for Fathead Minnows Exposed to Blazer (44.08% a.i.).

Nominal Test Concentration (mg/L)	No of Fish Per Replicate	Embryo Hatch Per Replicate (4)	28-Day Larval Survival (2)
50.0	25	2; 4; 7; 4	0; 0
25.0	25	5; 10; 9; 15	0; 0
10.0	25	18; 16; 15; 17	11; 12
6.0	25	21; 21; 21; 22	19; 20
2.0	25	25; 25; 23; 24	20; 18
Control	25	25; 25; 24; 24	21; 22

100.0 Pesticide Use

Blazer is currently registered as a herbicide for use on soybeans. The registrant is applying for an added use on rice for weed control of hemp sesbania.

100.1 Formulation:

Sodium Acifluorfen --- Blazer 2L .. 20.4% Liquic Conc.
Blazer 2S .. 21.4% Soluble Conc.

100.3 Application Method

Refer to previous reviews. Indentical use information was given for the two products. The only difference between the two formulations is that Blazer 2S contains an [redacted] while Blazer 2L does not.

INERT INGREDIENT INFORMATION IS NOT INCLUDED

101.0 Physical and Chemical Properties (Refer to previous reviews).

103.0 Toxicological Properties

103.1 Mammals: (Reference: Toxicology review (2/25/77)

Test	Species	Formulation	Results
Acute Oral	Rat (male)	39.6%*	3.33 mg/kg
Subacute-Oral	Rat		NOEL 30-50 ppm
Eye Irritation	Rabbit		Severe irritation

103.2 Fish (Reference: Stevens' review 5/1/79)

Test	Species	Formulation	Results	Status
96-hr LC_{50}	Rainbow T.	39.8%	54 mg/l	core
96-hr LC_{50}	Bluegill	39.8%	31 mg/l	core
96-hr LC_{50}	Channel catfish	42.4%	188 mg/l	core

(Reference: Rexrode 5/7/82)

Critical-life Stage	Fathead Minnow	44.08%	**	core

* Technical Blazer; purity cannot be acheived above 44% a.i.

** Appeared to be toxic to minnow eggs and larvae at the 8.0 ppm level. Larvae weight significantly reduced at the 1.5 ppm concention level.

103.2.4 Aquatic Invertebrates (Stevens' Review 5/1/79)

Test	Species	Formulation	Toxicity	Status
48-hr LC_{50}	Daphnia	39.8%	28.1 mg/l	core
96-hr LC_{50}	Freshwater Clam	42.4%	149.7 mg/l	core

103.3 Avian (Stevens' Review 5/1/79)

Test	Species	Formulation	Toxicity	Status
Acute Oral LD_{50}	Mallard	39.8%	4187 mg/kg	core
Dietary LC_{50}	Mallard	39.8%	>10,000 ppm	core
Dietary LC_{50}	Bobwhite	39.8%	>10,000 ppm	core
Reproduction	Mallard	39.8%	>100 ppm	core
	Bobwhite	39.8%	**	

** In the bobwhite quail study the 100 ppm dietary level of RH-6201 resulted in statistically significant lower ($p<0.05$) incidence of 11-day embryo viability than controls, conversely, the 20 ppm test group yielded statistically higher results than controls for the same parameter. No other reproductive effects were observed.

103.4 Estuarine and Marine Organisms

Test	Species	Formulation	Toxicity	Status
96-hr LC_{50}	Grass Shrimp	42.4%	446.4 mg/l	core
48-hr embryo-larvae	Eastern Oyster	42.4%	74.0 mg/l	core
96-hr LC_{50}	Fiddler Crab	39.8%	>1000 mg/l	suppl.

Estimated residue levels of 1.28 ppm in aquatic tissues following two successive applications and a 7-fold increase in residue concentrations, as indicated in a bluegill accumulation study would not be expected to produce tissue residues sufficient to effect predatory mammalian or avian species according to the results of dietary tests on rats, bobwhite quail, and mallard ducks.

Given the persistent nature of sodium acifluorfen and the cultural practice of discharging field water into waterways with its proximity and ultimate transport to estuaries, there is a potential that estuarine fauna will also be exposed to residues following use on rice. Available toxicity data on shrimp, fiddler crab, and oyster embryo-larvae indicate no apparent acute hazard to these species.

No data were available on the toxicity of this chemical to estuarine fish species. Therefore, EEB requests that a 96-hour LC_{50} test be conducted on a acceptable estuarine fish species as provide for in Section 163.723(a) of proposed guidelines published in the Federal Register on July 10, 1978.

104.0 Hazard Assessment

104.1 Discussion (Reference: Raberts' Review 8/5/81)

The proposed label directions of both products (Reg. No. 707-149 and 707-150) for hemp sesbania control in rice indicate that Blazer (sodium acifluorfen) will be applied at a rate of 1 pint (0.125 lb active) per acre with a maximum of two applications annually for a total of 0.25 lb active per acre. Applications are to be applied after rice planting at the late tillering stage up to the early boot stage (June and July). Best coverage is usually obtained when the sesbania is above the rice plants, actively growing, and before the sesbania is in flowering stage.

Following applications of 0.125 lb a.i./A, the maximum expected initial residues on various wildlife food sources and in different environments would be as indicated in the following table:

Application Rates (lb active/acre)	Residues (ppm) Grasses Short-Long		Weeds & Soil Seeds		Water Depth 6"	Water Depth 4'
1st Application 0.125 lb a.i./A	30	13.75	7.25	2.75	0.0913	0.0114
2nd Application (Max. Annual Total) 0.25 lb a.i./A	60	27.5	14.5	5.5	0.1825	0.0228

104.2 Likelihood of Adverse Effects to Non-target Organisms

According to Wildlife Utilization of Croplands (Gusey and Maturgo, 1973, Shell Oil Company) rice fields are utilized by a wide variety of avian species, including water and marsh birds, quail, and songbirds for feeding, nesting, and/or brood-rearing. From the expected initial residue levels and known toxicity levels, it is improbable that the proposed application 0.25 lb active per acre per season will pose an acute or chronic hazard to terrestrial wildlife. While residues on potential food sources are well below known lethal levels for all terrestrial species, the caustic chemical effects found in laboratory animals would be of concern, except that few if any animals would remain in rice fields while spraying is being conducted.

Despite the proximity of rice fields to bayous, lakes, and waterways and the cultural practice of flooding and discharging of field water into irrigation ditches (and ultimately into fish-bearing waters) neither an accidental, direct aerial application nor post-treatment transport of residues to the adjacent aquatic environments should cause adverse affect to aquatic organisms.

Chronic adverse effects to fish reproduction also appear unlikely. A reproductive study on fathead minnows indicated that Blazer (44.08% a.i.) was toxic to eggs and larvae at the 8.0 ppm concentration level. A reduction in larvae weight occured at the 1.5 ppm level.

104.3 Endangered Species Considerations (Reference Rabert (8/5/81))

The distribution of rice in Arkansas, California, Louisiana, Mississippi, Missouri, and Texas corresponds to the range of numerous endangered species. From the available toxicity and bioaccumulation data, the proposed use on rice would appear to present neither an acute hazard to any endangered species nor a chronic hazard to avain and mammalian species, such as the gray bat, Indiana bat, or bald eagle that feed on: aquatic insects over large streams and reservoirs, insects near foliage of riparian and floodplain trees, and fish, respectively from areas potentially exposed to sodium acifluorfen residues from use on rice.

The absence of chronic aquatic data precludes an evaluation of the potential chronic hazard posed to endangered aquatic species, such as the naiad mussel species (i.e., Curtis' pearly mussel, fat pocketbook pearly mussel, and pink mucket pearly mussel) found in rice-growing areas of Arkansas and Missouri or the more remote possibility of adverse effects on the American alligator in numerous counties in the southeastern U.S.. Since reptiles and mussels are typically less sensitive to chemicals than fish, the embryolarvae study on fathead minnows suggests that the use of Blazer provides for no significant hazard to these organisms.

Even though, the threatened fish species, Lahontan cutthroat trout, is found in the rice-growing county of Placer in California, use of sodium acifluorfen on rice would not present a hazard to this species, since this species is found in the upper parts of the Walker River System on the east side of the Sierra Nevada range and at Summit Lake in lodgepole pine areas and not in rice-growing areas of the county. No exposure to this fish species is expected because its distribution is on the opposite side of the Great Divide and upstream from rice-growing areas.

107.0 Conclusions

The fathead minnow early life stage study will support registration. All acute fish and wildlife data requirements have been submitted and will support registration.

EEB has completed an incremental risk assessment of the proposed conditional registration of Blazer for use on rice. Based upon the available data, EEB concludes that the proposed use provide for no significant hazard in acute and chronic risks to non-target organisms. Additional data should enable EEB to complete it's toxicity profile on Blazer and prescribe precautionary labeling.

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