MRID No. 416988-01

DATA EVALUATION RECORD 12/2/1993

1. **CHEMICAL:** Oxyfluorfen, GOAL® Technical Herbicide. Shaughnessey number: 111601.

2. **TEST MATERIAL:** GOAL® Technical Herbicide: active ingredient: 2-chloro-1-(3-ethoxy-4-nitrophenoxy) (trifluoromethyl)-benzene (oxyfluorfen); Lot No. 2-0956; a reddish-brown semi-solid; 71.4% active ingredient.

3. **STUDY TYPE:** Estuarine Fish 96-Hour Static Acute Toxicity Test. Species tested: Sheepshead minnow (Cyprinodon variegatus). 72-3(a) Acute Est. / Marine Fish

4. **CITATION:** Graves, W.C. and G.T. Peters. 1990. GOAL® Technical Herbicide: A 96-Hour Static Acute Toxicity Test with the Sheepshead Minnow (Cyprinodon variegatus). Rohm and Haas Company Research Laboratories, Spring House, Pennsylvania. Rohm and Haas Report Number: 90RC-0009. Submitted by Wildlife International Ltd., Easton, Maryland. EPA MRID Number: 416988-01.

5. **REVIEWED BY:**

Kelly A. Carr
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Signature: Kelly A. Carr
Date: 4/29/91

6. **APPROVED BY:**

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Signature: P. Kosalwat
Date: 5/24/91

Henry T. Craven, M.S.
Supervisor, EEB/HED
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John Noles 5/20/92

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Date: 12/2/93

7. **CONCLUSIONS:** This study appears to be scientifically valid and fulfills the guideline requirements for a 96-hour acute toxicity test with an estuarine fish species. The 96-hour LC_{50} based upon mean measured concentrations of Goal® Technical Herbicide to the sheepshead minnow (Cyprinodon variegatus) was > 0.17 mg/L.

8. **RECOMMENDATIONS:** N/A.

6 hrs

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Sheepshead minnows (Cyprinodon variegatus) used for this test were obtained from Aquatic Biosystems, Inc., Fort Collins, Colorado. The fish were approximately 79 days old at purchase and held for approximately 90 days at Wildlife International. During holding the fish were fed frozen brine shrimp, supplied by Artemia, Inc., Newark, CA, and flaked food from Zeigler Bros., Gardners, PA. The test organisms were acclimated to test conditions for 48 hours prior to the test initiation and were not fed during this time. Sheepshead minnows used for this study had a mean weight of 0.9 grams (g) with a range of 0.5 to 1.2 g. Length ranged from 28 to 40 mm with a mean of 35 mm. Loading biomass of the dilution water control was reported to be 0.6 g/L during the definitive test.

B. **Test System:** The test was conducted in Teflon®-lined, 25-L polyethylene aquaria filled with 15 L of dilution water/test solution to a depth of 16 cm. The test chambers were immersed in a temperature-controlled water bath that maintained test temperature at 22 ± 1°C. The whole system was enclosed in a plexiglass ventilation hood to minimize cross-contamination between test systems.

The natural seawater used as dilution water was transported in by tank truck from the Indian River Inlet in Delaware, filtered through a sand filter (25 µm) and then adjusted to 25 °/₀₀ salinity. The seawater was aerated with spray nozzles and filtered (0.2 µm) again before being added to the test system. Fluorescent lighting was used to provide a 16-hour light: 8-hour dark photoperiod with a 30-minute dawn/dusk transition period. At test initiation, the dilution water had a salinity of 27 °/₀₀, DO of 6.0 mg/L, and pH of 7.9.

C. **Dosage:** A ninety-six-hour static test. Five nominal concentrations of the test material were tested: 13, 22, 36, 60, and 100 mg/L. A solvent control was also maintained at a concentration of 0.34 mL/L (340 ppm) acetone. The test substance (Goal® Technical

Herbicide) was dissolved in Optima-grade acetone for a stock solution concentration of 0.4169 g/mL that was then added to dilution water to create the treatment concentrations. Each treatment contained a solvent concentration ≤0.34 mL/L.

D. **Design:** Five concentrations, a solvent control, and a control were selected for the study. Treatments were duplicated. Ten sheepshead minnows were impartially distributed, by twos, to each duplicate tank, for a total of 20 fish per treatment. Observations were made once every 24 hours for mortality and abnormal behavior. Fish were not fed during the test or during the 48 hours prior to test initiation. Temperature was measured in all test chambers at the beginning and end of the test and was continuously monitored in one solvent control tank. Salinity was measured in one replicate of each treatment at test initiation. DO and pH measurements were taken from one replicate of each treatment at test initiation and every 24 hours thereafter (see attached Table 5).

Samples of each treatment were collected at test initiation and termination for chemical analysis by gas chromatography with EC detection.

Water samples for chemistry were collected from Replicates A and B at test initiation and from Replicate A at test termination. Samples were collected from the center of the test chambers (midway between the top, bottom and sides) then stored in glass bottles in Teflon®-lined cups at 4°C until they were analyzed.

E. **Statistics:** No effects or mortality were observed at the nominal test concentrations of up to 100 mg a.i./L of Goal® Technical Herbicide. Therefore, the 24-, 48-, 72-, and 96-hour LC50 values were greater than 100 mg a.i./L (nominal concentration). The no-observed-effect concentration was 100 mg a.i./L (nominal concentration).

12. **REPORTED RESULTS:** The concentrations of Goal® Technical Herbicide were measured from water samples taken on Day 0 and Day 4 of the study (Table 1, attached). Mean measured concentrations were: 0.07, 0.06, 0.13, 0.11, and 0.17 mg a.i./L. These corresponded to nominal concentrations of: 13, 22, 36, 60, and 100 mg a.i./L. The discrepancy between the measured and the nominal concentrations was attributed to the fact that the concentrations used in the study far

exceeded the solubility of the test substance (0.1 mg/L in water). Most of the chemical precipitated out of solution and accumulated on the surface of the water in each tank.

The results of the test are presented in Table 6 (attached). No treatment-related effects or mortalities were observed at any treatment concentration tested. In the three highest concentrations, fish exhibited signs of surfacing on Day 4 of the study in response to a drop in DO levels that occurred between 72 and 96 hours. It was proposed that the drop in dissolved oxygen could have been due to the accumulation of precipitated chemical on the surface of the water preventing normal oxygen exchange.

The reported 24-, 48-, 72- and 96-hour LC_{50}'s, based upon nominal test concentrations, were greater than 100 mg a.i./L (0.17 mg a.i./L measured concentration). Measured concentrations corresponded to the 0.1 mg/L solubility limit of the test substance in each concentration. The NOEC was 100 mg a.i./L, nominal concentration.

During the course of the study, DO concentrations ranged from 3.0 mg/L to 6.6 mg/L (the lowest at 39% of saturation). The pH ranged from 7.1 to 7.9 mg/L. Temperature ranged from 19.3 to 23.0°C from measurements made in each tank at the beginning and end of the test and from 21.0 to 23.2°C from the continuous temperature readings in one Solvent Control tank.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No mortality or treatment-related signs of toxicity were observed in the sheepshead minnows at concentrations up to 100 mg a.i./L nominal concentration (0.17 mg/L measured concentration) of Goal® Technical Herbicide. The 24-, 48-, 72-, and 96-hour LC50 values were greater than 100 mg a.i./L (nominal concentration) and the no-observed-effect concentration (NOEC) was 100 mg a.i./L (nominal concentration).

A GLP compliance statement was included in the report and the study was audited by Wildlife International's Quality Assurance Unit. A statement of quality assurance was included in the report, indicating that the study was considered to satisfy the requirements of the USEPA Good Laboratory Practice Standards as set forth in Title 40 of the Code of Federal Regulations, Part 160.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

A. Test Procedure: Test procedures were generally in accordance with protocols recommended by the Guidelines, but deviated from the SEP as follows:

- The SEP recommends a salinity range of 10 to 17 °/$_{oo}$ for estuarine species of which the sheepshead minnow is a member. Salinity for this study was 27 to 28 °/$_{oo}$.
- The SEP recommends that the test temperature not deviate by more than 1°C during the test. Deviation in the test tanks in this study was 3.7°C from beginning to end with a difference between treatment temperatures at test initiation of 1.4°C.
- The SEP recommends that the loading factor of test organisms to volume of test solution/dilution water be no greater than 0.5 g/L in static tests at temperatures above 17°C. The loading factor for this study was 0.6 g/L.
- The SEP states that the test organisms should be added to the test chambers within 30 minutes after the test material is added. The report did not state when the animals were added.
- The report did not specify whether the length of fish was as standard or total length.
- The SEP states that the DO concentration should remain above 40% saturation after 48 hours. In this study the DO dropped just below 40% (39%) on the last day of the study.

B. Statistical Analysis: No statistical analysis was performed, as no concentration effects or mortalities were observed up to and including the highest concentration tested (100 mg/L nominal concentration).

C. Discussion/Results: All nominal test concentrations greatly exceeded the solubility of the test substance in water (0.1 mg/L). The maximum mean measured concentration tested was 0.17 mg/L and at this concentration no mortality or adverse sublethal effects were observed. Therefore, the 96-hour LC_{50} for sheepshead minnows exposed to GOAL® Technical Herbicide was > 0.17 mg/L mean measured concentration.

The NOEC was 0.17 mg/L.

D. **Adequacy of the Study:**

(1) **Classification:** Core.

(2) **Rationale:** Although the test procedures deviated slightly from the guidelines, the reviewer does not believe they significantly affected the validity of the toxicity results.

(3) **Repairability:** N/A

15. **COMPLETION OF ONE-LINER:** Yes, April 29, 1991.

RIN 0637-00

EFED Review - Oxyfluorfen

Page____ is not included in this copy.

Pages 7 through 8 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

X FIFRA registration data.

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____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

GOAL® Technical Herbicide

Shaughnessy No. 111601 Chemical Name (Oxyfluorfen) Chemical Class technical

Study/Species/Lab/ Accession	Chemical % a.i.	Results	Reviewer/ Date	Validati Status
14-Day Single Dose Oral LD_{50} Species _____ Lab Acc.		LD50 = mg/kg (95% C.L.) Contr. Mort.(%)= Slope= # Animals/Level= Age(Days)= Sex = 14-Day Dose Level mg/kg/(% Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
14-Day Single Dose Oral LD_{50} Species _____ Lab Acc.		LD50 = mg/kg. (95% C.L) Contr. Mort.(%)= Slope= # Animals/Level= Age(Days)= Sex = 14-Day Dose Level mg/kg/(% Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
8-Day Dietary LC_{50} Species Lab _____ Acc.		LC50 = ppm (95% C.L.) Contr. Mort.(%)= Slope= # Animals/Level= Age(Days)= Sex = 8-Day Dose Level ppm/(%Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
8-Day Dietary LC_{50} Species Lab _____ Acc.		LC50 = ppm (95% C.L) Contr. Mort.(%)= Slope= # Animals/Level= Age(Days)= Sex = 8-Day Dose Level ppm/(%Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
48-Hour LC_{50} Species Lab _____ Acc.		LC50 = pp__ (95% C.L.) Contr. Mort.(%)= Sol. Contr. Mort.(%)= Slope= # Animals/Level= Temperature = 48-Hour Dose Level pp /(%Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
96-Hour LC_{50} Species Lab _____ Acc.		LC50 = pp__ (95% C.L.) Con. Mor(%)= Sol. Con. Mor.(%)= Slope= # Animals/Level= Temp.= 96-Hour Dose Level pp /(%Mortality) ( ), ( ), ( ), ( ), ( ) Comments:	_____	_____
96-Hour LC_{50} Species Cyprinodon variegatus Lab Wildlife International Acc. 416988-01	71.4%	LC50 = >0.17 ppm (95% C.L) Con. Mort.(%)= 0 Sol. Con. Mort.(%)= 0 Slope= # Animals/Level=20 Temp.= 96-Hour Dose Level ppm /(%Mortality) (0.07), 0 (0.06), 0 (0.14), 0 (0.11), 0 (0.17) 0 Comments: As mean measured concentrations	KAC 4-29-91	CORE

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