3/11/86

Aquatic Field Study Team

Date

ROUTING AND TRANSMITTAL SLIP

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. Norman Cook	NC	3.11.86
2. Les Touart		
3. Ann Stavola		3/24/86
4. Dan Rieder 3/24/86		See Comments on yellow tabs
5. John Bascietto	JB	
6. Richard Lee		and Return Conversation 3/24/86

As Requested	For Correction	Prepare Reply	
Circulate	For Your Information	See Me	3/24/86
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Coordination	Justify		

REMARKS

Subject: Proposed aquatic field protocol for Pydrin (Fenvalerate). This is similar to the Fluvalenate protocol that was reviewed 2/25/86.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
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5041-102

OPTIONAL FORM 41 (Rev. 7-76)
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☆ GPO : 1981 O - 341-529 (120)

SHAUGHNESSEY NO. _____ REVIEW NO. _____

EEB REVIEW

DATE: IN 12-12-85 OUT _____

FILE OR REG. NO 201-401

PETITION OR EXP. NO. _____

DATE OF SUBMISSION 12-9-85

DATE RECEIVED BY HED 12-11-85

RD REQUESTED COMPLETION DATE 01-10-86

EEB ESTIMATED COMPLETION DATE 01-10-86

RD ACTION CODE/TYPE OF REVIEW 192

_____

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

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. G. LaRocca (15)

PRODUCT NAME(S) Pydrin

_____

COMPANY NAME Shell Oil Company

SUBMISSION PURPOSE Proposed aquatic field protocol for review.

_____

_____

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.

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1. PESTICIDE NAME: Fenvalerate

2. STUDY TYPE: Mesocosm for a simulated aquatic field test.

3. PESTICIDE USE: Insecticide/cotton: simulated aquatic.

4. STUDY PURPOSE: Satisfy requirements of a tier 4 aquatic test as per 158 guidelines.

5. SITE DESCRIPTION:

Study will be conducted by Wildlife International LTD., in a cotton growing area in the Southern United States, or on the Wildlife International Ltd., farm located near St. Michaels on the Eastern Shore of Maryland. A series of twelve pounds approximately 0.25 acres in size will be used.

6. PROPOSED STUDY METHODS:

Test Ponds: A series of twelve 0.25 acre ponds will be used. Nine will be treated, three will be untreated controls. Each pond will measure approximately 160 feet X 108 feet, with a total surface area of 140 X 75 feet. The maximum depth will be 8 feet. Ponds sides will be sloped to maximize the littoral zone. Ponds will be constructed to prevent leakage or infiltration and will be filled by rainfall or pumping from wells or surface water. Each pond will be surrounded by a earthen berm to prevent inflow of runoff. Water will be added or removed to maintain constant depth.

Pretest Analysis: Soil and water involved in the study, including the water in the biological collection pond, will be chemically analyzed for the parameters listed in Tables I (soil), II, and III (water).

Biological Loading: Phytoplankton, zooplankton, benthic invertebrates and rooted vegetation will be collected from nearby ponds for inoculation of test ponds. Lights will be placed by the test ponds at night to attract insects that will deposit eggs.

Each pond will be stocked with bluegill sunfish at 20 to 30 pounds per acre (5 to 8 pounds per quarter acre pond). The ratio of male to female will be approximately 50:50. The fish will be marked at the time of stocking according to size, those 8-14 cm in one group and 15-20 cm in other group. (3-6 inches and 6-8 inches).

Fertilization: Ponds will be fertilized according to recommendations from soul conservation service personnel and fishery experts in order to maintain a high level of productivity.

Sample Stations: The ponds will be divided into three zones (two littoral and one deep water). Physical, chemical, and biological samples will be collected at 20-foot intervals along each zone.

Sample Schedule: Pre-treatment, weekly samples will be taken at one sampling point in each zone beginning 6 weeks pretreatment. Post-treatment, weekly samples will be taken at each sampling station through September. There will be samples taken once in October and once in November at each sample station.

Proposed Sample Collection:

Physical and Chemical Measurements: Dissolved oxygen, pH, temperature, alkalinity, hardness, total suspended solid, BOD, COD, nitrogen, and phosphorus will be measured each sample day.

Residue analysis will begin after ponds are treated. Samples will include pond water, pond sediment, and dead fish found during the study and all fish collected at the end of the study.

Biological sampling will include sampling for phytoplankton, chlorophyll and pheophytin, photosynthesis, biomass (using ATP), filamentous algae, macrophytes, zooplankton, macroinvertebrates (using artificial substrates and emergent traps), and fish.

7. EXPOSURE REGIME:

Aerial spray drift and sediment runoff are the two major sources of exposure under actual use conditions. These two means of exposure will be studies in the treatment pond.

Each treatment pond will receive simulated aerial drift every seven days for a ten week period. In addition, runoff events will be simulated at approximately one per month for a total of three. Test concentrations for drift and runoff are noted in Table 1.

TABLE 1. Test Concentrations of Pydrin

GROUP	DRIFT (ppb)	RUNOFF (ppb)	REPLICATES
Control	0	0	3
Low	0.04	7.5	3
Medium	0.4	75.0	3
High	4.0	750.0	3

The 750 ppb concentration takes into account multiple applications, spray overlap, band applications, and other factors which may result in high residues of the test substance in soil. Three runoff events will be scheduled, one every 30 days for each pond.

Approximately five cubic feet of sediment will be treated with the test material using a cement mixer. Treated homogeneous sediment will be deposited along the banks on the two long sides of each treatment pond. Control ponds will receive untreated soil. Sediment will be introduced into each pond by washing the sediment into the ponds using simulated rainfall.

8. PROTOCOL EVALUATION:

The Ecological Effects Branch has reviewed the revised study protocol (Fenvalerate) and assessed its utility for predicting hazard to aquatic organisms from drift and run-off exposure. This protocol has been rejected because of certain inadequacies. The following questions and comments are meant to help clarify and assist in the development of this protocol:

A. Test Site

1. Need to identify the study site (specific location, soil type, etc).

2. Ponds should have one littoral zone and one deep zone. One third of the pond should have a depth greater than 1.5 meters in order to limit macrophyte growth.

3. How will ponds be lined to prevent leakage or infiltration?

4. Pond sediment should be at least 15 cm in depth.

B. Fertilization

1. What will be an acceptable fertilization level and how can this alter the effects of the test material?

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C. Sediment Lay-By

1. The mixing of sediment and test material into a homogeneous concentration is not going to provide the appropriate exposure. For example, if a pesticide has a Kd = 1000 we can assume that after partitioning, 50% of the runoff will be found in the water phase and the remaining 50% will be located in the sediment phase. According to Burns (USEPA Athens laboratory), test material equivalent to the amount that would be discerned in the water phase after partitioning (runoff) should be applied directly to the water edge. The corresponding material-laden soil should also be introduced into the pond directly. Washing the sediment into the pond with simulated rainfall is not advised.

D. Residue and water chemistry sampling

1. Three inch core samples (residue analysis) are acceptable with the following considerations:

   a. A separate analysis of the top 0.5 inches (hydrosoil, floc) sediment should be conducted. Fenvalerate is expected to be at it's highest concentration in this segment.

   b. Separate analysis of each of the next 0.5 inch and succeeding one inch sections should demonstrate Fenvalerate movement into the aquatic sediment (total of 3").

2. Triplicate sampling of all water parameters and residues is preferred.

3. Fenvalerate analysis: detail the methodology used for analysis and extraction, specifying detection limits.

E. Treatment Frequency

1. Fenvalerate label states that the pesticide is not to be applied at more than 0.5 lbs ai/A per season (ie 5 times at the maximum rate of 0.1 lb ai/A or 9 applications at 0.055 lbs ai/A).

2. The protocol indicates that one large dose of 6.0 ppm is to simulate multiple applications. Registrant should follow, as close as possible, an exposure regime comparable to the actual usage recommendations on the fenvalerate label. It should be emphasized that the study may not be acceptable if application is not credible.

F. Invertebrate Studies

1. Laboratory Toxicity Testing: These tests must be conducted on several taxa that are to be introduced into the test ponds. This will establish taxa and species sensitivity and develop a data base for explaining population and on-site bioassay effects. A progress report should be submitted to EPA after these tests are conducted.

2. On-Site Bioassays: The most sensitive representatives of copepods, cladocerans, amphipods, and aquatic insects will be tested in containers placed in the ponds. Depending upon various parameters (i.e., surface temperature) these test vessels can be stainless steel screen (silicon adhesive) cylinders (8.4 cm diameter X 10 cm high) fitted with styrofoam collars and tethered during exposure. Five to six different species should be tested (10 organisms per vessel) at 2 to 3 day intervals. These exposure times should include treatment, post-treatment, and non-exposure (control pond).

3. Population Evaluation: State when sampling is to occur and number of replicates (i.e., zooplankton: sampling occurs with triplicate horizontal tows on a set schedule each sampling day). Pesticidal effects in the population can be correlated with bioassay testing in the laboratory and at the pond site. This testing procedure has been adopted by the USEPA laboratory at Duluth (John Eaton, Richard Anderson). with good results.

G. Larval Fish Study

1. Spawning activity must be determined through the week (i.e., Monday, Wednesday, Friday) by randomly sampling the spawning substrates,

   a. Direct sampling of the nest to discern embryo development and viability.

   b. Drifting fish larvae can be collected by traps and nets.

H. Statistical Analysis: The registrant should submit raw data with suitable statistical analysis for EPA's perusal. Quarterly progress reports must be submitted to the Agency.

9. SUGGESTED MODIFICATIONS: N/A

10. CONCLUSIONS: Protocol accepted _____
Protocol accepted with modifications _____
Protocol rejected X

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