Shaughnessy Number: 109301

Date out of EFGWB: 7/2/90

To: George LaRocca/Adam Hayward
Product Manager 15
Registration Division (H7505C)

From: Henry Nelson, Acting Section Head H Nelson
Environmental Fate Review Section #3
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Thru: Hank Jacoby, Chief Hank Jacoby
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Attached, please find the EFGWB review of...

Reg./File #: 352-515

Chemical Name: (S)-cyano(3-phenoxyphenyl)methyl-(S)-4-chloro-α(1-methylethyl) benzeneacetate

Common Name: Fenvalerate

Type Product: insecticide

Product Name: Asana XL 0.66% EC

Company Name: E.I DuPont de Nemours

Purpose: submission of label and tolerance petition for new uses on alfalfa and lettuce

Date Received: 3/26/90

Action Code: 330

EFGWB#(s): 90-0466

Total Reviewing Time (decimal days): 3.0 days

Deferrals to: ___Ecological Effects Branch, EFED

___Science Integration and Policy Staff, EFED

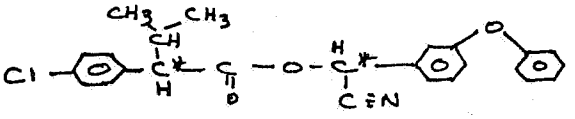
___Non-Dietary Exposure Branch, HED

___Dietary Exposure Branch, HED

___Toxicology Branch

1. CHEMICAL:

chemical name: (S)-cyano(3-phenoxyphenyl)methyl-(S)-4-chloro-α(1-methylethyl)benzeneacetate
common name: fenvalerate
trade name: pydrin
structure:



CAS #: 51630-38-1
Shaughnessy #: 109301

2. TEST MATERIAL: n.a.

3. STUDY/ACTION TYPE:

submission of label and tolerance petition for new uses, alfalfa and lettuce

4. STUDY IDENTIFICATION: no study. Submission is a new use and tolerance petition dated 2/27/90 from DuPont (signed by D. Westner) to G. LaRocca (PM 15) of RD/OPP

5. REVIEWED BY:

Typed Name: E. Brinson Conerly E.B. Conerly 6/28/90
Title: Chemist, Review Section 3
Organization: EFGWB/EFED/OPP

6. APPROVED BY:

Typed Name: Henry Nelson H Nelson 6/28/90
Title: Acting Section Head, Review Section 3
Organization: EFGWB/EFED/OPP

7. CONCLUSIONS:

1) There are no environmental fate data in the submission.

2) Since these are new, additional uses, EFGWB has no prior use rates on these crops with which to compare them. The proposed application rates (0.05 lb/A per season on lettuce or per cutting on alfalfa) are approximately 1/10 of the proposed use rates on carrots and brussels sprouts (0.4 - 0.5 lb/A/yr).

3) The addition of new crops and the retention of old ones means an overall increase in the total amount of active isomer applied. EFGWB would need to know the proposed additional amount expected to be used on these two crops in order to make an assessment of how significant this is relative to what is already in use on other crops. However, since 3/4 of the racemic mixture was pesticidally inactive, and will no longer be applied, the result seems to be an overall decrease of compound in the environment.

4) Several unfulfilled data requirements, identified as early as 2/4/86 and recently noted in EBC 4/6/90, have not been addressed. It is not known whether these studies are in progress.

5) The data which do exist were developed almost exclusively on the racemic mixture. Whether they apply to the isolated pure active isomer is still an open question, which the promised field study (see below) might answer.

6) Available data indicate that fenvalerate should not, in most cases, be a serious threat to ground water. It could, however, reach and persist in the sediment in bodies of surface water, and perhaps affect bottom feeding organisms living there.

8. RECOMMENDATIONS:

1) The applicant should, with all due speed, submit acceptable hydrolysis and fish bioaccumulation studies.
2) The applicant should submit a report of the field dissipation study which a previous review (JMJ 2/4/86) indicated would be performed, since EFGWB does not have this information on file. Its acceptance is not guaranteed. This study might provide the necessary support for the applicant's position that the degradative behavior of esfenvalerate is not significantly different from that of the racemic mixture.
3) With those exceptions, no further data are required by EFGWB at this time.
4) EEB should be informed of the potential of esfenvalerate to reach surface water and to persist there in the sediment.

9. BACKGROUND:

These are **new, proposed** uses for alfalfa and lettuce. The proposed rate for alfalfa is a maximum of 0.05 lb/A/cutting. The proposed rate for lettuce is a maximum of 0.05 lb/A/season.

The products which were formerly marketed as ***fenvalerate*** consisted of equal amounts of four isomers, all of which were claimed as active on the labels. Actually, only one isomer, the S,S-isomer, is pesticidally active. The new products essentially contain only the pure active isomer. The new labels, therefore will call for only ca. 1/4 the application rate of the old ones, and the products will contain correspondingly less "active ingredient". The applicant is in the process of revising labels and formulations to reflect this change.

Data requirements for the racemic mixture have been fulfilled except for the following:

HYDROLYSIS -- An acceptable hydrolysis study is required. The hydrolysis data requirement was previously declared fulfilled, but this was an error -- for details see EBC 4/6/90. An acceptable study will be valid for both the racemic mixture and the active isomer.

FISH BIOACCUMULATION -- an acceptable study on fish bioaccumulation is also required.

The applicant is using data developed in studies on the racemic mixture (25% each of four isomers) to support registration of the S,S-isomer, now isolated in a relatively pure form. To use data from a racemic mixture to predict behavior of an isomer might be misleading: although the rates of chemical processes would not vary significantly from isomer to isomer, those of biologically mediated processes might. The limited amount of data provided by one study (reviewed in JMJ 2/4/86), the aerobic soil metabolism study described below, indicates that fenvalerate is probably not such a case. The S,S-isomer has a very similar half-life (75 days) when isolated to that observed when it is present as a part of a racemic mixture (95 days). In the same review, the applicant was required to submit information and a field dissipation study to support their stated position that the various isomers had similar behaviours. THIS INFORMATION HAS NOT BEEN RECEIVED. The field dissipation study, *which should be submitted as soon as possible*, may provide additional evidence of similarity.

Per the product manager (EPA/RD), DuPont will no longer market the isomeric mixture.

The status of data requirements, taken from Dynamac reviews of 3/18/86 and 3/9/88, is given below. Studies were apparently performed using the racemic mixture unless otherwise stated.

hydrolysis -- **NOT SATISFIED**, although previous EFGWB summaries stated otherwise -- two reviewed studies (Acc. #s 243109 and 096386 -- Dynamac 3/18/86) were not acceptable. The review of one study says that fenvalerate is stable up to 93.5 hours, and then states that the study is not acceptable because it was discontinued too soon. EFGWB did not incorporate the second statement in its summary. A second study at elevated temperature was not acceptable for several reasons -- organic solvent in the mixture, incorrect pH.

photolysis in water -- satisfied (MRID # 404438-01 -- Dynamac 3/9/88) -- half-life of 6 days at pH 5 vs a dark control with (hydrolytic) half-life of 13.8 days. This study may not have been done at the pH of greatest stability, since acceptable hydrolysis data have not been reviewed.

soil photodegradation -- satisfied (Acc. #s 096386, 097296 -- Dynamac 8/18/86) -- half-life of phenoxyphenyl labelled compound was 14-28 days on sandy loam soil; more than 50% of chlorophenyl material was undegraded after 28 days -- under natural light, 53% was undegraded; under artifical light, 60% was undegraded.

aerobic soil metabolism -- satisfied (Acc. # 254470 -- Dynamac 8/18/86) -- **THE S,S-ISOMER WAS TESTED** -- half-lives of 65 days to more than 1 year in a variety of soils -- A study was submitted and accepted (JMJ 2/4/86) which demonstrates that in a silt loam soil the isolated S,S-isomer degrades with a half-life of 75 days. When followed as part of the racemic mixture, this same isomer has a half-life of 95 days under otherwise similar conditions. The same review mentions a field dissipation study to be performed using the single isomer.

anaerobic soil metabolism -- satisfied (Acc. # 254470 -- Dynamac 8/18/86) -- rates similar to aerobic metabolism

leaching/adsorption/desorption -- satisfied (Acc. # 243109 -- Dynamac 8/18/86) for aged and unaged *via column leaching studies* -- immobile in sand, sandy loam, loam, and silt loam; 88% was found in the top 3 cm after leaching with 20 cm of water

terrestrial field dissipation -- declared satisfied based on 1979 study (Acc. # 243109 -- Dynamac 8/18/86); there is no review on file of a field dissipation study which was supposed to have begun in 1986 to test the S,S-isomer -- in the 1979 studies, half-lives of 25 days in sandy loam (AZ), 34 days in clay loam (OK), 54 days in silt loam (LA), and 54 days in sandy loam (AL)

confined accumulation in rotational crops -- satisfied (Acc. #s 242588 -- Dynamac 8/18/86), residue detected up to 0.061 ppm

field accumulation in rotational crops -- (Acc. #s 261050, 242588, 248812 -- Dynamac 8/18/86) no residues detected (lod 0.01 ppm)

fish bioaccumulation -- **NOT SATISFIED** (Acc. # 096386 -- Dynamac 8/18/86) -- maximum BCF in edible tissue of rainbow trout ca 400x when exposed in a static system

ENVIRONMENTAL FATE ASSESSMENT

Fenvalerate is susceptible to degradation *via* a number of pathways (see summary below). Fenvalerate and its degradation products did not show mobility when tested with a variety of soils.

hydrolysis ("semi-valid" data) --	$t_{1/2}$	13.8 days pH 5
aqueous photolysis --	$t_{1/2}$	6 days pH 5
soil photolysis --	$t_{1/2}$	14 - 28 days in sandy loam
aerobic soil metabolism --	$t_{1/2}$	65 - 365 days
anaerobic soil metabolism --	$t_{1/2}$	similar to aerobic
terrestrial field dissipation --	$t_{1/2}$	25 - 54 days

GROUND WATER ASSESSMENT

The combination of susceptibility to hydrolysis and photolysis and lack of mobility indicate that fenvalerate is not likely to contaminate ground-water. If it should reach ground water, a major means of disappearance would be hydrolysis, which would probably be relatively rapid. Some relatively slow metabolism could also occur.

SURFACE WATER ASSESSMENT

Fenvalerate is apparently relatively susceptible to hydrolysis and photolysis, but could reach bodies of surface water during a runoff event. It would be carried on soil particles, and, remaining with them, become part of the sediment. Once there, it would dissipate by means of hydrolysis (possibly at a relatively fast rate), and metabolism (which would likely be slow). During the time it is in the body of water, it could cause adverse effects to bottom feeders living there.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES: n.a.

11. COMPLETION OF ONE-LINER: no information added

12. CBI APPENDIX: n.a.