Shaughnessy No.: 110201

Date out of EFGWB: DEC 20 1989

To: Joanne Miller
Product Manager 23
Registration Division (H7505C)

From: Emil Regelman, Supervisory Chemist
Environmental Fate Review Section #2
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

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

Attached, please find the EFGWB review of...

Reg./File #: 55947-UR

Chemical Name: Prodiamine

Type Product: herbicide

Product Name: Endurance 65WDG

Company Name: Sandoz Crop Protection

Purpose: submission of data -- hydrolysis in salt water

Date Received: 9/20/89

Action Code: 426

EFGWB#(s): 90791

Total Reviewing Time (decimal days): 2.0

Deferrals to: ___Ecological Effects Branch, EFED

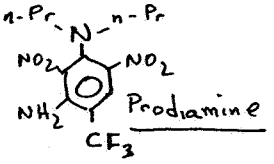
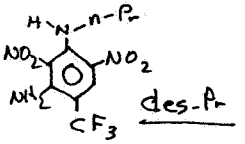
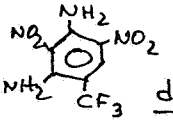
___Science Integration and Policy Staff, EFED

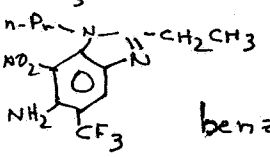
___Non-Dietary Exposure Branch, HED

___Dietary Exposure Branch, HED

___Toxicology Branch

1. CHEMICAL:

chemical name:	N^3,N^3-Di-n-propyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylenediamine
common name:	Prodiamine
trade name:	Endurance
structure:	 Prodiamine  des-Pr  di-des-Pr
CAS #:	29091-21-2
Shaughnessy #:	110201

 benzamide derivative

2. TEST MATERIAL: discussed under DER

3. STUDY/ACTION TYPE:

hydrolysis in salt water

4. STUDY IDENTIFICATION:

Fostiak, W. **Hydrolysis of Prodiamine in Salt Water**. Sandoz Crop Protection Corp., Des Plaines, IL. dated 7/3/89. received EPA 8/2/89, MRID# 411872-01.

5. REVIEWED BY:

Typed Name:	E. Brinson Conerly
Title:	Chemist, Review Section 2
Organization:	EFGWB/EFED/OPP

E. B. Conerly 12/20/89

6. APPROVED BY:

Typed Name:	Emil Regelman
Title:	Supervisory Chemist, Review Section 2
Organization:	EFGWB/EFED/OPP

DEC 20 1989

7. CONCLUSIONS:

1) An in-depth critical review by EFGWB is not appropriate at this time since the study does not directly relate to any of the unfulfilled EFGWB data requirements. It does provide supplementary evidence that prodiamine is hydrolytically stable.

2) The applicant company claims that certain aquatic ecotoxicity studies are impracticable and unnecessary due to the compound's very low solubility -- specifically, that prodiamine is not significantly more soluble in salt water than in fresh. This is a decision that rests with EEB.

8. RECOMMENDATIONS:

EEB should determine whether they choose to waive the aquatic toxicity studies.

Tox and Dietary Exposure Branches should determine whether the apparent persistence and potential for bioaccumulation are matters of concern.

As mentioned in the most recent review, the applicant should

1) submit studies to fulfill outstanding data requirements:
   - soil photolysis
   - anaerobic soil metabolism
   - fish bioaccumulation

2) supply information for completion of the following requirements:
   - hydrolysis -- confirmatory analyses
   - aerobic soil metabolism -- confirmatory analyses
   - adsorption/desorption -- data on the 6-imidazole metabolite alone
   - turf dissipation -- analyses on uncomposited soil samples

9. BACKGROUND:

The solubility of prodiamine is reported as 0.05 ppm in pH 8 salt sea water with 1% methanol as cosolvent, vs 0.013 ppm in water.

Prodiamine is a preemergent herbicide used to control annual grasses and broadleaf weeds. Submitted environmental fate studies have not generally been fully acceptable. With that *caveat*, however, available information indicates a compound with a long hydrolytic, short photolytic, and moderately long metabolic half-life; a tendency to leach; and potential to accumulate in fish and root crops.

The status of data requirements is as follows:

hydrolysis -- additional information needed on guidelines studies, but a half life in excess of 6 months is indicated at all three pHs

photolysis in water -- fulfilled 5/13/80 -- not done under current Guidelines. A short half life (ca. 20 min.) is indicated

soil photodegradation -- unacceptable 5/14/80

aerobic soil metabolism -- additional information needed, half-life ca. 2 mos, one major product

anaerobic soil metabolism -- unacceptable 5/14/80

leaching/adsorption/desorption -- acceptable unaged study indicates immobility in four soils, unacceptable aged study suggests immobility in one soil

turf terrestrial field dissipation -- information needed, no leaching or significant dissipation noted

confined accumulation on rotational crops -- satisfied 5/14/80 -- no significant accumulation except in root crops -- not current Guidelines

fish bioaccumulation -- not acceptable, significant accumulation and slow depuration

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES: See individual DER.

11. COMPLETION OF ONE-LINER: no information added

12. CBI APPENDIX: see individual DER

DATA EVALUATION REVIEW 1

I. Study Type: hydrolysis in salt water

II. Citation:

Fostiak, W. Hydrolysis of Prodiamine in Salt Water. Sandoz Crop Protection Corp., Des Plaines, IL. dated 7/3/89. received EPA 8/2/89, MRID# 411872-01.

III. Reviewer:

Typed Name: E. Brinson Conerly E.B. Conerly 12/20/89
Title: Chemist, Review Section 2
Organization: EFGWB/EFED/OPP

IV. Conclusions:

This study is not directly related to EFGWB data requirements. It does indicate stability of prodiamine to hydrolysis. The reported hydrolytic products are des- and didespropyl analogs of parent, and the benzamidazole formed by cyclization between one of the propyl groups and the nitro group in the 2-position. The original aromatic ring structure persists throughout these reactions.

V. Materials and Methods:

test compounds
- Prodiamine uniformly ^{14}C-labelled in the phenyl ring, >98% radiopure, 8.227×10^5 dpm/ml (5 ug/ml)
- analytical grade prodiamine
- reference compounds -- N-despropyl prodiamine; N,N-didespropyl prodiamine; 6-amino-2-ethyl-propyl-7-nitro-5-trifluoromethyl-benzimidazole

test solution -- 50 ppb prodiamine in pH 8 seawater

analytical methods
- TLC -- precoated silica gel G
  - hexane/ethyl acetate (70:30)
  - chloroform/ethyl acetate (90:10)
  - butanol/water/glacial acetic acid (60:25:15)
- LSC -- on spots scraped from TLC plates
- GC
- GC-MS

VI. Study Author's Results and/or Conclusions:

RESULTS:
Organic extractable radioactivity decreased slowly while aqueous residuals increased slightly. On day 0, 99.86% of the radiocarbon was in the organic extract, and 0.14% in the aqueous residuals. By day 30, this changed to 93.21% and 1.13% respectively. Methanol wash of solution bottles remained

relatively constant during the period of the study (0.60 to 1.28% of the radiocarbon). The material balance ranged between 95% and 100%.

Prodiamine exhibited slight hydrolysis. On day 0 the percent of applied prodiamine was 94.82%, decreasing to 87.11% by day 30.

CONCLUSIONS:
Hydrolysis is not expected to be a major factor in the degradation of prodiamine in a sea salt environment. Based on this study and apparent first order kinetics, prodiamine hydrolyzes very slowly in sea salt solution at pH 8.0 with a rate constant of 0.00172 day^{-1} and a half life of > 30 days.

VII. Reviewer's Comments:

This study was intended by the applicant to support their position that certain ecotox studies are impracticable due to very low solubility. It does not directly relate to EFGWB data requirements, but does support the indications from the regular study that the compound is stable to hydrolysis.

VIII. CBI Information Addendum: n.a.