EEL BRANCH REVIEW

DATE: IN 12-18-83 OUT 3-21-84

FILE OR REG. NO. 10182-AL, 10182-AU, 10182-IN

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 12-8-83

DATE RECEIVED BY HED 12-14-83

RD REQUESTED COMPLETION DATE 3-4-84

EEB ESTIMATED COMPLETION DATE 2-29-84

RD ACTION CODE/TYPE OF REVIEW 106/New Chemical

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

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. T. Gardner (17)

PRODUCT NAME(S) Cymbush 3E, Cymbush 2E, Cymbush OL

COMPANY NAME ICI Americas, Inc.

SUBMISSION PURPOSE Registrant response concerning aquatic field study

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

1
MEMORANDUM

TO:       Tim Gardner, Team 17
          Registration Division, TS-767c

THRU:     David Coppage, Head Sec. 3
          Ecological Effects Branch
          Hazard Evaluation Division, TS-769c

THRU:     Clayton Bushong, Chief
          Ecological Effects Branch
          Hazard Evaluation Division, TS-769c

SUBJECT:  ICI's Response Concerning an Aquatic Field Study with Cymbush 3E,
          Cymbush 2E, Cymbush OL; File Nos. 10182-AL, 10182-AU, and 10182-IN.

Cymbush is the trade name for cypermethrin. Based on laboratory data,
cypermethrin is extremely toxic to aquatic organisms. LC50's ranges of 4-10
parts per trillion are not uncommon. Because of this and environmental fate
data, aquatic benthic studies were requested.

ICI had submitted a field study. It was considered unsatisfactory to
answer the benthic question. In the attached letter, ICI considers the field
study and other submitted data show reasonable proof that adverse effects will
not occur with cypermethrin, and request conditional registration on cotton.

In the interim, ICI has submitted a document "A Review Of The Effects of
Pyrethrum and Synthetic Pyrethroids On Non-Target Organisms in Terrestrial
and Aquatic Environments" in lieu of a benthic field study. The study is being
reviewed at present.

EDEF defers action of the conditional registration of cypermethrin until
this document is examined. Based on available data, adverse environmental
effects can be anticipated with a cotton use.

Wayne C. Faatz, Ph.D.
Wildlife Biologist
Ecological Effects Branch
Hazard Evaluation Division, TS-769c

MAR 02 1984
December 8, 1983

Mr. Timothy A. Gardner
Product Manager (17)
Registration Division (TS-767C)
U.S. Environmental Protection Agency
Crystal Mall 2, Room 207
1921 Jefferson Davis Highway
Arlington, VA 22202

Dear Mr. Gardner:

RE: CYMBUSH® 3E Insecticide
File Symbol 10182-AL
CYMBUSH® 2E Insecticide
File Symbol 10182-AU
CYMBUSH® OL Insecticide
File Symbol 10182-IN
Response To Your Letter of 10/31/83
Request For Conditional Registration

In your letter of October 31, 1983 regarding the subject products, you stated that the request for a benthic study still remained. ICI believes that the aquatic field study and other aquatic data on cypermethrin submitted to date demonstrate that no severe effects upon aquatic ecosystems are likely to occur from the proposed uses on cotton. We thus believe that enough data have been submitted to support the registration of these products on cotton on the basis that resolution of this request is a condition of the registrations.

ICI therefore requests that conditional registrations be issued for the three products. ICI agrees to satisfy the request for the benthic study as a condition of the registrations.

Respectfully submitted,

Robert E. Ridsdale
R. E. Ridsdale, PhD
Director
Registration & Regulatory Affairs

RER/mah
120883mah07
Physical Chemical Properties

102.1 Chemical Name
(+)-cyano-3-(phenoxyphenyl) methyl (+) cis, trans 3-(2,2-dichloroethenyl)2,2-dimethyl cyclopropanecarboxylate

101.2 Structural Formula

102.3 Common Name
Cypermethrin

102.4 Trade Name
Cymbush 2E, Cymbush 3E, Cymbush OL

102.5 Molecular Weight : 416

102.6 Physical State
Dark brown viscous liquid

1,2,7 Properties

102.7.1 Solubility
Misicible with alcohols, ketones, chlorinated hydrocarbons and substituted aromatic hydrocarbons (xylene). Sparingly soluble in alephatic hydrocarbons.

102.7.2 Octanol/Water Partition Coefficient.
Unknown

102.7.3 Soil Adsorption Coefficient Kd 2,000

102.7.4 Vapor Pressure 10-22 mm/Hg depending on formulation

103 Behavior in the Environment

103.1 Soil

<table>
<thead>
<tr>
<th></th>
<th>Laboratory Degradation</th>
<th>Field Degradation</th>
<th>Photolysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic</td>
<td>2-8 weeks</td>
<td>4-12 days</td>
<td>8-16 days</td>
</tr>
<tr>
<td>Anaerobic</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYDRIN (109301)</td>
<td>PAY-OFF (110301)</td>
<td>PERMETHRIN (109701)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>6.2 ppb</td>
<td>0.31 ppb</td>
<td>9.8 &amp; 2.11 ppb</td>
</tr>
<tr>
<td>Channel catfish</td>
<td>0.81 ppb</td>
<td>0.51 ppb</td>
<td>5.4 ppb</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>0.42 ppb</td>
<td>0.70 ppb</td>
<td>2.52 &amp; 6.1 ppb</td>
</tr>
<tr>
<td>Mosquito fish</td>
<td>2.6 ppb 4=0.008ppb(EPA-68)</td>
<td>5.0 ppb 1=0.008ppb(EPA-68)</td>
<td>1=0.002ppb(arc-68)</td>
</tr>
<tr>
<td>Culex pipiens</td>
<td>72h-LC50 5=1 ppm</td>
<td>30-day early stage LC50</td>
<td>&gt;0.300.41 ppb Sign. reduct. fry</td>
</tr>
<tr>
<td>Sheepshead minnow</td>
<td></td>
<td>290 ppb for 2.4 lb/gal.</td>
<td>5.0 ppb 1.1ppb(EPA-68)</td>
</tr>
<tr>
<td>Fathead minnow</td>
<td></td>
<td>2.1 ppb(EPA/ESWC)</td>
<td>6= chronic MATC &gt;0.300.41 ppb</td>
</tr>
<tr>
<td>Atlantic silversides</td>
<td>0.31 ppb 1=0.004ppb(EPA-68)</td>
<td>0.31 ppb</td>
<td>4=2.2ppb(EPA-68)</td>
</tr>
<tr>
<td>(Menidia menidia)</td>
<td></td>
<td>0.354 &amp; 0.5 ppb</td>
<td>1=0.22ppb(EPA-68)</td>
</tr>
<tr>
<td>Pink shrimp</td>
<td>0.28ppb 1=0.004ppb(EPA-68)</td>
<td>0.354 &amp; 0.5 ppb</td>
<td>1=0.22ppb(EPA-68)</td>
</tr>
<tr>
<td>Gomphus amphipod</td>
<td>0.047ppb(EPA) 1=0.07ppb(EPA)</td>
<td>48hEC=31.0 ppb &gt; or =12.0 ppb</td>
<td>1=536 ppb(supp)</td>
</tr>
<tr>
<td>Eastern oyster:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Embriolarvae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Shell deposit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daphnia:</td>
<td>2= &lt; 1.6 ppb</td>
<td>2= 8.3 ppb</td>
<td></td>
</tr>
<tr>
<td>a) Adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Life cycle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiddler crab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mallard duck</td>
<td>4=&gt; 10,000ppm</td>
<td>4= 4885 ppm</td>
<td>3=&gt; 2,510 mg/kg</td>
</tr>
<tr>
<td>a) Adult</td>
<td>4=&gt; 10,000ppm</td>
<td>4= 4885 ppm</td>
<td>3=&gt; 2,510 mg/kg</td>
</tr>
<tr>
<td>1-</td>
<td>2= 8.335 ppm</td>
<td>3=&gt; 2,708 mg/kg</td>
<td>4= 7,716 ppm</td>
</tr>
<tr>
<td>2-</td>
<td>3=&gt; 4,640 mg/kg</td>
<td>6= at 25/75/125 ppm no effects</td>
<td></td>
</tr>
<tr>
<td>b) Reproduct.</td>
<td>4=5,502 ppm</td>
<td>4= 3,335 ppm</td>
<td>4= &gt;9,869 ppm</td>
</tr>
<tr>
<td>Bobwhite quail</td>
<td>4=5,502 ppm</td>
<td>4= 3,335 ppm</td>
<td>4= &gt;9,869 ppm</td>
</tr>
<tr>
<td>a) Adult</td>
<td>4=5,502 ppm</td>
<td>4= 3,335 ppm</td>
<td>4= &gt;9,869 ppm</td>
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<td>1-</td>
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</tr>
<tr>
<td>2-</td>
<td>3=&gt; 4,640 mg/kg</td>
<td>6= at 25/75/125 ppm no effects</td>
<td></td>
</tr>
<tr>
<td>b) Reproduct.</td>
<td>same as mallard</td>
<td>same as mallard</td>
<td>same as mallard</td>
</tr>
<tr>
<td>Bee</td>
<td>1.0to3.0 g/kg</td>
<td>3=67/to181 mg/kg</td>
<td>3=8.93g/kg</td>
</tr>
<tr>
<td>Rat</td>
<td>125 ppm</td>
<td>5=60 ppm NEL</td>
<td>5=2mg/kg NEL</td>
</tr>
</tbody>
</table>

\[ \text{Rainfall} \times \text{Deposition} = \text{Day of feeding} \]

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## COMPARATIVE TABLE OF CHEMICAL AND ENVIRONMENTAL FATE DATA FOR

**FOUR NEW SYNTHETIC PYRETHROIDS**

<table>
<thead>
<tr>
<th></th>
<th>PYDRIN</th>
<th>PAY-OFF</th>
<th>PERMETHRIN</th>
<th>TRALOMETHRIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sea H₂O Epa-eb)</td>
<td>(109301)</td>
<td>(119301)</td>
<td>(109701)</td>
<td>(121501)</td>
</tr>
<tr>
<td>Water solubility-pH</td>
<td>24 ppb. 24 ppb.</td>
<td>50 ppb. 0.07-0.01 ppm</td>
<td>0.07ppb(20°C)</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>C₂₅H₂₂ClNO₃</td>
<td>C₂₂H₂₃O₄NF₂</td>
<td>C₂₁H₂₀O₃Cl₂</td>
<td>C₂₂H₁₉Br₄NO₃</td>
</tr>
<tr>
<td>Empirical Formula</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Formula</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrolysis (half-life)</td>
<td>570 days @pH 7.2</td>
<td>51.7 days</td>
<td>Shade 3 wk</td>
<td>None @ pHs 3 &amp; 7</td>
</tr>
<tr>
<td>Photolysis</td>
<td>51.8% gone in 28 days</td>
<td>16.0 days</td>
<td>&lt; 2.5 days</td>
<td></td>
</tr>
<tr>
<td>Halftime (t 1/2) in:</td>
<td>34.0 days</td>
<td>79 days</td>
<td>&gt; 30 days</td>
<td></td>
</tr>
<tr>
<td>- Water</td>
<td>30 days</td>
<td>28 days</td>
<td>20 to 40 days</td>
<td>Immobile</td>
</tr>
<tr>
<td>- Soil</td>
<td>12 to 54 days</td>
<td>90 days</td>
<td>&gt; 30 days</td>
<td>Kads&gt;200rhgt</td>
</tr>
<tr>
<td>Leaching</td>
<td>Immobile</td>
<td>Immobile(CI-1)</td>
<td>Immobile</td>
<td></td>
</tr>
<tr>
<td>Bioaccumulation in:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Rainbow trout</td>
<td>400X</td>
<td>(1d.) MAX. (30d)</td>
<td>95X</td>
<td></td>
</tr>
<tr>
<td>- Catfish</td>
<td>490X</td>
<td>720X-2,490X</td>
<td>47X</td>
<td></td>
</tr>
<tr>
<td>- Bluegill sunfish</td>
<td></td>
<td>546X</td>
<td>4700X</td>
<td></td>
</tr>
<tr>
<td>- Fathead minnow</td>
<td></td>
<td>546X</td>
<td>4700X</td>
<td></td>
</tr>
<tr>
<td>Octanol/Water</td>
<td>6.2</td>
<td>6.2</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 1A x 4 ft. lake</td>
<td>8x10⁻⁴ ppm</td>
<td>6 ppm EFB's</td>
<td>0.2 lbs.a/ A</td>
<td>0.2 lbs.a/ A</td>
</tr>
<tr>
<td>- 3A x 15 ft</td>
<td>2.5x10⁻⁴ ppm</td>
<td>0.5 ppm-hydroso.</td>
<td>15/season 5mo.</td>
<td>15/season</td>
</tr>
<tr>
<td>- 10A x 20 ft</td>
<td>8x10⁻⁵</td>
<td>0.078 lbs.a/ A</td>
<td>Cotton</td>
<td>Cotton</td>
</tr>
<tr>
<td>- 3A x 4-6 ft</td>
<td></td>
<td>10 / season 5mo.</td>
<td>Cotton; celery; tomatoes; potatoes; alfalfa; cel.</td>
<td>Cotton</td>
</tr>
<tr>
<td>Max. applicat. rates</td>
<td>0.3 lbs.a/ A</td>
<td>Cotton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. No. of applicat.</td>
<td>15/season 5 mo.</td>
<td>Cotton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses (actual or proposed):</td>
<td>tomatoes; apples; plum; cabbage; corn; pears; beans;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results from field studies:</td>
<td>Spray drift studies showed adverse effects on fish at 50 ft and none beyond.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G.B = Epa

* B = Epa's Brett Lab