To: George LaRocca  
Product Manager 23  
Registration Division (H7505C)

From: Anthony P. Maciorowski, Chief  
Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

<table>
<thead>
<tr>
<th>Reg./File #</th>
<th>279-3124</th>
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<tbody>
<tr>
<td>Chemical Name</td>
<td>Cypermethrin and zeta cypermethrin</td>
</tr>
<tr>
<td>Type Product</td>
<td>Insecticide - Synthetic Pyrethroid</td>
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<tr>
<td>Product Name</td>
<td>Fury Technical</td>
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<tr>
<td>Company Name</td>
<td>FMC Corporation</td>
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<tr>
<td>Purpose</td>
<td>Review study conducted with cypermethrin (109702) and zetacypermethrin (129064)</td>
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<tr>
<th>Action Code</th>
<th>575</th>
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<tbody>
<tr>
<td>Date Due</td>
<td>04/15/94</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Renee Lamb</td>
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EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

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Y=Acceptable (Study satisfied Guideline)/Concur  
P=Partial (Study partially fulfilled Guideline but additional information is needed)  
S=Supplemental (Study provided useful information but Guideline was not satisfied)  
N=Unacceptable (Study was rejected)/Nonconcur
MEMORANDUM

JAN 24 1994

Subject: Data review for Cypermethrin minus (129064) and Cypermethrin (109702)

From: Anthony F. Maciorowski, Branch Chief
Ecological Effects Branch
Environmental Fate and Effects Division (H7507C)

To: George LaRocca, PM 13
Registration Division (H7505C)

The Ecological Effects Branch (EEB) has completed its review of the study submitted by FMC Corporation for Cypermethrin (109702) and Cypermethrin minus (129064). The study was submitted in order to compare cypermethrin minus with cypermethrin. The following is a summary of the data reviewed:


CONCLUSIONS: Although there was contamination of the control vessels in the cypermethrin test, this study appears to be scientifically sound and fulfills the guideline requirement for a 96 hour acute toxicity study with the mysid shrimp. Since this study is being used as a comparison between the toxicity of cypermethrin and zeta cypermethrin, the LC$_{50}$ values are unlikely to change significantly in a new study. The reported LC$_{50}$ value for FMC 56701 and cypermethrin based on measured concentrations was 5 ng/L for both, and the NOEC was 2.5 ng/L and 3.9 ng/L, respectively. Therefore, both cypermethrin and zetacypermethrin (FMC 56701) are classified as very highly toxic to estuarine organisms.

If there are any questions, contact Renee Lamb at 305-5294.
CASE TYPE: REGISTRATION
ACTION: 575 CON REG FLW-UP DAT REQ HE
CHEMICALS: 129064 Cyano(3-phenoxyphenyl) methyl(+-) cis/trans 3-(2, 88.0000%

ID#: 000279-03124 FURY TECHNICAL
COMPANY: 000279 FMC CORP.
PRODUCT MANAGER: 13 GEORGE LAROCCA 703-305-6100 ROOM: CM2 204
PM TEAM REVIEWER: ADAM HEWARD 703-305-5021 ROOM: CM2 202
RECEIVED DATE: 08/19/92 DUE OUT DATE: 12/07/92

DP BARCODE: 181929 EXPEDITE: N DATE SENT: 08/25/92 DATE RET.: / /
CHEMICAL: 129064 Cyano(3-phenoxyphenyl) methyl(+-) cis/trans 3-(2,2-dichlo
DP TYPE: 001 Submission Related Data Package
ADMIN DUE DATE: 11/03/92 CSF: N LABEL: N

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the attached ecological effects data (Mysid Shrimp)(GRN 72-3)(MRID Number 424446-01) submitted in support of the conditional registration of cypermethrin-s on cotton, lettuce and pecans.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC BRANCH/SECTION DATE OUT DUE BACK INS CSF LABEL
DATA EVALUATION RECORD

1. **CHEMICAL:** FMC 56701, Zetacypermethrin Shaughnessey Number: 129064; Cypermethrin Shaughnessey Number: 109702

2. **TEST MATERIAL:** Zetacypermethrin, 88.2% a.i., a viscous brown liquid; cypermethrin, 95.9% a.i., a viscous amber liquid.

3. **STUDY TYPE:** Acute toxicity of FMC 56701 Technical and Cypermethrin Technical to the mysid shrimp (*Mysis bahia*)


5. **REVIEWED BY:**
   Renee Lamb
   Biologist
   EFED/EEB (H7507C)
   Signature: [Signature]
   Date: 1/30/92

6. **APPROVED BY:**
   Ann Stavola
   Section Head Section 5
   EFED/EEB (H7507C)
   Signature: [Signature]
   Date: 12/1994

7. **CONCLUSIONS:** Although there was contamination of the control vessels in the cypermethrin test, this study appears to be scientifically sound and fulfills the guideline requirement for a 96 hour acute toxicity study with the mysid shrimp. Since this study is being used as a comparison between the toxicity of cypermethrin and zeta cypermethrin, the LC$_{50}$ values are unlikely to change significantly in a new study. The reported LC$_{50}$ value for FMC 56701 and cypermethrin based on measured concentrations was 5 ng/L for both, and the NOEC was 2.5 ng/L and 3.9 ng/L, respectively. Therefore, both cypermethrin and zetacypermethrin (FMC 56701) are classified as very highly toxic to estuarine organisms.

8. **RECOMMENDATIONS:** N/A

9. **BACKGROUND:** This study is submitted in order to compare the toxicity of zetacypermethrin (129064) to cypermethrin (109702) to the mysid shrimp. This test replaces a previous study (MRID No. 419682-10) in which contamination of the
control solution with test materials was experienced.

10. DISCUSSION OF INDIVIDUAL TESTS: N/A

11. MATERIALS AND METHODS:

A. TEST ANIMALS: Juvenile mysids (<24 hr old at start of the test) from a single source.
   Acclimation: 14 days for the mysid cultures
   FMC 56701 - 24.6 - 24.7°C, DO > 7.3 mg/L.
   Cypermethrin - 20.5 - 20.9°C, DO > 7.7 mg/L.

   Randomly arranged in a water bath.
   Photoperiod: 16 hour light/8 hour dark.
   Diluter: Intermittent flow proportional; FMC 56701 - average of 5.8 media exchanges per 24 hours;
   Cypermethrin - average of 6.0 media exchanges per 24 hours, in each vessel. Aeration was not required.

C. DOSAGE: The diluter was calibrated to deliver nominal concentrations of 3.75, 6.25, 10, 15, and 25 ng/L.
   There was a dilution water and a solvent (acetone) control.

D. DESIGN: Twenty mysids were indiscriminately and equally distributed among two replicates of each treatment until each concentration contained 20 organisms.
   The number of dead organisms and the occurrence of sublethal effects were noted at 0, 24, 48, 72, and 96 hours. Dead organisms were removed when observed.
   Test concentrations were measured at 0, 48 and 96 hours.
   DO, pH, salinity and temperature were recorded daily in each chamber containing live animals. Temperature in one vessel was recorded continuously during each test.

E. STATISTICS: Standard statistical procedures were used to determine the LC₅₀ values.

12. REPORTED RESULTS: No precipitate was observed in test vessels during either test, with the exception of the highest concentration during the cypermethrin test (appeared slightly golden colored at 48 hours). Mean measured concentrations of FMC 56701 were 1.6, 2.5, 3.5, 4.8, and 9.9 ng/L and of cypermethrin were 3.1, 3.9, 4.5, 6.0, and 10.0 ng/L (Table 2 and 3).
Despite preventative measures, such as a closed system and changes to sample analysis and diluter design, there was slight test material contamination in the cypermethrin test. This contamination occurred primarily in the samples taken at 48 hours and averaged 1.2 ng/L in the control and 1.3 ng/L in the solvent control, levels which are less than one-half of the lowest mean measured concentration and barely above the detection limit of 1.0 ng/L (Table A.1 and A.2). The contamination had no apparent biological consequences (Table 5). Survival was 95% or greater in the control groups and the first two treatment levels.

Biological and water quality data are presented in Tables 4, 5, B.1 and B.2. Control mysids had an average wet weight of 2 mg to 4 mg. Maximum loading rate during either test was ≈ 3 mg/L.

Exposure of mysids to FMC 56701 resulted in a 96 hour LC$_{50}$ of 5 ng/L (4 - 6 g/L); exposure of mysids to cypermethrin resulted in a 96 hour LC$_{50}$ of 5 ng/L (5 - 6 g/L), based on measured concentrations. The NOEC is 2.5 ng/L for FMC 56701 and 3.9 ng/L for cypermethrin (measured concentrations). The ratio in the acute 96 hour LC$_{50}$ values based on the measured concentrations was 1.0. Nominal and measured LC$_{50}$ values are presented in Tables 6 and 7, respectively.

13. STUDY AUTHOR’S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

The report has a quality assurance statement signed by a quality assurance officer.

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

A. TEST PROCEDURE: This test is in accordance with EPA’s SEP protocol with the following exception:

○ There was contamination of the controls in the cypermethrin test.

B. STATISTICAL ANALYSIS: The mortality data was analyzed using EEB’s Toxanal program.

C. DISCUSSION/RESULTS: Although there was contamination of the control vessels in the cypermethrin test, this study appears to be scientifically sound and fulfills the guideline requirement for a 96 hour acute toxicity study with the mysid shrimp. Since this study is being used as a comparison between the toxicity of cypermethrin and zeta cypermethrin, the LC$_{50}$ values are unlikely to change significantly in a new study. The study author’s calculated LC$_{50}$ value for FMC 56701 and cypermethrin are slightly different then the reviewer’s calculations (see attached), the difference (< 1) is
irrelevant in that this is a comparison of toxicities. The reported LC₉₀ value for FMC 56701 and cypermethrin based on measured concentrations was 5 ng/L for both, and the NOEC was 2.5 ng/L and 3.9 ng/L, respectively. Therefore, both cypermethrin and zetacypermethrin (FMC 56701) are classified as very highly toxic to estuarine organisms.

D. ADEQUACY OF STUDY:

1) CLASSIFICATION: core
2) RATIONALE: N/A
3) REPAIRABILITY: N/A
**CONC.**  | **NUMBER EXPOSED** | **NUMBER DEAD** | **PERCENT DEAD** | **BINOMIAL PROB. (PERCENT)**
---|---|---|---|---
9.899999 | 20 | 17 | 85
4.8  | 20 | 12 | 60.00001 | 25.17223
3.5  | 20 | 4 | 20 | .5908966
2.5  | 20 | 0 | 0 | 9.536742E-05
1.6  | 20 | 1 | 5 | 2.002716E-03

The binomial test shows that 3.5 and 9.899999 can be used as statistically sound conservative 95 percent confidence limits, because the actual confidence level associated with these limits is greater than 95 percent.

An approximate LC50 for this set of data is 4.450351

**RESULTS CALCULATED USING THE MOVING AVERAGE METHOD**

**SPAN** | **G** | **LC50** | **95 PERCENT CONFIDENCE LIMITS**
---|---|---|---
2 | .2084196 | 4.819006 | 3.702098 | 5.95717

**RESULTS CALCULATED USING THE PROBIT METHOD**

**ITERATIONS** | **G** | **H** | **GOODNESS OF FIT PROBABILITY** | **1.180313** | **1**
---|---|---|---|---|---

**SLOPE** = 4.218153
95 percent confidence limits = 2.768978 and 5.667328

**LC50 = 5.132855**
95 percent confidence limits = 4.327592 and 6.394686

**LC10 = 2.566135**
95 percent confidence limits = 1.831476 and 3.137039

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**CONC.**  | **NUMBER EXPOSED** | **NUMBER DEAD** | **PERCENT DEAD** | **BINOMIAL PROB. (PERCENT)**
---|---|---|---|---
10.3 | 20 | 20 | 100 | 9.536742E-05
6 | 20 | 13 | 65 | 13.1588
4.5 | 20 | 5 | 25 | 2.069473
3.9 | 20 | 1 | 5 | 2.002716E-03
3.1 | 20 | 0 | 0 | 9.536742E-05

The binomial test shows that 4.5 and 10.3 can be used as statistically sound conservative 95 percent confidence limits, because the actual confidence level associated with these limits is greater than 95 percent.

An approximate LC50 for this set of data is 5.396441
RESULTS CALCULATED USING THE MOVING AVERAGE METHOD
SPAN G LC50 95 PERCENT CONFIDENCE LIMITS
3  8.448128E-02 5.568876 5.094919
6.162673

RESULTS CALCULATED USING THE PROBIT METHOD
ITERATIONS G H
GOODNESS OF FIT PROBABILITY
5 .152655 1
.8837358

SLOPE = 10.57668
95 PERCENT CONFIDENCE LIMITS = 6.444257 AND 14.70911

LC50 = 5.417073
95 PERCENT CONFIDENCE LIMITS = 4.996598 AND 6.074492

LC10 = 4.108556
95 PERCENT CONFIDENCE LIMITS = 3.520322 AND 4.489378
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.
- FIFRA registration data.
- The document is a duplicate of page(s) _______.
- 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.