ENVIRONMENTAL CHEMISTRY EVALUATION FOR: endothall [7-oxabicyclo
(2.2.1) heptane-2, 3,-dicarboxylic acid] from the dihydroxy
aluminum salt of endothall.

Reg. No. 10250-R-
3 M Company
Ltr. 11/12/73

I. INTRODUCTION:

1. Applicant proposes the use of endothall as an aquatic herbicide.
Endothall is registred for aquatic uses.

2. Product name is Mariner Brand Aquatic Herbicide System E.

3. An interim tolerance of 0.2 ppm is established for endothall in
potable water (C.F.R. Sec. 121.1248), via PP#AP1105 from use in
the control of aquatic weeds in canals, lakes, ponds, and other
potential sources of potable water.

4. An experimental permit was granted for this use under permit
7182-EXP-SC. A request for an extension of this permit was

II. DIRECTIONS FOR USE

Endothall, (Mariner aquatic herbicide System E) is intended for the
control of aquatic weeds in non-flowing water in lakes, ponds, or
stagnant canals and waterways. It is applied to the surface of the
water. Depending on the type of vegetation, it is applied at a
rate of 50-200 lbs of product (13.4% active) per acre. Treat only
1/3 to 1/2 of the water area in a single operation.

Treated areas should be left undisturbed for two days following
treatment to obtain best results. Do not use treated water for
irrigation of lawns within two days after treatment.
Do not use fish from treated areas for food or feed within three
days after treatment.

If treated water is subject to complete water exchange within 7 days
the water may be used for irrigation of agricultural crops at 7 days
post treatment; if no exchange is possible, irrigation of agricultural
crops should be delayed until fourteen days post treatment.
Do not use treated water for domestic purposes until fourteen days
post treatment.
The data from the Fishery Environment Study (VOL. 111) suggest several changes or additions for the above restrictions:

a. The following restriction should be added to the label: "Use only on specified waters that are under complete control of the user".

b. The three day limitation on the use of fish from treated area should be extended to fourteen (14) days after treatment. (Otherwise a tolerance maybe needed for fish.

c. The fourteen (14) day limitation on using treated water for irrigation should be extended to 28 days. (Alternatively, residue data should be submitted for crops irrigated with treated water.)

III. DISCUSSION OF DATA

1. Metabolism

Data are available in PP#1F1105 and published literature endothall is fairly degraded in an aquatic environment, in plants, animals, and fish to carbon dioxide and natural components. Also, see previous reviews; particularly, PP#3F1416 of 2/27/74.

* Fate of C14O2 of Labeled Endothall

as Indicated by Metabolism Studies by M.L. Montgomery & V. H. Freed (1964)

\[ \text{C}_{14} \text{H}_2 \text{O}_2 \text{H}_2 \text{C}_{14} \text{H}_2 \xrightarrow{\text{alkyl acids}} \text{Alkyl acids} \]

\[ \xrightarrow{\text{short chain alkyl acids (acetate) lipophilic compounds (fats and fatty acids) proteins and amino acids carbohydrate and cellulose Krebs cycle acids}} \text{release of C}_{14} \text{O}_2 \]
2. Biomagnification

A model ecosystem study, (pp#1F1105) using ¹⁴C-endothall between organisms is not expected to be a problem.


The above subject was discussed in pp#3F1416, 2/27/74, by Ney and Cook. Briefly, this study involved the addition of endothall at 2 and/or 4 ppm to a farm pond and laboratory aquaria. Residues persisted for a longer period in the hydrosol than in the water.

4. FISHERY ENVIRONMENT STUDY (Vol. III)

After the establishment of aquatic plants in ponds, three ponds received 2 ppm and three received 4 ppm of endothall soil equivalent. Water and fish were sampled at various intervals. GLC was used as the as the quantitative tool. Satisfactory recovery is claimed at the 0.04ppm level.

Ave. Concentration of endothall in 3 ponds (PPM)

<table>
<thead>
<tr>
<th>TIME</th>
<th>Treated with 2 ppm</th>
<th>Treated with 4 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>3 hrs</td>
<td>5.44</td>
<td>7.07</td>
</tr>
<tr>
<td>23 hrs</td>
<td>1.70</td>
<td>3.08</td>
</tr>
<tr>
<td>2 days</td>
<td>2.01</td>
<td>3.67</td>
</tr>
<tr>
<td>3 days</td>
<td>1.93</td>
<td>4.20</td>
</tr>
<tr>
<td>5 days</td>
<td>1.76</td>
<td>3.66</td>
</tr>
<tr>
<td>7 days</td>
<td>1.71</td>
<td>3.59</td>
</tr>
<tr>
<td>10 days</td>
<td>0.68</td>
<td>2.10</td>
</tr>
<tr>
<td>15 days</td>
<td>0.14</td>
<td>0.38</td>
</tr>
<tr>
<td>21 days</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>28 days</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

PPM Concentration of endothall in fish from ponds treated at 4 ppm

<table>
<thead>
<tr>
<th>Time</th>
<th>Bass Body</th>
<th>Viscera</th>
<th>Catfish Body</th>
<th>Viscera</th>
<th>Bluegill Body</th>
<th>Viscera</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1 day</td>
<td>0.14</td>
<td>0.00</td>
<td>0.00</td>
<td>0.73</td>
<td>0.31</td>
<td>*</td>
</tr>
<tr>
<td>3 days</td>
<td>0.02</td>
<td>0.00</td>
<td>0.14</td>
<td>1.27</td>
<td>0.42</td>
<td>1.84</td>
</tr>
<tr>
<td>15 days</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

* petitioner states that samples could not be analyzed.
The petitioner states that the apparent high value at 3 days after treatment for the blue gill cannot be explained. Also, that interference in the methodology made it difficult to analyze several bluegill samples.

Conclusions:

a. The application rate to pond water is reported in ppm; however, we need to know the equivalent rate in pounds per acre of active ingredient.

b. At the treated rate of 2 and 4 ppm, endothall residues disappear from water about four weeks after treatment.

c. Residues do not concentrate in fish.

d. The maximum amount of residues that do accumulate in fish occur in the viscera; however, at, about 15 days after treatment residue have dissipated from the flesh and viscera of fish.

IV. RECOMMENDATIONS

A. Object to registration for the following reasons.

1. The (3) day limitation on the use of fish from treated areas should be amended to fourteen (14) days treatment.

2. The fourteen (14) days limitation on using treated waters for irrigation should be amended to 28 days; alternatively, residue data should be submitted for crops irrigated with treated water.

Ronald E. Ney, Jr. 7/3/74
Franklin D.R. Gee 6/20/74
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EIP/J.T. 7/9/74