MEMORANDUM

Subject: EEB's chapters for the Alachlor (SN 090501) RED

From: Anthony Maciorowski, Chief
Ecological Effects Branch
Environmental Fate and Effects Division (7507C)

To: David Farrar
Science Analysis and Coordination Staff
Environmental Fate and Effects Branch (7507C)

We have revised our chapters for the Registration Eligibility Document for Alachlor to incorporate your suggestions.

The documents are attached. Please contact Dr. James J. Goodyear at 305-7726 if you have any questions.
Two terrestrial plant studies were judged to be "Supplemental." The most sensitive vegetative vigor study (42468601) was phytotoxicity (NOEL = 0.019 lbs ai/A, but no EC$_{25}$). The 21-day weight study found a NOEL of 0.037 lbs/A and an EC$_{25}$ of 0.044 lbs/A. The most sensitive germination and growth study (42468701) was weight (NOEL = 0.0023 lbs/A and EC$_{25}$ = 0.0067 lbs/A).

Based on incomplete data, Alachlor was classified as "highly toxic to nontarget plants."

**RISK ASSESSMENT**

**TERRESTRIAL ANIMALS**

The potential risk for exposure to Alachlor that is applied as an emulsifiable concentrate or flowable concentrate on terrestrial vegetation to nontarget organisms and to endangered species is considered negligible.

<table>
<thead>
<tr>
<th>SUBSTRATE</th>
<th>APPLICATION RATE lbs ai /A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Short grass</td>
<td>490</td>
</tr>
<tr>
<td>Long grass</td>
<td>220</td>
</tr>
<tr>
<td>Leaves and leafy crops</td>
<td>250</td>
</tr>
<tr>
<td>Forage (alfalfa and clover) and insects</td>
<td>130</td>
</tr>
<tr>
<td>Pods containing seeds</td>
<td>24</td>
</tr>
<tr>
<td>Fruit</td>
<td>14</td>
</tr>
</tbody>
</table>

RESIDUES ON TYPICAL SUBSTRATES after application of Alachlor at various rates (after Hoerger and Kenaga, 1972).

The maximum alachlor residues (ppm) expected immediately after application at various rates were calculated using Hoerger and Kenaga's nomogram (1972). The mammalian acute oral LD$_{50}$ is 1,200 mg/kg and the avian dietary LC$_{50}$ is greater than 5,620 ppm. These data characterize the toxicity of Alachlor as slightly toxic to mammals and practically nontoxic to birds for dietary exposures. Minimal acute dietary risk is expected for birds or (by inference) mammals.

The avian acute oral data (LD$_{50}$ = 1,499 mg/kg) can be used to evaluate avian exposure to granules. Granules are not broadcast evenly over a field. They are deposited in a band on the crop row. Typically, a 6 inch band is used in fields with 32 inches between the rows.
This application uses 16,375 linear feet per acre. Therefore, the pesticide is applied to an area of 8,163 square feet in every acre. At the maximum label rate of 4.0 lbs ai per acre, there is 0.22 g/sq. ft. If 85% of the granules are incorporated (Erbach and Tollefson, 1983) the potential surface "residue" is 33 mg/sq. ft. or < 0.02 LD$_{50}$/sq. ft. The potential hazard to birds for exposure to granules should be slight.

AQUATIC ANIMALS

Acute Freshwater- Alachlor is a pre-emergent herbicide and is usually applied only once. There are some postemergence uses that allow two applications. Rain or irrigation water is recommended within five days of planting to move the chemical to the root zone.

The major use of Alachlor is on corn. Very little (<1%) of the applications to corn are done by air, but this use does exist. Lasso (524-314) is registered at a maximum rate of 6.0 lbs. ai/A. This is the highest application rate (it exceeds the yearly total for multiple applications). We will use it to calculate runoff and drift.

The application calculation compares the runoff plus drift to the direct application of 1 lb ai of pesticide to a 1 acre pond that is 6 feet deep. Such an application would produce an EEC of 61 ppb.

\[
\text{runoff} - 6 \text{ lbs ai} \times 0.6 \times 0.05 \times 10 \text{ A} = 1.8 \text{ lbs ai}
\]

application appl efficiency runoff field size total runoff

\[
\text{drift} - 6 \text{ lbs ai} \times 0.05 = 0.3 \text{ lb ai}
\]

application 5% drift total drift

\[
\text{total} - 1.8 \text{ lbs runoff} + 0.3 \text{ lbs ai drift} = 2.1 \text{ lbs ai total loading}
\]

\[
\text{EEC} = 61 \text{ ppb} \times 2.1 \text{ lbs} = 128 \text{ ppb}
\]

The lowest LC$_{50}$ for a freshwater fish is 1.4 ppm for a rainbow trout. The lowest LC$_{50}$ for a freshwater invertebrate is 3.2 ppm for a midge. The EEC is an order of magnitude below these LC$_{50}$s, therefore, it is not predicted that Alachlor will put fresh water fish or invertebrates at risk of death. Although the EEC exceeds an LOC for endangered fish (0.128/1.4 > 0.05), surface water monitoring data indicate exposures much less than estimated and below the LOC. It is concluded that Alachlor does not exceed any acute LOC for aquatic animals.

Chronic freshwater- Surface Water Section has supplied data for Alachlor in drinking water taken from surface waters. The Safe Water Drinking Act established the Maximum Contaminant Level (MCL) for various chemicals. The MCL for Alachlor is 2 µg/l (i.e., 2 ppb). The standard is that the average of the concentrations found in each of four-quarterly measurements may not exceed the MCL. The methods used may have overestimated the exceedence of the MCL (Nelson, 1993, p.3).

Alachlor residues degraded slowly in nonsterile lake water. After 30 days of incubation, 88.8% of a 2 ppm [¹⁴C] Alachlor solution remained. Data from chronic aquatic studies are necessary as per 158 regulations.
ECOLOGICAL EFFECTS
ALACHLOR DISCIPLINARY REVIEW

ECOLOGICAL EFFECTS PROFILE

BIRDS

Scientifically sound data on the toxicity of technical Alachlor to birds has been received. One acute toxicity study (00079523, Fink, R., 1979) was considered adequate to characterize Alachlor as slightly toxic to birds on an acute oral basis. The LD$_{50}$ value was 1,499 mg/kg Bobwhite Quail.

The two dietary toxicity studies had identical results for the Bobwhite quail and the Mallard duck: LC$_{50}$ 5,620 ppm and the NOEL $\geq$ 1,000 ppm.

FISH

_Freshwater-_ The "Core" 96-hour LC$_{50}$ value for rainbow trout was 1.8 ppm (40098001, Mayer, 1986). Bluegill sunfish 96-hour LC$_{50}$ values were 2.4 and 2.8 ppm (40098001, Mayer, 1986 and 00023615, Thompson, 1978). There is sufficient information available to characterize technical Alachlor as moderately toxic to both coldwater fish and warmwater fish.

The only "Core" study for Rainbow trout (_Oncorhynchus mykiss_) with an end use product (EC 45) had an LC$_{50}$ of 1.4 ppm (40098001, Mayer, 1986). The only "Core" LC$_{50}$ value in a Bluegill sun-fish study was 3.2 ppm (40098001, Mayer, 1986). There is sufficient data to characterize Alachlor EC as moderately toxic to freshwater fish. There is sufficient information available to characterize EC 45 Alachlor as moderately toxic to both coldwater fish and warmwater fish.

_Estuarine-_ No marine/estuarine species have been tested.

AQUATIC INVERTEBRATES

_Freshwater_ The results of studies on the toxicity of technical Alachlor to _Daphnia magna_ were LC$_{50}$ of 10 and 21 ppm (00028549, Forbis, 1978; 40098001, Mayer, 1986). Studies using Midges (40098001, Mayer, 1986) found an LC$_{50}$ of 3.2 ppm. There is adequate information to categorize Alachlor as slightly toxic to aquatic invertebrates.

There are two studies done with EC 45 Alachlor on freshwater invertebrates that are considered "Core." The LC$_{50}$ of _Daphnia magna_ was 7.7 ppm (40098001, Mayer, 1986) and the LC$_{50}$ of a Midge was 2.5 ppm (40098001, Mayer, 1986). The available data on the toxicity of formulated EC 45 Alachlor to freshwater invertebrates are adequate to categorize formulated Alachlor as slightly toxic to practically nontoxic

_Estuarine-_ No estuarine species have been tested.

NONTARGET PLANTS

One "Core" aquatic plant Growth and Reproduction study with TGAI Alachlor (42763801) was submitted. The NOEC was 0.35 $\mu$g/l and the EC$_{50}$ was 1.64 $\mu$g/l.
Estuarine and marine- We do not have toxicity or environmental concentration data for marine and estuarine fish and invertebrates and cannot evaluate the risk. The marine and estuarine studies as listed in Table A are required to support corn, cotton, and soybean uses.

PLANTS

Aquatic- Studies have found that Alachlor has an aquatic plant EC_{50} of 1.64 μg/l. Alachlor was classified as being "highly toxic" to nontarget aquatic plants.

EEB's calculated maximum EEC (above) is 128 ppb. EFGWB has found reports in the literature that, at their peak, measured residues of Alachlor in surface water exceed 8 ppb. Hoheisel, et al., (1992) found that Alachlor has been detected in ground water in 25 states at concentrations ranging from trace levels to 1000 ppb. Where ground water emerges it becomes surface water. These levels greatly exceed the NOEC and EC_{50} (0.35 and 1.64 ppb) for aquatic plants (green algae).

Terrestrial- Risk is measured by a dimensionless number call the Risk Quotient. It is the amount of the pesticide compared to the acute effects level. For terrestrial plants an RQ of over "1" is presumed to indicate high risk.

Typically Alachlor is applied by ground equipment at rates of 4.0 lbs ai/A. If there is 5% runoff, then the total preliminary EEC rate would be 0.2 lbs ai/A. The (supplemental) EC_{25} for seedling emergence was 0.04 lbs ai/A. Therefore, the Risk Quotient would be 0.2 ÷ 0.04 = 5. Since Alachlor is persistent in water (88% after 30 days), additional applications would be almost fully additive. The highest ground application is Bronco (524-341) at 5.94 lbs ai/A. Its RQ is 7.4.

The highest application is a 6 lbs ai/A rate that is applied by air. The runoff would be the percent of the chemical that landed on the field times the rate of application times the rate of runoff. If 60% of the chemical landed on the field, then 0.60 X 6 X 0.05 = .18 lbs ai/A. The loading from drift is calculated as 5% of the 6 lb ai/A originally sprayed: 6 X 0.05 = 0.3 lbs ai/A. The total loading is 0.48 lbs ai/A. The RQ is obtained by dividing by the seedling emergence EC_{25} of 0.04 lbs ai/A or 12.

Alachlor has a high potential for effecting nontarget plants near the use sites. It may pose a significant risk to endangered plant species inhabiting those areas.

EPA has been working with the U.S. Fish and Wildlife Service and other state and national agencies to develop a program to avoid jeopardizing the continue existence of listed species by the use of pesticides. The Endangered Species Protection Program is expected to become final in 1994. Limitation on the use of Alachlor will be required to protect endangered and threatened species, but these limitations have not yet been defined. EPA’s Endangered Species Program may require the registrants to collect information about where the use of their herbicide overlaps with the range of endangered species.

Consultation with the FWS will be conducted in accordance with the species based priority approach described in the program. After completion of the consultation, regis-
trants will be informed if any required label modification are necessary. Such modification would may consist of the generic label statement referring pesticide users to use limitation contained in county bulletins.

DATA GAPS

We do not have acute exposure data for marine and estuarine fish and invertebrates or chronic exposure to aquatic animals. There are no data for toxic degradates of Alachlor in ground and surface water. We do not have enough information to decide if we need degrade testing and will have to reserve these studies.

PRECAUTIONARY STATEMENT

END USE

"For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark."

MANUFACTURING USE

Do not discharge into lakes, streams, ponds or public water unless in accordance with an NPDES permit. For guidance contact your Regional Office of EPA

Literature Cited


### TABLE A

Generic Data Requirements for Alachlor

<table>
<thead>
<tr>
<th>ECOLOGICAL EFFECTS §158.145 WILDLIFE AND AQUATIC ORGANISMS</th>
<th>Does EPA Have Enough Data to Satisfy This Requirement? Yes, No, or Partially</th>
<th>Must Additional Data be Submitted Under FIFRA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Requirement</strong></td>
<td><strong>Formula$^1$</strong></td>
<td><strong>Use Pattern$^2$</strong></td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>71-1 Avian Oral Acute LD$_{50}$</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>71-2 Avian Dietary LC$_{50}$</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-1 Freshwater Fish Acute LC$_{50}$</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-2 Freshwater Invertebrate LC$_{50}$</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-3(a) Estuarine/Marine Toxicity Fish</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-3(b) Estuarine/Marine Toxicity Mollusk</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-3(c) Estuarine/Marine Toxicity Shrimp</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-4(a) Early Life Stage Fish</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>72-4(b) Life Cycle Aquatic Invertebrate</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>123-1 Vegetative vigor</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>123-1 Seed germination</td>
<td>TGAI</td>
<td>A</td>
</tr>
<tr>
<td>123-2 Plant growth</td>
<td>TGAI</td>
<td>A</td>
</tr>
</tbody>
</table>

In addition data may be required on toxic degradates of Alachlor if fate, groundwater, and chemistry studies show that it is warranted.

1. TGAI = Technical grade of the active ingredient.
2. The use patterns are coded as follows: A = Terrestrial, food crop; B = Terrestrial, noncrop; D = Aquatic, nonfood; H = Domestic outdoor; I = Outdoor.
3. Necessary to support cotton, corn, and soybean uses.
ECOLOGICAL EFFECTS

ALACHLOR TOPICAL SUMMARY

EFFECTS ON BIRDS

Three studies in two submissions were received and evaluated under this topic. They are acceptable for use in a hazard assessment.

<table>
<thead>
<tr>
<th>Author</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fink, R</td>
<td>0079523</td>
</tr>
<tr>
<td>Grimes, J</td>
<td>43087101</td>
</tr>
<tr>
<td></td>
<td>43087001</td>
</tr>
</tbody>
</table>

In order to establish the toxicity of Alachlor to birds, the following studies are required using the technical grade material: 1) two subacute dietary studies on one species of waterfowl (preferably, mallard duck) and one species of upland game bird (preferably, bobwhite quail, or ring-necked pheasant); 2) one avian single dose oral study on one species (preferably mallard duck or bobwhite quail).

The acceptable acute oral toxicity data is listed below:

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LD$_{50}$</th>
<th>AUTHOR</th>
<th>FULFILLS THE GUIDELINES REQUIREMENT? YES, NO, OR PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIES</td>
<td>% ai</td>
<td>in mg/kg</td>
<td>DATE</td>
</tr>
<tr>
<td>Bobwhite</td>
<td>92.3</td>
<td>1,499</td>
<td>1979</td>
</tr>
</tbody>
</table>

There is sufficient information to characterize Alachlor as slightly toxic to birds on an acute basis. The avian acute oral guideline requirements have been satisfied by the evaluated documents.

Two studies were evaluated for dietary toxicity, both were acceptable. The acceptable dietary toxicity data are listed below:

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LC$_{50}$</th>
<th>AUTHOR</th>
<th>FULFILLS THE GUIDELINES REQUIREMENT? YES, NO, OR PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIES</td>
<td>% ai</td>
<td>in ppm</td>
<td>DATE</td>
</tr>
<tr>
<td>Bobwhite</td>
<td>95.4</td>
<td>&gt; 5,620</td>
<td>1986</td>
</tr>
<tr>
<td>Mallard</td>
<td>95.4</td>
<td>&gt; 5,620</td>
<td>1986</td>
</tr>
</tbody>
</table>

There is sufficient information to characterize Alachlor as practically nontoxic to birds on a dietary basis. The avian acute dietary guideline requirements have been satisfied by the evaluated documents.

PRECAUTIONARY LABELING

Available avian toxicity data indicate no toxicity statement for birds is necessary.
EFFECTS ON FRESHWATER FISH

Twelve studies (in eleven citations) were received and evaluated under this topic. Nine studies were acceptable for use in a hazard assessment.

<table>
<thead>
<tr>
<th>Author</th>
<th>ID Number</th>
<th>Author</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thompson, C.M.</td>
<td>00028550</td>
<td>Thompson, C.M.</td>
<td>00031521</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00031525</td>
<td>Thompson, C.M.</td>
<td>00028553</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00031522</td>
<td>Thompson, C.M.</td>
<td>00023615</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00028554</td>
<td>Forbis, A.D.</td>
<td>00023616</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00028551</td>
<td>Mayer, F.L.</td>
<td>40098001</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00031524</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The minimum data required for establishing the acute toxicity of Alachlor to fish are the results from two 96-hour studies with technical Alachlor. These studies should be performed on one coldwater species (preferably rainbow trout) and one warmwater species (preferably bluegill sunfish).

The acceptable toxicity data are listed below:

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LC$_{50}$</th>
<th>AUTHOR</th>
<th>FULFILLS THE GUIDELINES REQUIREMENT? YES, NO, OR PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIES</td>
<td>% ai</td>
<td>DATE</td>
<td>ID NUMBER</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>90 2.8 Thompson</td>
<td>1978</td>
<td>00023615</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>90 1.8 Forbis</td>
<td>1978</td>
<td>00023616</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>100 4.3 Mayer,</td>
<td>1986</td>
<td>40098001</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>100 2.4 Mayer,</td>
<td>1986</td>
<td>40098001</td>
</tr>
</tbody>
</table>

There is sufficient information to characterize Alachlor as moderately toxic to both warmwater fish and coldwater fish. The guideline requirements for LC$_{50}$ values for coldwater fish and warmwater fish have been satisfied for Alachlor.

Studies with a formulated product can be required under (158.145(7)(i)). The following acceptable studies are cited:

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LC$_{50}$</th>
<th>AUTHOR</th>
<th>FULFILLS THE GUIDELINES REQUIREMENT? YES, NO, OR PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIES</td>
<td>% ai</td>
<td>DATE</td>
<td>ID NUMBER</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>44 6.4 Thompson</td>
<td>1978</td>
<td>00028554</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>45 6.2 Forbis</td>
<td>1978</td>
<td>00028551</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>42.4 7.9 Thompson</td>
<td>1978</td>
<td>00031525</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>42.5 3.6 Thompson</td>
<td>1979</td>
<td>00031524</td>
</tr>
</tbody>
</table>

(continued)
ALACHLOR TOPICAL SUMMARY

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LC$_{50}$</th>
<th>AUTHOR</th>
<th>DATE</th>
<th>ID NUMBER</th>
<th>PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(continued) Rainbow trout</td>
<td>45</td>
<td>3.7</td>
<td>Thompson</td>
<td>1978</td>
<td>00028550</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>44</td>
<td>4.2</td>
<td>Thompson</td>
<td>1978</td>
<td>00028553</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>43</td>
<td>1.4</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
</tr>
<tr>
<td>Bluegill sunfish</td>
<td>43</td>
<td>3.2</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
</tr>
</tbody>
</table>

The end-use product is moderately toxic to warm and cold water fish.

PRECAUTIONARY LABELING

No fish toxicity statement is required.

EFFECTS ON FRESHWATER INVERTEBRATES

Five studies were received and evaluated under this topic. Five studies were acceptable for use in a hazard assessment.

<table>
<thead>
<tr>
<th>Author</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbis, A.D.</td>
<td>00028555</td>
</tr>
<tr>
<td>Forbis, A.D.</td>
<td>00028549</td>
</tr>
<tr>
<td>Forbis, A.D.</td>
<td>00028552</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00031523</td>
</tr>
<tr>
<td>Thompson, C.M.</td>
<td>00031526</td>
</tr>
<tr>
<td>Mayer, F.L.</td>
<td>40098001</td>
</tr>
</tbody>
</table>

The minimum data required to establish the acute toxicity of Alachlor to freshwater invertebrates is a 48-hour acute aquatic study with technical material. The study organisms should be first instar Daphnia magna or early instar amphipods, stoneflies, or mayflies.

The acceptable acute toxicity data are listed below:

<table>
<thead>
<tr>
<th>FORMULATION</th>
<th>LC$_{50}$</th>
<th>AUTHOR</th>
<th>DATE</th>
<th>ID NUMBER</th>
<th>PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daphnia magna</td>
<td>90</td>
<td>10</td>
<td>Forbis</td>
<td>1978</td>
<td>00028549</td>
</tr>
<tr>
<td>Daphnia magna</td>
<td>93</td>
<td>21</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
</tr>
<tr>
<td>Midge</td>
<td>93</td>
<td>3.2</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
</tr>
</tbody>
</table>
Studies with a formulated product can be required (158.145(7)(c)). The following studies are cited:

<table>
<thead>
<tr>
<th>FORMULATION SPECIES</th>
<th>% ai</th>
<th>LC₅₀ in ppm</th>
<th>AUTHOR</th>
<th>DATE</th>
<th>ID NUMBER</th>
<th>FULFILLS THE GUIDELINES REQUIREMENT? YES, NO, OR PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daphnia magna</td>
<td>49</td>
<td>33</td>
<td>Forbis, A.</td>
<td>1978</td>
<td>00028555</td>
<td>Partial</td>
</tr>
<tr>
<td>Daphnia magna</td>
<td>45</td>
<td>22</td>
<td>Forbis, A.</td>
<td>1978</td>
<td>00028555</td>
<td>Partial</td>
</tr>
<tr>
<td>Daphnia magna</td>
<td>42.4</td>
<td>27</td>
<td>Thompson</td>
<td>1979</td>
<td>00031526</td>
<td>Partial</td>
</tr>
<tr>
<td>Daphnia magna</td>
<td>43</td>
<td>7.7</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
<td>Yes</td>
</tr>
<tr>
<td>Midge</td>
<td>45</td>
<td>2.5</td>
<td>Mayer</td>
<td>1986</td>
<td>40098001</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The end-use product is moderately toxic to slightly toxic to aquatic invertebrates.

There is sufficient information to characterize Alachlor as moderately toxic to freshwater invertebrates. The guideline requirement for an LC₅₀ value for freshwater invertebrates has been satisfied for Alachlor.

PRECAUTIONARY LABELING

No aquatic invertebrate toxicity statement is required.

EFFECTS ON ESTUARINE AND MARINE ORGANISMS

No studies were received under this topic.

Estuarine and marine organisms toxicity studies on technical and formulated pesticides are required to support registration if there is an intended direct application to an estuarine or marine environment or if the pesticide may be expected to enter these environments in significant concentrations because of use or mobility pattern. These include acute LC₅₀ studies on shrimp, oysters, and estuarine fish.

The use pattern for Alachlor includes applications to corn, cotton, and soybeans. Part of these crops are grown in close proximity to estuarine and marine environments. Therefore, estuarine and marine organism testing is required.

EFFECTS ON NONTARGET PLANTS

Three studies were received and evaluated under this topic.

<table>
<thead>
<tr>
<th>Author</th>
<th>MRID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blasberg</td>
<td>42763801</td>
</tr>
<tr>
<td>Cañez</td>
<td>42468601</td>
</tr>
<tr>
<td>Chetram</td>
<td>42468701</td>
</tr>
</tbody>
</table>

Studies were required to establish Alachlor’s effect upon nontarget aquatic plants.
Based upon these studies, Alachlor can be classified as being highly toxic to aquatic plants.

Studies were required to establish Alachlor's effect upon nontarget terrestrial plants. Two studies were received.

Based on incomplete data, we would classify Alachlor as highly toxic to nontarget plants.

PRECAUTIONARY LABELING

"For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark."
ECOLOGICAL EFFECTS

ALACHLOR DISCIPLINARY REVIEW

ECOLOGICAL EFFECTS PROFILE

BIRDS

Scientifically sound data on the toxicity of technical Alachlor to birds has been received. One acute toxicity study (00079523, Fink, R., 1979) was considered adequate to characterize Alachlor as slightly toxic to birds on an acute oral basis. The LD₅₀ value was 1,499 mg/kg Bobwhite Quail.

The two dietary toxicity studies had identical results for the Bobwhite quail and the Mallard duck: LC₅₀ 5,620 ppm and the NOEL ≥ 1,000 ppm.

FISH

*Freshwater* The "Core" 96-hour LC₅₀ value for rainbow trout was 1.8 ppm (40098001, Mayer, 1986). Bluegill sunfish 96-hour LC₅₀ values were 2.4 and 2.8 ppm (40098001, Mayer, 1986 and 00023615, Thompson, 1978). There is sufficient information available to characterize technical Alachlor as moderately toxic to both coldwater fish and warmwater fish.

The only "Core" study for Rainbow trout (*Oncorhynchus mykiss*) with an end use product (EC 45) had an LC₅₀ of 1.4 ppm (40098001, Mayer, 1986). The only "Core" LC₅₀ value in a Bluegill sun-fish study was 3.2 ppm (40098001, Mayer, 1986). There is sufficient data to characterize Alachlor EC as moderately toxic to freshwater fish. There is sufficient information available to characterize EC 45 Alachlor as moderately toxic to both coldwater fish and warmwater fish.

*Estuarine*- No marine/estuarine species have been tested.

AQUATIC INVERTEBRATES

*Freshwater* The results of studies on the toxicity of technical Alachlor to *Daphnia magna* were LC₅₀s of 10 and 21 ppm (00028549, Forbis, 1978; 40098001, Mayer, 1986). Studies using Midge (40098001, Mayer, 1986) found an LC₅₀ of 3.2 ppm. There is adequate information to categorize Alachlor as slightly toxic to aquatic invertebrates.

There are two studies done with EC 45 Alachlor on freshwater invertebrates that are considered "Core." The LC₅₀ of *Daphnia magna* was 7.7 ppm (40098001, Mayer, 1986) and the LC₅₀ of a Midge was 2.5 ppm (40098001, Mayer, 1986). The available data on the toxicity of formulated EC 45 Alachlor to freshwater invertebrates are adequate to categorize formulated Alachlor as slightly toxic to practically nontoxic.

*Estuarine*- No estuarine species have been tested.

NONTARGET PLANTS

One "Core" aquatic plant Growth and Reproduction study with TGAI Alachlor (42763801) was submitted. The NOEC was 0.35 µg/l and the EC₅₀ was 1.64 µg/l.
Two terrestrial plant studies were judged to be "Supplemental." The most sensitive vegetative vigor study (42468601) was phytotoxicity (NOEL = 0.019 lbs ai/A, but no EC₂₅). The 21-day weight study found a NOEL of 0.037 lbs/A and an EC₂₅ of 0.044 lbs/A. The most sensitive germination and growth study (42468701) was weight (NOEL = 0.0023 lbs/A and EC₂₅ = 0.0067 lbs/A).

Based on incomplete data, Alachlor was classified as "highly toxic to nontarget plants.

RISK ASSESSMENT

TERRESTRIAL ANIMALS

The potential risk for exposure to Alachlor that is applied as an emulsifiable concentrate or flowable concentrate on terrestrial vegetation to nontarget organisms and to endangered species is considered negligible.

<table>
<thead>
<tr>
<th>SUBSTRATE</th>
<th>APPLICATION RATE lbs ai /A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Short grass</td>
<td>490</td>
</tr>
<tr>
<td>Long grass</td>
<td>220</td>
</tr>
<tr>
<td>Leaves and leafy crops</td>
<td>250</td>
</tr>
<tr>
<td>Forage (alfalfa and clover) and insects</td>
<td>130</td>
</tr>
<tr>
<td>Pods containing seeds</td>
<td>24</td>
</tr>
<tr>
<td>Fruit</td>
<td>14</td>
</tr>
</tbody>
</table>

RESIDUES ON TYPICAL SUBSTRATES after application of Alachlor at various rates (after Hoerger and Kenaga, 1972).

The maximum alachlor residues (ppm) expected immediately after application at various rates were calculated using Hoerger and Kenaga's nomogram (1972). The mammalian acute oral LD₅₀ is 1,200 mg/kg and the avian dietary LC₅₀ is greater than 5,620 ppm. These data characterize the toxicity of Alachlor as slightly toxic to mammals and practically nontoxic to birds for dietary exposures. Minimal acute dietary risk is expected for birds or (by inference) mammals.

The avian acute oral data (LD₅₀ = 1,499 mg/kg) can be used to evaluate avian exposure to granules. Granules are not broadcast evenly over a field. They are deposited in a band on the crop row. Typically, a 6 inch band is used in fields with 32 inches between the rows.
This application uses 16,375 linear feet per acre. Therefore, the pesticide is applied to an area of 8,163 square feet in every acre. At the maximum label rate of 4.0 lbs ai per acre, there is 0.22 g/sq. ft. If 85% of the granules are incorporated (Erbach and Tollefson, 1983) the potential surface "residue" is 33 mg/sq. ft. or < 0.02 LD$_{50}$/sq. ft. The potential hazard to birds for exposure to granules should be slight.

AQUATIC ANIMALS

Acute Freshwater- Alachlor is a pre-emergent herbicide and is usually applied only once. There are some postemergence uses that allow two applications. Rain or irrigation water is recommended within five days of planting to move the chemical to the root zone.

The major use of Alachlor is on corn. Very little (<1%) of the applications to corn are done by air, but this use does exist. Lasso (524-314) is registered at a maximum rate of 6.0 lbs. ai/A. This is the highest application rate (it exceeds the yearly total for multiple applications). We will use it to calculate runoff and drift.

The application calculation compares the runoff plus drift to the direct application of 1 lb ai of pesticide to a 1 acre pond that is 6 feet deep. Such an application would produce an EEC of 61 ppb.

\[
\text{runoff-} \quad 6 \text{ lbs ai} \times 0.6 \times 0.05 \times 10 \text{ A} = 1.8 \text{ lbs ai}
\]

\[
\text{application \ appl efficiency \ runoff \ field size \ total runoff}
\]

\[
\text{drift-} \quad 6 \text{ lbs ai} \times 0.05 = 0.3 \text{ lb ai}
\]

\[
\text{application \ 5% drift \ total drift}
\]

\[
\text{total-} \quad 1.8 \text{ lbs runoff } + 0.3 \text{ lbs ai drift } = 2.1 \text{ lbs ai total loading}
\]

\[
\text{EEC} = 61 \text{ ppb} \times 2.1 \text{ lbs} = 128 \text{ ppb}
\]

The lowest LC$_{50}$ for a freshwater fish is 1.4 ppm for a rainbow trout. The lowest LC$_{50}$ for a freshwater invertebrate is 3.2 ppm for a midge. The EEC is an order of magnitude below these LC$_{50}$s, therefore, it is not predicted that Alachlor will put fresh water fish or invertebrates at risk of death. Although the EEC exceeds an LOC for endangered fish (0.128/1.4 > 0.05), surface water monitoring data indicate exposures much less than estimated and below the LOC. It is concluded that Alachlor does not exceed any acute LOC for aquatic animals.

Chronic freshwater- Surface Water Section has supplied data for Alachlor in drinking water taken from surface waters. The Safe Water Drinking Act established the Maximum Contaminant Level (MCL) for various chemicals. The MCL for Alachlor is 2 µg/l (i.e., 2 ppb). The standard is that the average of the concentrations found in each of four quarterly measurements may not exceed the MCL. The methods used may have overestimated the exceedence of the MCL (Nelson, 1993, p.3).

Alachlor residues degraded slowly in nonsterile lake water. After 30 days of incubation, 88.8% of a 2 ppm [$^{14}$C] Alachlor solution remained. Data from chronic aquatic studies are necessary as per 158 regulations.
Estuarine and marine- We do not have toxicity or environmental concentration data for marine and estuarine fish and invertebrates and cannot evaluate the risk. The marine and estuarine studies as listed in Table Aare required to support corn, cotton, and soybean uses.

PLANTS

Aquatic- Studies have found that Alachlor has an aquatic plant EC₅₀ of 1.64 µg/l. Alachlor was classified as being "highly toxic" to nontarget aquatic plants.

EEB's calculated maximum EEC (above) is 128 ppb. EFGWB has found reports in the literature that, at their peak, measured residues of Alachlor in surface water exceed 8 ppb. Hoheisel, et al., (1992) found that Alachlor has been detected in ground water in 25 states at concentrations ranging from trace levels to 1000 ppb. Where ground water emerges it becomes surface water. These levels greatly exceed the NOEC and EC₅₀ (0.35 and 1.64 ppb) for aquatic plants (green algae).

Semi-Aquatic Plants- Semi-aquatic plant species live for some part of the year in wet soil. The most appropriate toxicity measurements for these plants are the ones used for terrestrial plants. Exposure scenarios are similar to those described previously for aquatic organisms.

Risk to semi-aquatic plants exceeds levels of concerns. Risk is assessed using two different risk quotients, representing exposure by drift and runoff. Both are both compared to an LOC of 1.

A risk quotient is calculated based on exposure to aerial drift of pesticide, when the pesticide is applied aerially at 6 lbs ai/A, and drifts to a plot with area equal to that of the application plot. A loading 0.3 lbs ai/A is calculated in the same way as for aquatic organisms. The most applicable toxicity data is that for vegetative vigor of terrestrial plants (§A.2.a.(3)), EC₂₅ measurements as low as 0.044 lbs ai/A. The value of the risk quotient is 0.3 ÷ 0.044 = 7.

A risk quotient is calculated based on exposure to runoff of water containing pesticide. The standard model assumes that pesticide is applied aerially at 6 lbs ai/A to a 10 acre plot and is transported to a 1 acre plot. A loading of 1.8 lbs ai/A is calculated in the same way as for aquatic organisms. The most applicable toxicity data is that for germination and growth of terrestrial plants, EC₂₅ measurements as low as 0.0067 lbs ai/A. The value of the risk quotient is 269.

Terrestrial- Risk is measured by a dimensionless number call the Risk Quotient. It is the amount of the pesticide compared to the acute effects level. For terrestrial plants an RQ of over "1" is presumed to indicate high risk.

Typically Alachlor is applied by ground equipment at rates of 4.0 lbs ai/A. If there is 5% runoff, then the total preliminary EEC rate would be 0.2 lbs ai/A. The (supplemental) EC₂₅ for seedling emergence was 0.04 lbs ai/A. Therefore, the Risk Quotient would be 0.2 ÷ 0.04 = 5. Since Alachlor is persistent in water (88% after 30
days), additional applications would be almost fully additive. The highest ground application is Bronco (524-341) at 5.94 lbs ai/A. Its RQ is 7.4.

The highest application is a 6 lbs ai/A rate that is applied by air. The runoff would be the percent of the chemical that landed on the field times the rate of application time the rate of runoff. If 60% of the chemical landed on the field, then 0.60 X 6 X 0.05 = .18 lbs ai/A. The loading from drift is calculated as 5% of the 6 lb ai/A originally sprayed: 6 X 0.05 = 0.3 lbs ai/A. The total loading is 0.48 lbs ai/A. The RQ is obtained by dividing by the seedling emergence EC25 of 0.04 lbs ai/A or 12.

Alachlor has a high potential for effecting nontarget plants near the use sites. It may pose a significant risk to endangered plant species inhabiting those areas.

EPA has been working with the U.S. Fish and Wildlife Service and other state and national agencies to develop a program to avoid jeopardizing the continue existence of listed species by the use of pesticides. The Endangered Species Protection Program is expected to become final in 1994. Limitation on the use of Alachlor will be required to protect endangered and threatened species, but these limitations have not yet been defined. EPA’s Endangered Species Program may require the registrants to collect information about where the use of their herbicide overlaps with the range of endangered species.

Consultation with the FWS will be conducted in accordance with the species based priority approach described in the program. After completion of the consultation, registrants will be informed if any required label modification are necessary. Such modification would may consist of the generic label statement referring pesticide users to use limitation contained in county bulletins.

DATA GAPS
We do not have acute exposure data for marine and estuarine fish and invertebrates or chronic exposure to aquatic animals. There are no data for toxic degradates of Alachlor in ground and surface water. We do not have enough information to decide if we need degradate testing and will have to reserve these studies.

PRECAUTIONARY STATEMENT

END USE
"For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark."

MANUFACTURING USE
Do not discharge into lakes, streams, ponds or public water unless in accordance with an NPDES permit. For guidance contact your Regional Office of EPA
Literature Cited


TABLE A

Generic Data Requirements for Alachlor

<table>
<thead>
<tr>
<th>ECOLOGICAL EFFECTS §158.145 WILDLIFE AND AQUATIC ORGANISMS</th>
<th>Does EPA Have Enough Data to Satisfy This Requirement?</th>
<th>Must Additional Data be Submitted Under FIFRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Requirement</td>
<td>Formulation¹ Use Pattern² No, or Partially Bibliographic Citation</td>
<td>Section 3(c)(2)(B)</td>
</tr>
<tr>
<td>71-1 Avian Oral Acute LD₅₀</td>
<td>TGA¹                  A        Yes                              0007923</td>
<td>No</td>
</tr>
<tr>
<td>71-2 Avian Dietary LC₅₀</td>
<td>TGA¹                  A        Yes                              43087101, 43087001</td>
<td>No</td>
</tr>
<tr>
<td>72-1 Freshwater Fish Acute LC₅₀</td>
<td>TGA¹                  A        Yes                              00031525, 00028550, 00028554, 00028551, 00028553, 00023615, 00023616, 00031524 40098001</td>
<td>No</td>
</tr>
<tr>
<td>72-2 Freshwater Invertebrate LC₅₀</td>
<td>TGA¹                  A        Yes                              40098001</td>
<td>No</td>
</tr>
<tr>
<td>72-3(a) Estuarine/Marine Toxicity Fish</td>
<td>TGA¹                  A        No³                              Yes</td>
<td></td>
</tr>
<tr>
<td>72-3(b) Estuarine/Marine Toxicity Mollusk</td>
<td>TGA¹                  A        No³                              Yes</td>
<td></td>
</tr>
<tr>
<td>72-3(c) Estuarine/Marine Toxicity Shrimp</td>
<td>TGA¹                  A        No³                              Yes</td>
<td></td>
</tr>
<tr>
<td>72-4(a) Early Life Stage Fish</td>
<td>TGA¹                  A        No                               Yes</td>
<td></td>
</tr>
<tr>
<td>72-4(b) Life Cycle Aquatic Invertebrate</td>
<td>TGA¹                  A        No                               Yes</td>
<td></td>
</tr>
<tr>
<td>123-1 Vegetative vigor</td>
<td>TGA¹                  A        No                               42468601</td>
<td>Yes</td>
</tr>
<tr>
<td>123-1 Seed germination</td>
<td>TGA¹                  A        No                               42468701</td>
<td>Yes</td>
</tr>
<tr>
<td>123-2 Plant growth</td>
<td>TGA¹                  A        Yes                              42763801</td>
<td>No</td>
</tr>
</tbody>
</table>

In addition data may be required on toxic degradates of Alachlor if fate, groundwater, and chemistry studies show that it is warranted.

1. TGA¹ = Technical grade of the active ingredient.
2. The use patterns are coded as follows: A = Terrestrial, food crop; B = Terrestrial, noncrop; D = Aquatic, nonfood; H = Domestic outdoor; I = Outdoor.
3. Necessary to support cotton, corn, and soybean uses.
MEMORANDUM

Subject: Alachlor (SN 090501) avian dietary studies.

From: Anthony Maciorowski, Chief
Ecological Effects Branch
Environmental Fate and Effects Division (7507C)

To: Walter Waldrop, Jr.
Head, Section 1, Registration Branch
Special Review and Reregistration Division 7508W

EEB has reviewed the two avian dietary studies that were submitted by Monsanto. They were both found to be "Core."

Our Date Evaluation Report is attached. Please contact Dr. James J. Goodyear at 305-7726 if you have any questions.
Data Evaluation Record

ALACHLOR

Guideline 71-2(a) Bobwhite Quail Dietary Toxicity Study

1. TEST MATERIAL - Alachlor.

2. STUDY MATERIAL - Technical grade - 95.4%

3. STUDY TYPE - Avian Dietary Oral LC₅₀.

  Species used - Bobwhite quail (Colinus virginianus)


5. REVIEWED BY:

  James J. Goodyear, Ph.D.  
  Biologist, Section 1  
  Ecological Effects Branch  
  Environmental Fate and Effects Division (7507C)

  Signature: [signature]  
  Date: 6-8-94

6. APPROVED BY:

  Leslie W. Touart, Ph.D.  
  Head, Section 1  
  Ecological Effects Branch  
  Environmental Fate and Effects Division (7507C)

  Signature: [signature]  
  Date: 6-8-94

7. CONCLUSIONS:

  Alachlor technical is practically nontoxic (LC₅₀ > 5,620 ppm) to Bobwhite quail chicks in dietary tests. The study is "Core" and fulfills the guideline requirement.

8. RECOMMENDATIONS - N/A.

9. BACKGROUND:

  Submitted for reregistration.

10. DISCUSSION OF INDIVIDUAL TEST - N/A.
11. MATERIALS AND METHODS:

A. TEST ANIMALS:

Sand Prairie Quail Farm, Route 3, Box 159, Maquoketa, Iowa 52060. The were pen-reared and indistinguishable for wild birds.

B. DOSE:

The nominal concentrations were 562, 1000, 1780, 3160, and 5620 ppm.

C. DESIGN:

They were acclimated for eight days, exposed for five days and observed for four days. There were ten birds in each mixed sex group. There were three control groups and five test groups. The toxicant was mixed with corn oil (2%) but no other solvent. The controls contained 2% corn oil.

Birds were put into pens at random. The pens were 72(W) X 90(D) X 23(H) cm. Temperature was 32° ± 2° C and the relative humidity was 70%.

The photoperiod was 17 hours of light. Birds were observed daily. Weights were taken by group at the start of the study, on day 5, and the end of the study. Food consumption was calculated for the exposure period and for the observation period.

There were no deaths in the control or test groups.

D. STATISTICS:

The LC\textsubscript{50} was taken as being in excess of the highest dose.

12. REPORTED RESULTS:

There were no mortalities. The body weights were reduced at and above 1000 ppm.

13. STUDY AUTHORS' CONCLUSIONS/QA MEASURES:

LC\textsubscript{50} > 5620 ppm. Based upon the reduction in body weight, 1000 ppm called the NOEL.

14. REVIEWER'S DISCUSSION AND CONCLUSIONS:

A. TEST PROCEDURES:

The procedures were within acceptable limits.
B. STATISTICAL ANALYSIS:

$\text{LC}_{50} > 5620 \text{ ppm}$. Based upon the reduction in body weight, the NOEL was considered to be 1000 ppm.

C. DISCUSSION/RESULTS:

Alachlor technical is practically nontoxic to bobwhite chicks.

D. ADEQUACY OF THE STUDY:

Classification- Core.

Rationale- Meets SEP requirements.

Repair- n/a.

15. COMPLETION OF ONE-LINER FOR STUDY- yes.

16. CBI APPENDIX- N/A.
Data Evaluation Record

ALACHLOR

Guideline 71-2(b) Mallard Dietary Toxicity Study

1. TEST MATERIAL - Alachlor.

2. STUDY MATERIAL - Technical grade - 95.4%

3. STUDY TYPE - Avian Dietary Oral LC₅₀.

   Species used - Mallard duck (Anas platyrhynchos)


5. REVIEWED BY:

   James J. Goodyear, Ph.D.
   Biologist, Section 1
   Ecological Effects Branch
   Environmental Fate and Effects Division (7507C)

   Signature: [Signature]
   Date: 6.8.94

6. APPROVED BY:

   Leslie W. Touart, Ph.D.
   Head, Section 1
   Ecological Effects Branch
   Environmental Fate and Effects Division (7507C)

   Signature: [Signature]
   Date: 6.8.94

7. CONCLUSIONS:

   Alachlor technical is practically nontoxic (LC₅₀ > 5,630 ppm) to mallard duckling in dietary tests. The study is "Core" and fulfills the guideline requirement.

8. RECOMMENDATIONS - N/A.

9. BACKGROUND:

   Submitted for reregistration.
10. DISCUSSION OF INDIVIDUAL TEST- N/A.

11. MATERIALS AND METHODS:

A. TEST ANIMALS:

Ten day old ducklings from Whistling Wings, Box 1, 113 Washington Street, Hanover, Illinois 61041. The were pen-reared and indistinguishable for wild birds.

B. DOSE:

The nominal concentrations were 562, 1000, 1780, 3160, and 5620 ppm.

C. DESIGN:

They were acclimated for eight days, exposed for five days and observed for three days. There were ten in each mixed sex group. There were three control groups and five test groups. The toxicant was mixed with corn oil (2%) but no other solvent. The controls contained 2% corn oil.

Birds were put into pens at random. The pens were 72(W) X 90(D) X 24(H) cm. Temperature was 82° ± 3° F and the relative humidity was 72%.

The photoperiod was 17 hours of light. Birds were observed daily. Weights were taken by group at the start of the study, on day 5, and the end of the study. Food consumption was calculated for the exposure period and for the observation period.

There were no deaths in the control groups. One bird died in the 3160 ppm group, but they did not attribute this to the toxicant.

D. STATISTICS:

The LC₅₀ was taken as being in excess of the highest dose.

12. REPORTED RESULTS:

There were no mortalities in the control groups. "There was one mortality on Day 1 at the 3160 ppm concentration which was not attributed to treatment." There was a reduction in the weights of the 1780, 3160, and 5620 ppm groups.

13. STUDY AUTHORS' CONCLUSIONS/QA MEASURES:

LC₅₀ > 5620 ppm. Based upon the reduction in body weight, 1000 ppm called the NOEL.
14. REVIEWER'S DISCUSSION AND CONCLUSIONS:

A. TEST PROCEDURES:

The procedures were within acceptable limits. It was not explained how the mortality at the 3160 level, "which was not attributed to treatment" occurred. There is very little difference in the LC₅₀ if this mortality is attributed to the treatment. The statistical method of determining the LC₅₀ (Stephan, 1977) will not accept such an unusual distribution of mortality. We are willing to accept the mortality as being unrelated to the treatment.

B. STATISTICAL ANALYSIS:

LC₅₀ > 5620 ppm. Based upon the reduction in body weight, the NOEL was considered to be 1000 ppm.

C. DISCUSSION/RESULTS:

Alachlor technical is practically nontoxic to mallard ducklings.

D. ADEQUACY OF THE STUDY:

Classification- Core.

Rationale- Meets SEP requirements.

Repair- n/a.

15. COMPLETION OF ONE-LINER FOR STUDY- yes.

16. CBI APPENDIX- N/A.

LITERATURE CITED