105001

24

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

23 NOV 1984

MEMORANDUM

TO: John Tice
Science Integration Staff
Hazard Evaluation Division, TS 769C

THRU: Dave Coppage, Acting Chief
Ecological Effects Branch
Hazard Evaluation Division, TS 769C

SUBJECT: Comments on Memo: " Terbufos - Reevaluation of Registration Data Requirements".

EEB concurs with the RD draft memo reevaluating terbufos registration data requirements. Our concurrence is based on the imposition of the requirement for field monitoring tests in four (4) areas: Corn belt, Plain states, Lake states and an estuarine/corn-use watershed.

John J. Bascietto

John J. Bascietto
Wildlife Biologist,
Ecological Effects Branch
Hazard Evaluation Division, TS 769C

27 pages

EEB

#23

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

19 OCT 1984

MEMORANDUM

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

TO: William Miller, PM (16)
Registration Division (TS-767c)

THRU: Dave 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: Response To Inquiries Regarding Aquatic Field Monitoring of Terbufos (Counter®).

This memo responds to your 9 Oct. 1984 questions regarding new residue data documenting aquatic contamination of Northwestern Ohio rivers with terbufos, submitted by E.P.A. Region V, and how these data may bear on current testing requirements under terbufos re-registration guidance issued in June, 1983 (registration standard).

Terbufos (Counter®) is considered to be "very highly toxic" to freshwater aquatic species: Daphnia magna, techincal grade LC_{50} = 0.31 (0.27-0.36) ppb; Bluegill sunfish, Lepomis macrochirus technical grade LC_{50} = 0.77 (0.72-0.83) ppb. No studies of marine/estuarine species, nor chronic or reproductive data for aquatic species, have been available.

In answer to your first question - EEB was unaware of the new information on toxic levels of terbufos discovered in NW Ohio rivers by monitoring studies submitted by E.P.A. Region V and reviewed by Exposure Assessment Branch/HED (EAB/HED) - (see EAB memo of 26 July '84). This new data suggests that E.P.A. previously underestimated the potential for aquatic contamination of streams with terbufos resulting from pesticide runoff from agricultural use (see previous reviews with SWRRB and EXAMS model predictions for aquatic estimated environmental concentrations - EEC's). These predictions indicated a maximum short-term residue level of 0.21 ppb in rivers. Actual terbufos residues measured in Region V were as high as 0.54 ppb in streams. This level exceeds "Restricted" and "RPAR" triggers, and is greater than LC_{50} for the most sensitive aquatic indicator species. Any endangered aquatic species exposed to these levels would be considered to be at a subtantial risk of "jeopardy". The Agency should make any effort to avoid this possibility - (see "corn cluster" biological opinion of the Office of Endangered Species, U.S. Dept. of the Interior, for endangered species at risk).

2

We emphasize that the new data on terbufos was obtained on flowing streams which would be expected to provide a good degree of dilution of chemical pollutants. It is apparent from EAB's report on the new monitoring data that pesticide runoff resulting from natural rainfall events played an important role in the observation of peak residues. It seems reasonable therefore, to expect that runoff to ponds adjacent to treated fields may result in substantially greater terbufos residues than those observed in streams. Model predictions for typical use directions for Counter® on corn indicated peak Ohio pond residues at 7 ppb terbufos in the water column and 10 ppb in sediments (EXAMS).

Reported fish kill information since 1981 indicates that Counter® has been confirmed or implicated in fish kills in Missouri, Illinois, Wisconsin, and South Carolina. These kills ranged in size from 500-5000 fish (approx.). I have requested additional (pre-1981) fish kill statistics for Counter® be reported to me, but have not yet received these statistics.

Because of the potential for hazard indicated by EAB/HED initial modeling efforts, EEB requested that field monitoring of residues resulting from actual use of Counter® be required by EAB as part of their monitoring requirements for the registration standard. In the standard (issued 6/83) the Agency stated:

> "In order to determine whether significant evidence relating to aquatic organisms would raise prudent concerns of unreasonable adverse risk to the environment, the Agency is requiring further monitoring of water, sediment and fish in ponds adjacent to treated fields..... Once the Agency has evaluated these additional data, it will determine whether the Agency should initiate a public interim review process by placing the chemical in special review."

To answer your second question - the new information on residues found in streams does not change EEB's March 30 determination that "field monitoring of fish" is "premature". However, this determination refers only to the Pesticide Assessment Guideline 158.45 requirement 72-7, "Simulated or Actual Field Testing for Aquatic Organisms", sometimes referred to as "actual field monitoring" by our staff. On March 27th, 1984 EEB met with American Cyanamid Co. and your team to discuss this matter. That discussion refferred specifically to the 72-7 guideline requirement, and resulted in the March 30, 1984 determination.

We fully support the original registration standard requirement for three (3) monitoring sites and further suggest that a fourth site, i.e., an estuarine/corn-use watershed, be added. A reiteration of the specific objectives and instructions for carrying out the field monitoring contained in the registration standard for terbufos follows. It summarizes the aquatic monitoring requirements for terbufos at this time, and is further substantiated by the fish kill and stream residue data from Region V.

(from EAB requirements - Terbufos Re-registration guidance, June, 1983, Table A, "Monitoring Studies", 158.130, footnote 15.):

3

"The objective of this monitoring requirement is to measure real world levels of terbufos and metabolites in treated fields and ponds adjacent to fields where terbufos is used.

The majority of terbufos marketed is used for corn rootworm control and it is most likely that environmental concerns will arise in the corn growing areas of the U.S. The application sites chosen should possess a known application history and be adjacent to ponds. Geographic areas for sampling should include: corn belt states, plains states and lake states.

Soil in treated fields should be monitored before and after application of terbufos. Pond water, sediment and fish should be monitored before and after fields are treated with terbufos. The scheme of monitoring (where, when, how) should reflect the attempt to measure maximum residues. Fish samples should be analyzed for cholinesterase inhibition, as well as terbufos residues. Baseline cholinesterase levels in fish brains should be established both in the ponds at the treatment sites and in an area without any history of anticholinesterase pesticide use (e.g., ponds near pastureland, but not where hay is harvested). The pH-stat technique as described by Coppage (1971) should be used. Metabolites as well as parent levels should be monitored (Cook, et. al., 1976). Additional information on this type of field study can be found in Tagatz, et.al. (1974) and Coppage and Braidech (1976).

Treatment rates should be at highest recommended rate for that site and crop. Normal agricultural practice should be followed, including repeated applications if appropriate. If possible, some sites with a history of terbufos treatment should also be chosen.

The monitoring protocol (including analytical methodology) must be submitted to the Agency, prior to initiating the study, with enough lead time for Agency review (two months)."

If useful data is obtained by the performance of the above monitoring, as specified, it will be used in conjunction with data on hand and outstanding requirements for laboratory assays, such as the acute marine/estuarine tests (72-3) and the freshwater species chronic studies (72-4), to assess potential for unreasonable risk. If substantial concerns are then indicated, we will initiate a field study requirement for aquatic organisms as we previously stated as "reserved" in Table A of the standard - 158.145 "Wildlife and Aquatic Organisms" 72-7, footnote 10.

We note with concern that on 29 Dec. 1983 EAB/HED approved a field monitoring protocol submitted by American Cyanamid to study terbufos at a cornbelt site. We would like to make two points on thier approval of that protocol:

1) their review makes no mention of proposals to monitor fish, as required by the standard.

2) the protocol was apparently for one (1) site only, rather than the required three (3) sites.

We expect that number of sites will be addressed by EAB/HED because they have apparently withdrawn their waiver to study the additional two (2) sites as a result of the Region V stream residue data. We request that you emphasize to the registrant that fish monitoring requirements, as specified in the standard, are still imposed, and suggest that they obtain written protocol approval prior to initiating field work for fish monitoring.

John J. Bascietto

John J. Bascietto
Wildlife Biologist, Sec. 3
Ecological Effects Branch/HED TS-769c

Attachments

(1) - your submission of 9 Oct '84 which contains:

EAB memo, 7/26/84; EEB memo, 3/30/84; EAB review of waiver, 12/16/83; excerpt from terbufos registration standard.

(2) - undated report by EAB/HED -
Summary of E.P.A. Region V monitoring data.

(3) - EAB/HED review of proposed pond monitoring protocol - 12/29/83

5

(32) Terbufos

A) Regulatory Position + Rationale (Reg. Std.)

- request for study June 30/83 Basciotto
  - i) water, sediment, and fish monitoring study.

- American Cyanimid
- used on corn, sorghum, sugar beet

6

RATIONALE FOR STUDY REQUEST (TERBUFOS, NUMEROUS USES, AMER CYANAMID)

1. Extensive uses: corn, sorghum

2. EEC's > aquatic LC50 values.

3. Highly toxic to aquatics.

Published TERBUFOS Guidance Package June, 1983 sent to Companies - letter dated June 30, 1983

105001

105001

PM = # 16
Marsha Mauritz
Bill Miller

II. REGULATORY POSITION AND RATIONALE

A. INTRODUCTION

This Registration Standard describes the regulatory position of the Environmental Protection Agency (EPA) on manufacturing use products (MPs) containing the insecticide-nematicide terbufos. The Agency's position is based on an evaluation of all registered uses and registered MPs with terbufos as the sole active ingredient. There are no products registered that contain terbufos in a mixture with other active ingredients. This position is based on a number of considerations. Foremost among these is an analysis of terbufos data based on the risk criteria found in Section 162.11(a) of Title 40 of the U.S. Code of Federal Regulations. The Standard also considers labeling requirements, tolerances, "Special Local Needs" registrations authorized by Section 24(c) of the FIFRA as well as federal registrations granted under Section 3 of the FIFRA. Finally, the Agency sets forth the data requirements that must be met to register or reregister products covered by the Standard.

This Standard only addresses registration requirements for current or substantially similar future MPs and their intermediaries. Terbufos MPs that differ appreciably from those described here may require amendments to the Standard. Additionally, use patterns which differ from those described here may also require amendments to the Standard.

B. USE PROFILE

Terbufos is the acceptable common name for S-[[(1,1-dimethyl-ethyl)thio] methyl]O,O-diethyl phosphorodithioate recognized by the American National Standards Institute, British Standards Institution, New Zealand and International Organization for Standardization. Trade names and other names for terbufos are: Counter®, CL 92100, AC 92100, ENT 97920, and ST 100.

American Cyanamid Company, Agricultural Division is currently the sole manufacturer of the technical product and formulator of granular end-use products in the U.S.A.

Terbufos, an organophosphate chemical, is principally used as an insecticide for corn rootworms on corn and is applied as a soil incorporated product at planting and at post-emergence. Other uses include use as a nematocide for lesion, spiral, stunt, sting, stubby-root and dagger nematodes on corn; and as an insecticide for greenbugs on grain sorghum, sugarbeet root maggot on sugarbeets, and seedcorn maggots, symphylans, wireworms, maize billbug, southern corn billbug and reduction of white grubs on corn.

There are two federal registrations for products containing terbufos: one, an MP containing 85.0% terbufos, the other, an end-use granular product containing 15.0%. There are several Special Local Need Registrations which were issued for 15% granular products.

C. REGULATORY POSITION

Based on a review and evaluation of available data and other relevant information on the chemical, the Environmental Protection Agency has made the following determinations regarding terbufos:

1. Manufacturing - use pesticide products containing terbufos as a sole active ingredient or mixed with other active ingredients may be registered for sale, distribution, and use, subject to the terms and conditions specified in this Standard.

2. Based on available data, the Agency has determined that terbufos has not been demonstrated to cause unreasonable adverse effects in man when used in accordance with prescribed label directions and precautions.

   However, the safety of this chemical cannot be adequately addressed at the present time due to extensive data gaps.

3. The review has identified potential environmental concerns. Results of available laboratory studies indicate a very high acute toxicity to fish and aquatic invertebrates. The SWRRB* and EXAMS** models predict

* SWRRB is a hydrology model combined with a pesticide runoff model.
** EXAMS is a hydrologic model to predict "steady-state" and "pulse-load" behavior of organic toxicants in aquatic ecosystems.

aquatic concentrations of terbufos in excess of the LC_{50} for aquatic organisms. In order to determine whether significant evidence relating to aquatic organisms would raise prudent concerns of unreasonable adverse risk to the environment, the Agency is requiring further monitoring of water, sediment, and fish; in ponds adjacent to treated fields. The Agency will also conduct additional modeling utilizing various parameters. Once the Agency has evaluated these additional data, it will determine whether the Agency should initiate a public interim review process by placing the chemical in special review. If, instead, regulation of the chemical through the normal registration process is found to be appropriate, the Agency will update its regulatory position and rationale to reflect this conclusion and the reasoning behind it.

see EAB data tables attached

4. A May 19, 1983 Biological Opinion from the Office of Endangered Species (OES), Fish and Wildlife Service, U.S. Department of Interior, predicted that the use of terbufos on corn is "...likely to jeopardize the continued existence ..." of a variety of federally-listed endangered/threatened species. These species include three species of birds, two species of fish, twelve aquatic invertebrate species and two insect species. Consultation for an opinion

from OES has recently been initiated for use on sorghum; and consultation for sugar beets may be initiated, if it is deemed necessary. Labeling and/or other alternatives, as appropriate will be prescribed by the Agency based on the biological opinions received from OES for the use of terbufos on corn, sorghum and sugar beets.

5. Based on available information, there appears to be a potential for substantial hazard to terrestrial organisms from the use of terbufos as described in this Standard. This is based on the availability of granules to wildlife at and below the soil surface, the high to very high acute toxicity of terbufos to terrestrial organisms, and the record of field kills with other granular products of similar toxicity. Additional avian and mammalian testing including actual field testing are needed to fully assess this hazard potential.

6. Registrants must provide or agree to develop additional data, as specified in Tables A and B located in Chapter IV of this document, in order to maintain existing registrations or to permit new terbufos registrations.

7. Tolerance reassessment is normally a part of the Registration Standard review process. Because essential toxicology data are not available, the Agency is unable

to complete its reassessment of terbufos tolerances. Specifically, due to the extensive data gaps the Agency is unable to establish a valid "No Observable Effect Level" (NOEL) or determine an Acceptable Daily Intake (ADI) for terbufos.

The tolerances listed under 40 CFR 180.352 for terbufos are currently set for " .....combined residues of the insecticide terbufos.....and its cholinesterase-inhibiting metabolites.....". This wording will be revised to read ".....phosphorylated (cholinesterase-inhibiting) metabolites....." as specified in Section H.

8. On August 1, 1979, a notice was published in the Federal Register (44 FR 45219) of a proposal to amend 40 CFR 162.31 by assigning the granular formulations of several pesticide chemicals a restricted use classification under the optional classification by regulation procedures pursuant to 40 CFR 162.30. On August 7, 1979 (44 FR 46303) this notice was corrected to include granular formulations of terbufos, on the basis of acute oral, and dermal toxicity and residue effects on avian species. A final classification determination of the end-use formulations containing terbufos will be made by the Agency pursuant to these optional classification by regulation procedures.

D. REGULATORY RATIONALE

Terbufos, a cholinesterase-inhibiting chemical has a high acute toxicity to humans. The available acute studies indicate that the chemical is in Toxicity Category I for both the oral and dermal routes of exposure. The acute inhalation toxicity remains to be determined pending receipt and review of the requested rat LC_{50} inhalation testing.

The Agency has determined that it should continue to allow registration of terbufos for the following reasons:

1. The stringent label warning statements reflecting the high acute toxicity to humans which include directions for use of protective clothing including gloves, goggles, and a mask or respirator will minimize the acute hazards to users of the manufacturing use product associated with the oral, dermal, inhalation and ocular routes of exposure. The registered manufacturing use product described in this Standard, a liquid product, bears such stringent warning statements.

   The granular composition of the end-use product as described in this Standard together with the recommended stringent label precautions which include the use of gloves, goggles, and protective clothing, will minimize the acute hazards to loader/ applicators through the oral, dermal and ocular routes of exposure. Due to the size of the granulars and the method of application

(soil incorporation), exposure through inhalation from use of the end-use product is not expected. The end-use product for terbufos as described in this Standard is intended for outdoor, nondomestic use only, and bears the label restriction, "not for use or storage in or around the home".

Because the end-use product is of a granular composition, and because the current registered use patterns require soil incorporation, there is little potential for worker re-entry exposure. Consequently, no re-entry data are required to support current registered uses described in this Standard and no re-entry interval as defined in 40 CFR 170.2 of Part 170, Worker Protection Standards for Agricultural Pesticides would be required for these current uses.

2. Based on available data, terbufos is not expected to leach into ground water.

3. Terbufos was first registered in 1974 for use in corn fields to control corn rootworms. The Pesticide Incident Monitoring System (PIMS) records through June, 1981, include 31 reports involving terbufos, of which 19 involved terbufos alone. Of these 19 incidents, 9 involved humans; 8 involved domestic livestock and 2 involved wildlife. No human fatalities resulted. In those human exposure incidents which were reported with some detail, it appears that carelessness or

negligence were important factors. In two of these incidents, the granular pesticide was reported to have been handled with bare hands during loading and application procedures.

In those instances involving livestock, one resulted in the death of about 600 cattle, another in the death of 127 cattle. The accidental contamination of livestock feed was reported as the cause in these incidents. The two wildlife instances involved fish kills which were reportedly due to runoff from treated fields. Only one included analysis of the water samples. Though the sampling agency was unable to test for terbufos, no evidence of organophosphorous compounds was found in the sampled water.

Carelessness and/or negligence appear to have been important factors in most incidents. Strict adherence to proper storage and application techniques as prescribed in the label directions and precautions will minimize the risk of potential adverse effects to humans and domestic animals.

4. It is not the Agency's policy to cancel or to withhold registration merely because data are missing or inadequate [see FIFRA Sections 3(c)(2)(B) and 3(c)(7)]. Rather, publication of this Standard provides a mechanism for identifying data needs, and registration of terbufos under this standard allows for the upgrading of labels

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

Data Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?3/
§158.130 Environmental Fate					
DEGRADATION STUDIES-LAB:					
161-1 - Hydrolysis	TGAI or PAIRA	A	Yes	00087694*	No
Photodegradation					
161-2 - In water	TGAI or PAIRA	A	Partial	00087694*	Yes 5/
161-3 - On soil	TGAI or PAIRA	-	No	-	No 6/
161-4 - In Air	TGAI or PAIRA	A	No	-	No 14/
METABOLISM STUDIES-LAB:					
162-1 - Aerobic Soil	TGAI or PAIRA	A	Yes	00087690*	No
162-2 - Anaerobic Soil	TGAI or PAIRA	A	Yes	00087690*	No
162-3 - Anaerobic Aquatic	TGAI or PAIRA	-	No	-	No 7/
162-4 - Aerobic Aquatic	TGAI or PAIRA	-	No	-	No 8/
MOBILITY STUDIES:					
163-1 - Leaching and Adsorption/Desorption	TGAI or PAIRA	A	Yes	00087693*	No
163-2 - Volatility (Lab)	TEP	A	No	-	Yes
163-3 - Volatility (Field)	TEP	A	No	-	Reserved 4/

* Data submitted by American Cyanamid. These data may be compensable.

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

ata Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?3/
158.130 Environmental Fate (continued)					
DISSIPATION STUDIES-FIELD:					
164-1 - Soil	TEP	A	Yes 13/	00087708*; 00087706*	No
164-2 - Aquatic (Sediment)	TEP	-	No	-	No 8/
164-3 - Forestry	TEP	-	No	-	No 9/
164-4 - Combination and Tank Mixes		-	No	-	No 10/
164-5 - Soil, Long-term	TEP	-	No	-	No 11/
ACCUMULATION STUDIES:					
165-1 - Rotational Crops (Confined)	PAIRA	A	Yes	00087692*	No
165-2 - Rotational Crops (Field)	TEP	A	No	-	Yes
165-3 - Irrigated Crops	TEP	-	No	-	No 12/
165-4 - In Fish	TGAI or PAIRA	A	Yes	00085184*	No
165-5 - In Aquatic Non-Target Organisms	TEP	-	No	-	No 7/
MONITORING STUDIES					
- Soil, and water, sediment and fish	TEP	A	No	-	Yes 15/

See p. 6

* Data submitted by American Cyanamid. These data may be compensable.

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

§158.130 Environmental Fate (continued)

1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product.
2/ The use patterns are coded as follows: A=Terrestrial, Food Crop; B=Terrestrial, Non-Food; C=Aquatic, Food Crop; D=Aquatic, Non-Food; E=Greenhouse, Food Crop; F=Greenhouse, Non-Food; G=Forestry; H=Domestic Outdoor; I=Indoor.
3/ Data must be submitted no later than June, 1986.
4/ Reserved pending result of lab volitility data (163-2).
5/ A study utilizing proper controls is needed.
6/ This study is not required to support the current application method of soil incorporation.
7/ This study is not required to support the current use pattern which does not include aquatic, forestry or aquatic impact uses.
8/ This study is not required to support the current use pattern which does not include aquatic or aquatic impact uses.
9/ This study is not requried to support the current use pattern which does not include forestry uses.
10/ There are no current registered combination or tank mixes for terbufos.
11/ This study is not required because less than 50% terbufos residues remain upon subsequent application.
12/ This study is not required to support the current use pattern which does not include aquatic uses.
13/ Both data citations are needed to satisfy this data requirement.
14/ This data is not required to support the current uses of terbufos which are outdoor, soil-incorporated uses.
15/ The objective of this monitoring requirement is to measure real world levels of terbufos and metabolites in treated fields and ponds adjacent to fields where terbufos is used.
The majority of terbufos marketed is used for corn rootworm control and it is most likely that environmental concerns will arise in the corn growing areas of the U.S. The application sites chosen should possess a known application history and be adjacent to ponds. Geographic areas for sampling should include: corn belt states, plains states and lake states.
Soil in treated fields should be monitored before and after application of terbufos. Pond water, sediment and fish should be monitored before and after fields are treated with terbufos. The scheme of monitoring (where, when, how) should reflect the attempt to measure maximum residues. Fish samples should be analyzed for cholinesterase inhibition, as well as terbufos residues. Baseline cholinesterase levels in fish brains should be established both in the ponds at the treatment sites and in an area without any history of anticholinesterase pesticide use (e.g., ponds near pastureland, but not where hay is harvested). The pH-stat technique as described by Coppage (1971) should be used. Metabolites as well as parent levels should be monitored (Cook, et. al., 1976). Additional information on this type of field study can be found in Tagatz, et.al. (1974) and Coppage and Braidech (1976).
Treatment rates should be at highest recommended rate for that site and crop. Normal agricultural practice should be followed, including repeated applications if appropriate. If possible, some sites with a history of terbufos treatment should also be chosen.
The monitoring protocol (including analytical methodology) must be submitted to the Agency, prior to initiating the study, with enough lead time for Agency review (two months).

9

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

Data Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)? 3/
§158.145 Wildlife and Aquatic Organisms					
AVIAN AND MAMMALIAN TESTING					
71-1 - Avian Oral LD_{50}	TGAI	A	Yes	00106551*	No
71-2 - Avian Dietary LC_{50}	TGAI	A	Yes 8/	00087717** 00035120**	No
71-3 - Wild Mammal Toxicity	TGAI	A	Not Applicable	-	-
71-4 - Avian Reproduction	TGAI	A	Partial	00085177* 00097892*	Yes 5/
71-5 - Simulated and Actual Field Testing - Mammals and Birds	TEP	A	Partial	00085178* 00087726* 00085180* 00085179* 00085183*	Yes 6/
AQUATIC ORGANISM TESTING					
72-1 - Freshwater Fish LC_{50}	TGAI	A	Yes 9/	00037483* 00085176* 00087718**	No
	TEP	A	Yes	GS0109002 GS0109003	No

* Data submitted by American Cyanamid. These data may be compensable.
** Data submitted by Aceto Chemical Co., Inc. These data may be compensable.

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

Data Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)? 3/
§158.145 Wildlife and Aquatic Organisms (continued)					
72-2 - Acute LC_{50} Freshwater Invertebrates	TGAI	A	Yes 7/	00101495* 00085176*	No
-do-	TEP	A	Yes	GS0109004	No
72-3 - Acute LC_{50} Estuarine and Marine Organisms	TGAI	A 4/	No	-	Yes
72-4 - Fish Early Life Stage and Aquatic Invertebrate Life-Cycle	TGAI	A	No	-	Yes 11/
72-5 - Fish - Life-Cycle	TGAI	A	Reserved 10/		
72-6 - Aquatic Organism Accumulation	TGAI, PAI or Degradation Product	A	Reserved 10/		
72-7 - Simulated or Actual Field Testing - Aquatic Organisms	TEP	A	Reserved 10/		

* Data submitted by American Cyanamid. These data may be compensable.

TABLE A
GENERIC DATA REQUIREMENTS FOR TERBUFOS

§158.145 Wildlife and Aquatic Organisms
(continued)

1/ Composition: TGAI = Technical grade of the active ingredient; PAI = pure active ingredient; TEP = Typical end-use product;
2/ The use patterns are coded as follows: A=Terrestrial, Food Crop; B=Terrestrial, Non-Food Crop; C=Aquatic, Food Crop; D=Aquatic, Non-Food; E=Greenhouse, Food Crop; F=Greenhouse, Non-Food; G=Forestry; H=Domestic Outdoor; I=Indoor.
3/ Data must be submitted no later than June, 1986.
4/ This data is necessary to support corn and sorghum uses.
5/ All pen-by-pen data must be provided to enable full statistical evaluation of results.
6/ Actual field testing should be conducted with the corn use, using the present maximum application rate (2.4 oz a.i./1000 feet of row). Census data should be taken before and after treatment, intensive searches for dead or dying animals should be made within one day of application, and analyses for cholinesterase inhibition should be conducted. A protocol for conducting this study should be submitted to the Agency for review, at least six months prior to initiation of testing.
7/ The data citation 00101495 is sufficient to satisfy this data requirement.
8/ Data citation 00087717 is sufficient to satisfy the data requirement for a Bobwhite quail dietary LC_{50} study. Though data citation 00035120 only partially satisfies the guideline requirement for a mallard duck dietary LC_{50} study, further mallard testing is not deemed warranted because of the food rejection problem.
9/ To satisfy this data requirement, both a coldwater species and a warmwater species study must be cited. Either data citation 00087718, or 00037483 is sufficient to satisfy the data required for a coldwater species; and either 00087718 or 00037483 is sufficient to satisfy the data requirement for a warmwater species.
10/ The need for these studies is reserved pending evaluation of: 1) the monitoring data (§ 158.130), 2) completion of additional EECs (discussed in Chapter II), 3) the outstanding aquatic studies (72-3 and 72-4). This information will then dictate the need for anyone of the reserved studies.
11/ The applicant should consult with the Agency regarding the appropriate test species and test methodologies.

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PLANNING AND STANDARDS
WASHINGTON, D.C. 20460

Form Approved OMB No. 158-R0036

FOR OWPS USE ONLY

REPORT OF POLLUTION-CAUSED FISH KILL

1A. LOCATION (Name of body of water; Latitude-Longitude)
Private Pond NW¼ SE¼ Sec. 31 T15N R19E — Latitude 43° 45' 53" Longitude 88° 22' 09"

B. NEAREST TOWN: Village of Eden — COUNTY: Fond du Lac — C. STATE: WI — 2. DATE OF KILL: 6/11, 12/84

3. TYPE OF WATER BODY (Private Pond)
☐ RIVER OR STREAM ☒ LAKE ☐ ESTUARY ☐ OCEAN OR GULF

4. PUBLIC DRINKING WATER SUPPLY
☐ YES ☒ NO

5. POLLUTION SOURCE - TYPE OF OPERATION

A. AGRICULTURAL OPERATIONS
- ☒ POISONS (pesticides, etc.)
- ☐ FERTILIZERS
- ☐ MANURE DRAINAGE, ENSILAGE LIQUORS, OR FEED LOT OPERATIONS
- ☐ NANOLINE OF EQUIPMENT & CONTAINERS

B. INDUSTRIAL OPERATIONS
- ☐ MINING
- ☐ FOOD & KINDRED PRODUCTS
- ☐ PAPER & ALLIED PRODUCTS
- ☐ CHEMICALS
- ☐ PETROLEUM
- ☐ METALS
- ☐ OTHER:
- ☐ TEXTILES
- ☐ LEATHER & LEATHER PRODUCTS
- ☐ RUBBER & PLASTICS
- ☐ LUMBER & WOOD PRODUCTS
- ☐ SAND & GRAVEL

C. MUNICIPAL OPERATIONS
- ☐ SEWERAGE SYSTEM
- ☐ REFUSE DISPOSAL
- ☐ WATER SYSTEM
- ☐ SWIMMING POOL
- ☐ POWER (public service)
- ☐ PEST CONTROL

D. TRANSPORTATION OPERATIONS
☐ RAIL ☐ TRUCK ☐ BARGE OR BOAT ☐ AIR ☐ PIPELINE

E. CONSTRUCTION OR OTHER
☐ CONSTRUCTION
☐ OTHER:

F.
☐ UNKNOWN

G. SPECIFIC POLLUTANT OR FACTOR CHANGING WATER CHARACTERISTICS (Name of chemical, thermal discharge, etc.)
Possible chemicals - Counter, Atrazine and Lasso.

6. TYPE OF FISH KILL		7. EST. NO. KILLED	8. SEVERITY
GAME	100 %	4350	☐ TOTAL ☒ HEAVY ☐ MOD. ☐ LIGHT
NON-GAME	— %	9 EXTENT OF AREA AFFECTED	10 DURATION OF CRITICAL EFFECT
TOTAL	100 %	A. MILES OF STREAM	B. ACRES OF LAKE: 1.21 — A. DAYS: 2 — B. HOURS: —
COMMERCIAL	%		

11A. SPECIES OF FISH KILLED (If known)
Pumpkinseed ≈ 2000 (2-3½") ≈ 100 larger panfish
Bluegill ≈ 2000 (2-3")
Largemouth Bass ≈ 150
Northern Pike ≈ 100

B. ADDITIONAL REMARKS (Include effects on other than fish, e.g., shellfish, waterfowl, etc.)
Heavy rains (3" in an hour or so) on Sat. evening, 6/9/84, caused a significant amount of runoff to reach pond. Runoff was from an agricultural area. Chemicals used in the area this spring are Counter, Atrazine and Lasso. Complainant says that he had a fish kill after heavy rains 6 years ago.

12. REPORTING OFFICIAL	13. AGENCY MAILING ADDRESS	14. DATE OF REPORT
Keith F. Kutchenreiter W.S. Dept. of Natural Resources	1210 N. Palmatory Horicon, WI 53032	6/18/84

EPA Form 7500-8 (Rev. 7-80) 1-79 AND 4-79 EDITIONS MAY BE USED, ALL OTHERS OBSOLETE

INSTRUCTIONS: Upon completion fold card to show address and face where indicated.

23

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PLANNING AND STANDARDS
WASHINGTON, D.C. 20460

Form Approved OMB No. 158--R0036

FOR OWPS USE ONLY

REPORT OF POLLUTION–CAUSED FISH KILL

1A. LOCATION (Name of body of Water; Latitude–Longitude)
Carthage Lake #2

B. NEAREST TOWN: Carthage
COUNTY: Hancock
C. STATE: IL
2. DATE OF KILL: 6/11/84

3. TYPE OF WATER BODY
☐ RIVER OR STREAM ☒ LAKE ☐ ESTUARY ☐ OCEAN OR GULF

4. PUBLIC DRINKING WATER SUPPLY
☐ YES ☒ NO

5. POLLUTION SOURCE – TYPE OF OPERATION

A. AGRICULTURAL OPERATIONS
☒ POISONS (pesticides, etc.)
☐ FERTILIZERS
☐ MANURE DRAINAGE, ENSILAGE LIQUORS, OR FEED LOT OPERATIONS
☐ HANDLING OF EQUIPMENT & CONTAINERS

B. INDUSTRIAL OPERATIONS
☐ MINING
☐ FOOD & KINDRED PRODUCTS
☐ PAPER & ALLIED PRODUCTS
☐ CHEMICALS
☐ PETROLEUM
☐ METALS
☐ OTHER:
☐ TEXTILES
☐ LEATHER & LEATHER PRODUCTS
☐ RUBBER & PLASTICS
☐ LUMBER & WOOD PRODUCTS
☐ SAND & GRAVEL

C. MUNICIPAL OPERATIONS
☐ SEWERAGE SYSTEM
☐ REFUSE DISPOSAL
☐ WATER SYSTEM
☐ SWIMMING POOL
☐ POWER (public service)
☐ PEST CONTROL

D. TRANSPORTATION OPERATIONS
☐ RAIL ☐ TRUCK ☐ BARGE OR BOAT
☐ AIR ☐ PIPELINE

E. CONSTRUCTION OR OTHER
☐ CONSTRUCTION
☐ OTHER:

F.
☐ UNKNOWN

G. SPECIFIC POLLUTANT OR FACTOR CHANGING WATER CHARACTERISTICS (Name of chemical, thermal discharge, etc.)
"Counter" –?

6. TYPE OF FISH KILL		7. EST. NO. KILLED	8. SEVERITY
GAME	100 %	not established	☐ TOTAL ☒ HEAVY ☐ MOD. ☐ LIGHT
NON-GAME	%	9 EXTENT OF AREA AFFECTED	10 DURATION OF CRITICAL EFFECT
TOTAL	100 %	A. MILES OF STREAM	B. ACRES OF LAKE: 9.3
COMMERCIAL	%		A. DAYS: 1
			B. HOURS

11A. SPECIES OF FISH KILLED (If known)
Bluegill, Green Sunfish, White Crappie, Largemouth Bass

B. ADDITIONAL REMARKS (Include effects on other than fish, e.g., shellfish, waterfowl, etc.)

12. REPORTING OFFICIAL	13. AGENCY MAILING ADDRESS	14. DATE OF REPORT
Mike Conlin, Chief Div/Fish & Wildlife Res.	600 N. Grand Ave. W. Springfield, IL 62706	7/2/84

EPA Form 7500–6 (Rev. 7–80) 7-73 AND 4-73 EDITIONS MAY BE USED. ALL OTHERS OBSOLETE

INSTRUCTIONS: Upon completion fold card to show address and date where indicated.

24

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PLANNING AND STANDARDS
WASHINGTON, D.C. 20460

Form Approved OMB No. 158-R0036

FOR OWPS USE ONLY

REPORT OF POLLUTION-CAUSED FISH KILL

1A. LOCATION (Name of body of Water; Latitude—Longitude)
Private Pond

B. NEAREST TOWN: Hemingway
COUNTY: Williamsburg
C. STATE: S.C.
2. DATE OF KILL: 3/31/84

3. TYPE OF WATER BODY
☐ RIVER OR STREAM ☒ LAKE ☐ ESTUARY ☐ OCEAN OR GULF

4. PUBLIC DRINKING WATER SUPPLY
☐ YES ☒ NO

5. POLLUTION SOURCE — TYPE OF OPERATION

A. AGRICULTURAL OPERATIONS
☑ POISONS (pesticides, etc.)
☐ FERTILIZERS
☐ MANURE DRAINAGE, ENSILAGE LIQUORS, OR FEED LOT OPERATIONS
☐ HANDLING OF EQUIPMENT & CONTAINERS

B. INDUSTRIAL OPERATIONS
☐ MINING
☐ FOOD & KINDRED PRODUCTS
☐ PAPER & ALLIED PRODUCTS
☐ CHEMICALS
☐ PETROLEUM
☐ METALS
☐ OTHER:
☐ TEXTILES
☐ LEATHER & LEATHER PRODUCTS
☐ RUBBER & PLASTICS
☐ LUMBER & WOOD PRODUCTS
☐ SAND & GRAVEL

C. MUNICIPAL OPERATIONS
☐ SEWERAGE SYSTEM
☐ REFUSE DISPOSAL
☐ WATER SYSTEM
☐ SWIMMING POOL
☐ POWER (public service)
☐ PEST CONTROL

D. TRANSPORTATION OPERATIONS
☐ RAIL ☐ TRUCK ☐ BARGE OR BOAT
☐ AIR ☐ PIPELINE

E. CONSTRUCTION OR OTHER
☐ CONSTRUCTION
☐ OTHER:

F.
☐ UNKNOWN

G. SPECIFIC POLLUTANT OR FACTOR CHANGING WATER CHARACTERISTICS (Name of chemical, thermal discharge, etc.)
Counter & Bicep

6. TYPE OF FISH KILL		7. EST. NO. KILLED	8. SEVERITY
GAME	100 %	500	☑ TOTAL ☐ HEAVY ☐ MOD. ☐ LIGHT
NON-GAME	0 %	9 EXTENT OF AREA AFFECTED	10 DURATION OF CRITICAL EFFECT
TOTAL	100 %	A. MILES OF STREAM	B. ACRES OF LAKE: 1
COMMERCIAL	0 %		A. DAYS: 1 B. HOURS

11A. SPECIES OF FISH KILLED (If known)
Bass, bream

B. ADDITIONAL REMARKS (Include effects on other than fish, e.g., shellfish, waterfowl, etc.)

12. REPORTING OFFICIAL	13. AGENCY MAILING ADDRESS	14. DATE OF REPORT
Alan Tecan DHEC	2600 Bull St. Colu, S.C. 29201	6/20/84

EPA Form 7500-8 (Rev. 7-80) 7-78 AND 4-78 EDITIONS MAY BE USED. ALL OTHERS OBSOLETE
INSTRUCTIONS: Upon completion fold card to show address and tape where indicated.

25

Tabulate

Fish Kills –

from
Nina HarLee
382-7017
10/15/84

Counter (12) 1981-84

Krueger Pond, Alma, Lafayette Cty Missouri
May 29, 1981 – "light kill" 1 acre

1982 – none
1983 – "

1984 – Counter (?)
Carthage Lake #2, Carthage, Hancock CTY, Illinois
6/11/84 – ~~[illegible]~~
"heavy" kill
9.3 Acres
1 Day
Bluegill, Green sunfish, white crappie, largemouth bass

~~Counter~~ Counter
Atrazine
Lasso
Eden, Fondulac cty, Wis.
private pond
11 + 12th June 1984
4,350 fish killed – "heavy"
1.2 Acres
2 Days
pumpkinseed 2000
Bluegill 2000 } 2-3" pan
100 large panfish
largemouth Bass – 150
northern Pike 100
heavy rain 3" in Hr on June 9 caused runoff to ~~[illegible]~~ pond from Ag area was above

South Carolina Williamsburg cty | Private Pond 1 Acre
March 31 1984 Counter + BICEP
100% game 500 fish killed total
Bass + Bream
? 1 Day duration

Also use fish kill in the wildl Int'l men [illegible] Dinoseb, 1984 – aerial app to corn

26

large mouth bass

~~County~~ County
Atrazine Edan, Fondulac Co, Wis.
Lasso private pond
11 + 12th June 1984
4350 fish killed - "young"
1.2 Acres
2 days
Pumpkinseed 2000 } 2-3"
Bluegill [illegible]
100 large panfish
largemouth Bass - 150
Northern Pike 100
[illegible] rain 2" in [illegible] on June 9 caused
runoff to ~~[illegible]~~ pond from Ag [illegible] uses
above

South Carolina [illegible] City Private Pond 1 Acre
March 31 1984 Counter + DICEP
100% [illegible] 500 [illegible] killed
Bass + Bream 1 [illegible]