

FILE

REVIEW NUMBER

ECOLOGICAL EFFECTS BRANCH REVIEW

OUT FEB 24 1992

REREG CASE # : _____
LIST A, B, C, D

COMMON CHEMICAL NAME IMIDACLOPRID

ECOLOGICAL EFFECTS BRANCH REVIEW

Chemical: NTN 33893 0.62% Granular Insecticide

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

Miles Inc. (formerly Mobay Corp.) is requesting an Experimental Use Permit for the use of NTN 33893 0.62% Granular on turf (golf courses). The purpose, as proposed, is to conduct terrestrial field testing (Guideline # 71-5) to demonstrate a lack of adverse effects to avian species under actual field conditions. The detailed methodology of the experimental procedure is unavailable at this time. However, Mobay has reported the maximum values they will utilize while testing (acres, lbs. of active ingredient, etc.). This experimental use permit is requested for a twelve-month period beginning January 1, 1992 and ending December 31, 1992.

100.2 Formulation Information

Active Ingredient:

1-[(6-Chloro-3-pyridinyl)methyl]-4,5-dihydro-N-nitro-1H-imidazol-2-amine0.62%

Inert Ingredients:.....99.38%

100.3 Application Methods, Directions, Rates

The experimental program is planned to take place in the Columbus, Ohio area. The maximum anticipated acreage treated will be 420 acres. Fourteen golf courses are planned to be used as treatment sites, with 30 acres treated per course. A single application of NTN 33893 0.62% Granular will be made to each treatment site. A maximum of 210 lbs of active ingredient, or 33,870 lbs of formulated product will be required for the proposed EUP. Both drop-type and rotary-type spreaders may be used for application. The maximum recommended application rate is 80 lb per acre (or 1.8 lb/1000 ft²), which is .5 lb active ingredient per acre.

100.4 Target Organism (From proposed EUP Label)

Target organisms include soil insects such as: white grub larvae, Japanese beetles, Black Turfgrass atatenius, Northern and Southern Masked Chafers, European Chafer Phyllophaga spp., Oriental beetle, Asiatic garden beetle and the Billbug. Also adult Mole crickets are targeted.

100.5 Precautionary Labeling

"Hazards to Humans and Domestic Animals.

FOR EXPERIMENTAL USE ONLY.

Keep out of lakes, streams or ponds. Do not contaminate water when disposing equipment washwaters.

Do not graze treated areas or use clippings from treated areas for feed or forage. Avoid runoff or puddling of irrigation water following application. Avoid application of NTN 33893 0.62% Granular insecticide to turf which is waterlogged or saturated."

101 Hazard Assessment

101.1 Discussion

Miles Inc. requests an Experimental Use Permit for the use of NTN 33893 0.62% Granular on turf (golf courses) to control several species of soil insects and adult mole crickets. Miles Inc. anticipates no more than 14 golf courses will be needed to perform the study. Each golf course chosen for the study will be divided into a treatment plot and a control plot. Each plot will consist of fairways and adjacent habitat from 6-9 holes of the course. At this time, it is anticipated that a maximum of 420 acres will be treated, 15 to 30 acres on each of the 14 courses. Miles Inc. has proposed the study be conducted in the vicinity of Columbus, Ohio (Delaware and/or Franklin Counties).

A single application of NTN 33893 0.62% Granular will be made to each treatment site using conventional ground equipment at the rate specified on the EUP label. Applications will be made by cooperating golf course personnel.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Residue data for food, feed and foliage was not submitted with this application because no such data are yet available; also this data is not required for a non-food terrestrial EUP. Other Environmental Fate Data is under review at this time.

The Estimated Environmental Concentrations (EEC) for NTN 33893 0.62% Granular Insecticide were determined using a 2% runoff scenario. (This value was based on the characteristics of NTN 33893 technical in an acute toxicity test to Bluegill sunfish (MRID #420553-14); at concentrations of ≥ 42 ppm a precipitate remained in the solution, indicating a water solubility limit of less

than 42 ppm). The EEC's for NTN 33893 0.62% Granular Insecticide at a rate of .5 lb a.i./acre are as follows: (See attached).

Direct Application to water column:8

6" water column = 367 ppb

6' water column = 30.6 ppb

Unincorporated Ground Application:

Runoff to 6' deep 1 acre pond = 6.1 ppb

Runoff to 6" deep 1 acre pond = 73.4 ppb

Terrestrial Organisms

The following are data taken from previous EEB reviews on NTN 33893 Technical (the species and the degree of toxicity associated with each is noted):

Bobwhite Quail LD50 = 152.30 mg a.i./kg - Moderately
MRID# 420553-08

Bobwhite Quail LC50 = 1535.87 mg a.i./kg - Slightly
MRID# 420553-10

Bobwhite Quail One-Generation Reproduction
NOEC = 126 ppm MRID# 420553-12

Mallard Duck LC50 = >4797 mg a.i./kg - Slightly to non
MRID# 420553-11

Mallard Duck One-Generation Reproduction
NOEC = 126 ppm MRID# 420553-13

House Sparrow LD50 = 41.70 mg a.i./kg - Highly
MRID# 420553-09

The LD50 classifies NTN 33893 as highly toxic to House sparrows. Based upon this and the granular formulation of the proposed use, an LD50 per square foot was determined. The average weight of a House sparrow is 27.7 grams (Dunning, 1984); utilizing the weight data and application rates, an LD50 per square foot of NTN 33893 to the House sparrow was determined. The LD50/ft² is 4.57 per average House sparrow. (See attached). It has been determined that a LD50/ft² ≥ 1.0 denotes a hazard.

Aquatic Organisms

The following were taken from EEB reviews:

Bluegill sunfish LC50 = >105 ppm, MRID# 420553-14

Rainbow trout LC50 = >83 ppm, MRID# 420553-15

Sheepshead Minnow LC50 = 163.0 ppm, MRID# 420553-18

Daphnia magna EC50 = 85.2 ppm, MRID# 420553-17

Life Cycle NOEC = 1.8 ppm, MATC = 2.5 ppm
MRID# 420553-21

NTN 33893 is classified as practically non-toxic to the

aquatic organisms tested - with the exception of D. magna, whose effect was classified as slightly toxic.

101.3

Endangered Species Concerns

The Indiana Bat is the only endangered/threatened species in the proposed use counties. EEB feels the Indiana Bat would not be at risk due this experimental use.

101.4

Adequacy of Toxicity Data

The following studies were submitted with this experimental use permit request:

| <u>MRID NO.</u> | <u>Study Type</u> | <u>Classification.</u> |
|---|------------------------------|------------------------|
| 420553-08 | 71-1, BWQ LD50 | Core. |
| 420553-09 | House sparrow, LD50 | Supplemental* |
| (* - Formulation tested, adjusted for 100% active ingredient) | | |
| 420553-10 | 71-2, BWQ LC50 | Core. |
| 420553-11 | 71-2, MAL LC50 | Core. |
| 420553-12 | 71-4, BWQ Avian Repro. | Core. |
| 420553-13 | 71-4, MAL Avian Repro. | Supplemental. |
| 420553-14 | 72-1, Bluegill | Core. |
| 420553-15 | 72-1, Rainbow Trout | Core. |
| 420553-16 | 72-1, Rainbow Trout | Supplemental. |
| 420553-17 | 72-2, <u>D. magna</u> , EC50 | Core. |
| 420553-18 | 72-3, Sheepshead minnow | Core. |
| 420553-19 | 72-3, Mysid | Invalid. |
| 420553-20 | 72-4, Fish Early- Life | In review. |

(cont.)

| | | |
|-----------|--|---------------|
| 420553-21 | 72-4, Invertebrate Life Cycle | Supplemental. |
| 420553-22 | 72-4, Invertebrate Chronic Study, Mysids | Invalid. |

This EUP request was reviewed based on the prior submitted studies, a meeting on 12/17/91 with Miles Inc. representatives and the revised Section G submitted 1/15/92.

101.5 Adequacy of Labeling

The proposed use label is adequate.

102 Conclusions

EEB has evaluated this experimental use permit request for NTN 33893 0.62% Granular on turf (golf courses). EEB believes that this experimental program in Ohio will not place non-target organisms at an unnecessary risk based on the limited area of application and there will only be a single application. However, let it be noted that approval of this EUP does not imply that the data obtained can be used to satisfy #71-5 requirements (Terrestrial Field Study). A Terrestrial Field Study protocol was not submitted to the agency, therefore Miles Inc. understands that the methods used may not constitute an acceptable Terrestrial Field Study and that EEB may not accept it as such.

Even without a protocol the study raises several questions. One major area of concern with the design of the EUP, with regard to #71-5 acceptability, is the area of the test site. Miles Inc. states that testing in Columbus Ohio will give a representative sample of avian species that may come in contact with the pesticide. The area for which the greatest sales of this product are anticipated is the "grub" belt, which Miles Inc. states is the northeastern quarter of the contiguous U.S., roughly from New England to Kansas City. The EUP label also lists mole crickets as a targeted organism, which are found predominantly in the Southeast. Therefore, based on these findings, an eastern, southeastern and northeastern United States use pattern seems appropriate.

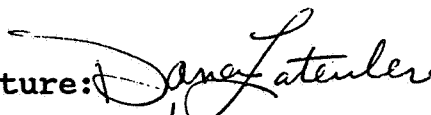
Testing solely in Ohio will not be representative of the avian species which may come in contact with NTN 33893 0.62% Granular. There are many species that inhabit the eastern coast or only the southern states that would be considered at risk due to golf course exposure but will not be found in Columbus, Ohio. (i.e. Boat Tailed

Grackle, Chuck-Will's Widow, Scrub Jay, Fish Crow and the Common Ground Dove).

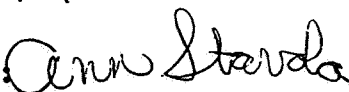
Other site related concerns are the climate and soil differences from New England to Kansas City. EEB feels that Columbus, Ohio is not representative of this range. Also, if the product is to be sold as far South as Florida, the seasonal differences are quite extensive. Therefore, the time of year when the pesticide is applied will be different. This seasonal difference needs to be taken into consideration due to avian migration behavior and nesting seasons.

Even in the absence of a protocol, EEB feels that this experimental use program may show effects to certain avian species in certain environments. However, EEB questions if the data collected will be representative for the entire "grub" belt or the southeastern United States.


Dana Lateulere, Biologist
Ecological Effects Branch
Environmental Fate and Effects Division

Signature: 
Date: 2/14/92

Ann Stavola, Head Section V
Ecological Effects Branch
Environmental Fate and Effects Division

Signature: 
Date: 2/14/92

Douglas Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division

Signature: 
Date: 2/24/92

EEB Review dated 2/24/92

Page is not included in this copy.

Pages 8 through 12 are not included.

The material not included contains the following type of information:

- ☐ Identity of product inert ingredients.
- ☐ Identity of product impurities.
- ☐ Description of the product manufacturing process.
- ☐ Description of quality control procedures.
- ☐ Identity of the source of product ingredients.
- ☐ Sales or other commercial/financial information.
- ☒ A draft product label.
- ☐ The product confidential statement of formula.
- ☐ Information about a pending registration action.
- ☐ FIFRA registration data.
- ☐ The document is a duplicate of page(s) .
- ☐ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

SECTION G

Proposed Experimental Program

PURPOSE

The purpose of this experimental use permit is to evaluate the potential for applications of NTN 33893 0.62% Granular Insecticide to cause adverse effects on avian species under actual use conditions.

In explanation, in a 12/18/90 pre-registration conference with EPA's Registration Division (RD) and Ecological Effects Branch (EEB) personnel, the Agency representatives indicated that actual terrestrial field testing (EPA Guideline No. 71-5) would probably be required on a granular formulation for use on turf before RD could grant Section 3 registration for this type of use of a granular product. Based on laboratory data, the proposed use of this product will result in more than one LD50 dose (for small songbirds) being applied per square foot.

Consequently, the purpose of this EUP is to allow conduct of 71-5 testing to demonstrate lack of adverse effects (i.e., avian mortalities) under actual field conditions.

DURATION

This experimental use permit is requested for a twelve-month period beginning January 1, 1992 and ending December 31, 1992.

OBJECTIVES

The objective of this program is to conduct a terrestrial field study at multiple turf grass sites (golf courses) in the Northeast U.S. (northern states from New England to Kansas). The detailed methodology will be provided in a protocol to be submitted for Agency review in November 1991. The protocol is unavailable at this time. The methodology will be developed based upon another meeting (to be arranged) with EEB to resolve specific experimental parameters. However, we anticipate at this time that the endpoints will include the following:

- Abundance of birds (by species) at each study site
- Relative use of treated turf grass by birds
- Number of mortalities or behaviorally impaired birds at treated and untreated (control) areas
- Efficiency of study methods in detecting mortality at study sites
- Relative survival of marked birds on selected treatment and control sites
- Magnitude and persistence of residues of NTN 33893 in soil, water, turf verdure, and invertebrates at treatment sites

APPLICATIONS

A single application of NTN 33893 0.62% Granular will be made to each treatment site using conventional ground equipment at the rate specified on the EUP label. Applications will be made by cooperating golf course personnel.

Equipment will be calibrated prior to application to ensure that the nominal rate is applied. No test compound will be applied to control sites. So far as possible, applications of other compounds that might pose a risk of mortality to birds will be excluded from the vicinity of both treatment and control sites during the study period.

SCOPE OF PROGRAM

More definitive information on the scope of the program will be provided to the Agency with the protocol to be submitted in November 1991. Mobay will treat only the minimum area needed to constitute an acceptable study for EEB. The total acreage to be treated is unknown at this time. However, we have estimated the maximum acreage which may be needed, and this maximum is reflected in this EUP application. Obviously, no more than this maximum will be treated without the specific prior approval of the Agency to revise the EUP.

Geographic Area

The geographic region for which greatest sales of this product are anticipated is the "grub" belt that stretches across the northeastern quarter of the contiguous U.S., roughly from New England to Kansas City. Most of this area belongs to the eastern deciduous forest biome. Avian species likely to be present on golf courses do not vary greatly from one end of this region to the other. Therefore, it seems reasonable that a study conducted at one geographic area typical of the region as a whole, should be sufficient to support registration. Because of its central location, availability of a large number of potential test replicates (golf courses), and presence of heavy pest infestations, Mobay proposes the study be conducted in the vicinity of Columbus, Ohio (Delaware, Franklin, Licking and Union Counties).

Number of Study Sites

The actual number of sites (golf courses) studies will be determined by the experimental design agreed upon in the future meeting with EEB. At this time, Mobay anticipates no more than 14 golf courses will be needed. Mobay will choose sites (golf courses) after surveying all possible sites in the study area. Potential study sites are listed in Table A.

Size of Study Sites

Each golf course chosen for study will be divided into a treatment plot and a control plot. Each plot will consist of fairways and adjacent habitat from 6-9 holes of the course. At this time we anticipate 15-30 acres per golf course will be treated.

Total Treated Acreage

As stated above, the amount of actual treated acreage will depend upon the experimental design agreed to in the yet to be arranged meeting with EEB. The maximum anticipated acreage treated with NTN 33893 0.62% Granular insecticide will be 420 acres (i.e., 30 acres per course times 14 courses).

Quantity of NTN 33893 0.62% Granular Insecticide

At the use rate of 0.5 lb. active ingredient/acre, the treatment of 420 acres will require 210 lb. of active ingredient or 33,870 lbs. of formulated product (i.e., 210 lbs. a.i./0.0062 lb. a.i. per lb. of formulated NTN 33893 0.62% Granular = 33,870 lb.).

STORAGE AND DISPOSAL:

NTN 33893 0.62% Granular Insecticide will be stored in accordance with directions on the EUP label. All unused product will be returned to Mobay Corporation. Empty containers will be disposed of in accordance with the EUP label.

SUPERVISION:

Tests conducted under the EUP will be under the supervision of Dr. David L. Fischer, Mobay Corporation, Research and Development Department, Environmental Research Section, 17745 South Metcalf, Stilwell, Kansas 66085 (phone 913-897-9134). Dr. Fischer received a B.S. degree in zoology from the University of Massachusetts (1977), a M.S. degree in zoology from Western Illinois University (1982) and a Ph.D. degree in zoology with emphasis in wildlife and range resources from Brigham Young University (1986). Biological field data collection and laboratory analysis of residue samples will be conducted by Mobay personnel or by one or more contract laboratories selected by Dr. Fischer. Applications will be made under the supervision of Dr. Fischer and the golf course superintendent and/or greenskeepers at each course. All phases of the studies will be conducted according to GLP.

Table A. Potential Study Sites and Cooperators.

Golf Course

Address/Location

Central Ohio:

Delaware County

| | |
|-----------------------|----------------------------|
| Bent Tree Golf Club | Rt 36, Sunbury |
| Blackhawk Golf Club | 8830 Dustan, Galena |
| Mill Creek Golf Club | 7259 Penn Rd, Ostrander |
| Riverview Golf Course | 10245 Riverside Dr, Powell |
| Tanglewood Golf Club | 1086 Cheshire, Delaware |

Indiana Bat

Franklin County

| | |
|--|---|
| Airport Golf Course | 900 N. Hamilton Rd, Columbus |
| Blacklick Woods Golf Course | 7309 E. Livingston, Reynoldsburg |
| Bolton Field Golf Course | 6005 Alkire Rd, Galloway |
| Brookside Country Club | 2770 W. Dublin-Granville Rd, Worthington |
| Columbus Country Club | 4831 E. Broad St, Columbus |
| The Country Club at Muirfield Village | 8715 Muirfield Dr, Dublin |
| The Golf Club | 4522 Kitzmiller Rd, New Albany |
| Groveport Golf Club | Richardson Rd and Groveport Rd, Groveport |
| Hickory Hills Golf Club | 3344 Georgesville-Wrightsville Rd, Grove City |
| Little Turtle Country Club | 4400 E. Dublin-Granville Rd, Westerville |
| Muirfield Village Golf Club | 5750 Memorial Dr, Dublin |
| Oakhurst Country Club | 3223 Norton Rd, Grove City |
| Ohio State University Golf Courses (2 18-holes) | 3605 Tremont Rd, Columbus |
| Riviera Country Club | 8205 Avery Rd, Dublin |

Indiana Bat

Table A. Potential Study Sites and Cooperators.

Golf Course

Address/Location

Central Ohio:

Franklin County (continued)

| | |
|--------------------------------|--------------------------------|
| Scioto Country Club | 2195 Riverside Dr, Columbus |
| Winding Hollow Country Club | 3900 Westerville Rd, Columbus |
| Worthington Hills Country Club | 920 Clubview Blvd, Worthington |
| York Golf Club | 7459 N. High St, Worthington |

Licking County

| | |
|----------------------------|----------------------------|
| Granville Golf Course | 527 Newark, Granville |
| Highlands Golf Club | Rt 310, Pataskala |
| Licking Springs Golf Club | 2250 Horns Hill Rd, Newark |
| Moundbuilders Country Club | 125 N. 33rd St, Newark |

Union County

| | |
|------------------------|-----------------------------|
| Marysville Golf Course | 13683 Rt 38, Marysville |
| Timberview Golf Club | 1107 London Ave, Marysville |

*Indian
Bat*

*Indian
Bat*

Agriculture Division

January 15, 1992

Miles Inc.
8400 Hawthorn Road
P.O. Box 4913
Kansas City, MO 64120-0013
Phone: 816 242-2000

Mr. Dennis H. Edwards, Jr.
Product Manager (19)
Registration Division (H7505C)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Subject: NTN 33893 0.62% Granular Insecticide,
EPA File Symbol No. 3125-EUP-ENR

Dear Mr. Edwards:

With regard to the subject EUP, we have revised our Section G - Proposed Experimental Program, and two copies of the revised section are enclosed.

The revisions in the enclosed Section G are the following:

- The purpose of the EUP is simply to conduct an avian field study.
- The proposed use sites have been narrowed to two central Ohio counties - Delaware and Franklin - whereas the previous Section G included both these proposed sites and some proposed sites in Licking and Union counties.
- The company name Mobay has been changed to our new name - Miles Inc. (we have notified the Agency of this name change effective on 1/1/92 in our 1/3/92 correspondence).

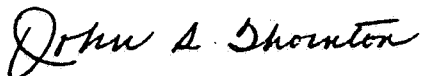
Please note, the proposed experimental program in terms of acreages to be treated and requested timing have not changed from the previous Section G. Furthermore, no additional data are needed, nor are they being provided.

As these changes have no impact on the Agency's review of the supporting data, we request that the Agency continue its expeditious review of this application.

If you have any questions on this matter, please contact Terry McNamara (816/242-2327) of my staff.

Yours very truly,

MILES INC.
AGRICULTURE DIVISION



John S. Thornton
Manager
Registrations

JST:FTM:brh

cc: ✓ Ms. Portia Jenkins
Product Team 19 H7505C

SECTION G

Proposed Experimental Program

PURPOSE

The purpose of this experimental use permit is to conduct an avian field study with NTN 33893 0.62% Granular Insecticide.

DURATION

This experimental use permit is requested for a twelve-month period beginning January 1, 1992 and ending December 31, 1992.

OBJECTIVES

The objective of this program is to conduct a terrestrial field study at multiple turf grass sites (golf courses) in the Northeast U.S. (northern states from New England to Kansas). The study endpoints will include the following:

- Abundance of birds (by species) at each study site
- Relative use of treated turf grass by birds
- Number of mortalities or behaviorally impaired birds at treated and untreated (control) areas
- Efficiency of study methods in detecting mortality at study sites
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- Magnitude and persistence of residues of NTN 33893 in soil, water, turf verdure, and invertebrates at treatment sites

APPLICATIONS

A single application of NTN 33893 0.62% Granular will be made to each treatment site using conventional ground equipment at the rate specified on the EUP label. Applications will be made by cooperating golf course personnel.

Equipment will be calibrated prior to application to ensure that the nominal rate is applied. No test compound will be applied to control sites. So far as possible, applications of other compounds that might pose a risk of mortality to birds will be excluded from the vicinity of both treatment and control sites during the study period.

SCOPE OF PROGRAM

The total acreage to be treated is unknown at this time. However, we have estimated the maximum acreage which may be needed, and this maximum is reflected in this EUP application. Obviously, no more than this maximum will be treated without the specific prior approval of the Agency to revise the EUP.

Geographic Area

The geographic region for which greatest sales of this product are anticipated is the "grub" belt that stretches across the northeastern quarter of the contiguous U.S., roughly from New England to Kansas City. Most of this area belongs to the eastern deciduous forest biome. Avian species likely to be present on golf courses do not vary greatly from one end of this region to the other. Therefore, it seems reasonable that a study conducted at one geographic area typical of the region as a whole, should be sufficient to support registration. Because of its central location, availability of a large number of potential test replicates (golf courses), and presence of heavy pest infestations, Miles proposes the study be conducted in the vicinity of Columbus, Ohio (Delaware or Franklin Counties).

Number of Study Sites

The actual number of study sites (golf courses) will be determined by the experimental design agreed upon after consultation with a statistician. At this time, Miles anticipates no more than 14 golf courses will be needed. Miles will choose sites (golf courses) after surveying all possible sites in the study area. Potential study sites are listed in Table A.

Size of Study Sites

Each golf course chosen for study will be divided into a treatment plot and a control plot. Each plot will consist of fairways and adjacent habitat from 6-9 holes of the course. At this time we anticipate 15-30 acres per golf course will be treated.

Total Treated Acreage

The maximum anticipated acreage treated with NTN 33893 0.62% Granular insecticide will be 420 acres (i.e., 30 acres per course times 14 courses).

Quantity of NTN 33893 0.62% Granular Insecticide

At the use rate of 0.5 lb. active ingredient/acre, the treatment of 420 acres will require 210 lb. of active ingredient or 33,870 lbs. of formulated product (i.e., 210 lbs. a.i./0.0062 lb. a.i. per lb. of formulated NTN 33893 0.62% Granular = 33,870 lb.).

STORAGE AND DISPOSAL:

NTN 33893 0.62% Granular Insecticide will be stored in accordance with directions on the EUP label. All unused product will be returned to the Agriculture Division of Miles. Empty containers will be disposed of in accordance with the EUP label.

SUPERVISION:

Tests conducted under the EUP will be under the supervision of Dr. David L. Fischer, Miles, Agriculture Division, Research and Development Department, Environmental Research Section, 17745 South Metcalf, Stilwell, Kansas 66085 (phone 913-897-9134). Dr. Fischer received a B.S. degree in zoology from the University of Massachusetts (1977), a M.S. degree in zoology from Western Illinois University (1982) and a Ph.D. degree in zoology with emphasis in wildlife and range resources from Brigham Young University (1986). Biological field data collection and laboratory analysis of residue samples will be conducted by Miles personnel or by one or more contract laboratories selected by Dr. Fischer. Applications will be made under the supervision of Dr. Fischer and the golf course superintendent and/or greenskeepers at each course. All phases of the studies will be conducted according to GLP.

Table A. Potential Study Sites and Cooperators.

| <u>Golf Course</u> | <u>Address/Location</u> |
|--|---|
| <u>Central Ohio:</u> | |
| <u>Delaware County</u> | |
| Bent Tree Golf Club | Rt 36, Sunbury |
| Blackhawk Golf Club | 8830 Dustan, Galena |
| Mill Creek Golf Club | 7259 Penn Rd, Ostrander |
| Riverview Golf Course | 10245 Riverside Dr, Powell |
| Tanglewood Golf Club | 1086 Cheshire, Delaware |
| <u>Franklin County</u> | |
| Airport Golf Course | 900 N. Hamilton Rd, Columbus |
| Blacklick Woods Golf Course | 7309 E. Livingston, Reynoldsburg |
| Bolton Field Golf Course | 6005 Alkire Rd, Galloway |
| Brookside Country Club | 2770 W. Dublin-Granville Rd, Worthington |
| Columbus Country Club | 4831 E. Broad St, Columbus |
| The Country Club at Muirfield Village | 8715 Muirfield Dr, Dublin |
| The Golf Club | 4522 Kitzmiller Rd, New Albany |
| Groveport Golf Club | Richardson Rd and Groveport Rd, Groveport |
| Hickory Hills Golf Club | 3344 Georgesville-Wrightsville Rd, Grove City |
| Little Turtle Country Club | 4400 E. Dublin-Granville Rd, Westerville |
| Muirfield Village Golf Club | 5750 Memorial Dr, Dublin |
| Oakhurst Country Club | 3223 Norton Rd, Grove City |
| Ohio State University Golf Courses (2 18-holes) | 3605 Tremont Rd, Columbus |
| Riviera Country Club | 8205 Avery Rd, Dublin |

Table A. Potential Study Sites and Cooperators.

Golf Course

Address/Location

Central Ohio:

Franklin County (continued)

| | |
|--------------------------------|--------------------------------|
| Scioto Country Club | 2195 Riverside Dr, Columbus |
| Winding Hollow Country Club | 3900 Westerville Rd, Columbus |
| Worthington Hills Country Club | 920 Clubview Blvd, Worthington |
| York Golf Club | 7459 N. High St, Worthington |

EEC Calculation Sheet

I. Un-incorporated ground application.

Runoff

$$\frac{.5 \text{ lb(s)}}{\text{a.i.}} \times 0.0\textbf{2} \text{ (\%runoff)} \times 10\textbf{A} \text{ (from 10A drainage basin)} = \textbf{.1} \text{ lb(s)}$$

EEC of 1 lb. a.i. direct application to 1A pond 6-foot deep = 61 ppb,

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \textbf{.1} \text{ (lb)} = \text{ppb. } \textbf{6.1} \rightarrow \textbf{6'}$$
$$\textbf{734 ppb} \times \textbf{.1} \text{ (lb)} = \textbf{73.4 ppb} \rightarrow \textbf{6''}$$

II. For incorporated ground application

Runoff

$$\frac{\text{___ lb(s)}}{\text{depth of incorp.}} \times \text{___ (cm)} \times 0.0\text{___} \text{ (\% runoff)} \times 10\textbf{A} = \text{___ lb(s)}$$

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \text{___ lb(s)} = \text{ppb}$$

III. For aerial application (or mist blower).

A. Runoff

$$\text{___ lb(s)} \times 0.6 \text{ (appl. efficiency)} \times 0.0\text{___} \text{ (\%runoff)} \times 10 \textbf{A} \text{ (basin)} = \text{___ lb(s)} \text{ (tot. runoff)}$$

B. Drift

$$\text{___ lb(s)} \times 0.05 \text{ (5\% drift)} = \text{___ lb(s) total drift}$$

$$\text{Tot. loading} = \text{___ lb(s)} \text{ (total runoff)} + \text{___ lb(s)} \text{ (total drift)} = \text{___ lb(s)}$$

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \text{___ lb(s)} = \text{___ ppb}$$

Equation for LD50/ft²

1 acre = 43560 ft²

1 lb = 453600 mg

Average sparrow weight = 27.7 g (.027 kg)

Determined LD50 = 41 mg/kg

Rate = .5 lb a.i./A

The amount of chemical per square foot at a rate of .5 lb/A:

$$\text{a) } \frac{.5 \text{ lb a.i.}}{\text{acre}} \times \frac{1 \text{ acre}}{43560 \text{ ft}^2} \times \frac{453600 \text{ mg}}{1 \text{ lb}} = 5.21 \frac{\text{mg a.i.}}{\text{ft}^2}$$

and the LD50 for a 27.7 gram bird is:

$$\text{b) } \frac{41 \text{ mg}}{\text{kg}} \times .0277 \text{ kg} = 1.14 \text{ mg}$$

The number of LD50's per square foot is determined by a/b.

Therefore:

$$\frac{5.21 \frac{\text{mg a.i.}}{\text{ft}^2}}{1.14 \text{ mg}} = 4.57 \text{ LD50's/ft}^2$$