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RECORD NO.

105001
SHAUGHNESSEY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 1/25/89 OUT 2/6/89

FILE OR REG. NO 89-ND-02

PETITION OR EXP. NO _____

DATE OF SUBMISSION: 1/13/89

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RD ACTION CODE/ TYPE OF REVIEW: 510

TYPE PRODUCT(S): Insecticide

ACCESSION NUMBER(S): _____

PRODUCT MANAGER: D. Stubbs (41)

PRODUCT NAME(S): COUNTER 5G

COMPANY NAME: State of North Dakota

PURPOSE OF SUBMISSION: Proposed Section 18 for use on rape and
mustard plantings as a planting time
drill box treatment.

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	%A.I.
<u>105001</u>	<u>Terbufos</u>	<u>5</u>
_____	_____	_____

ECOLOGICAL EFFECTS BRANCH REVIEW

Chemical: COUNTER 5G (Terbufos)

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

The North Dakota Department of Agriculture is requesting an emergency exemption (Section 18) for the use of COUNTER 5G (terbufos) as a planting time drill box treatment for rapeseed and mustard to control flea beetles. A maximum of 100,000 acres (20,000 acres mustard, 80,000 acres rape) could be treated in North Dakota using a maximum total of 50,000 lbs of active ingredient. The emergency exemption is requested to be approved for use from April 15, 1989 through October 15, 1989.

100.2 Formulation Information

Active Ingredient:

Terbufos (S-[[[(1,1-Dimethylethyl)Thio]Methyl]0,0-Diethyl Phosphorodithioate)	5%
Inert Ingredients	95%
	Total 100%

Granular Formulation

100.3 Application Methods, Directions, Rates

COUNTER 5G will be mixed with the seed in the drillbox with a mixing stick. COUNTER 5G will be applied with the seed at planting time at 5 to 10 lb/acre (0.25 to 0.50 lb a.i./acre) and will be covered with soil after application. The submission states: "Additional application instructions and restrictions are in the proposed Counter 5-G label"; however, no proposed label was included.

100.4 Target Organism

Flea beetle (Phyllotreta spp.)

100.5 Precautionary Labeling

The submission states that potential risks to the environment are addressed in the proposed COUNTER 5G label; however, no proposed label was included.

101 Hazard Assessment

101.1 Discussion

Terbufos is the active ingredient in COUNTER 15G, a 15% granular formulation systemic organophosphate insecticide currently

registered for use in corn, grain sorghum, and sugar beets (EPA Registration Number 241-238). These crops encompass some 900,000 acres of cropland in North Dakota with the major producing areas being located in the eastern part of the state. Nearly all of the rapeseed and mustard in North Dakota is also grown in the eastern half of the state; however, the submission states that any grower of rapeseed or mustard in North Dakota may apply COUNTER 5G. COUNTER 5G has no registration in the U.S.

A similar exemption request was reviewed by EEB 5/4/88 (Record No. 218333). It was determined in that review that use of COUNTER 5G on rape and mustard in North Dakota would cause adverse effects to some species of fish and significant impact on aquatic invertebrates to nearby aquatic ecosystems.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Terrestrial Species

Terbufos is characterized as extremely toxic to bobwhite quail based on avian acute oral studies. One acute oral test (MRID No. FEOTERO2) using the technical grade active ingredient determined the bobwhite LD₅₀ to be 28.6 mg/kg. Another study using the technical grade concluded the bobwhite LD₅₀ was 15 mg/kg (Hill and Camardese 1984). Using the 15G formulated product, Hill and Camardese (1984) determined the bobwhite LD₅₀ to be 26 mg/kg on an active ingredient basis. Another study (Balcomb et al. 1984) utilizing graduated doses of the 15G formulated product resulted in 100% mortality of 5 male red-winged blackbirds orally administered 10 COUNTER granules; a 5 granule dose resulted in no mortalities. Assuming proportional results would be obtained from testing with a 5G product, the LD₅₀ equivalent for songbirds would be between 15 and 30 5G granules.

Terbufos is also considered to be highly toxic to bobwhite quail based on avian dietary studies. Two acceptable avian dietary tests determined the bobwhite LC₅₀ to range from 143 ppm (MRID No. 00087717) to 157 ppm (MRID No. 160387).

The primary route of exposure of granular terbufos to nontarget terrestrial species is through direct ingestion of the granules. Given that the COUNTER 5G granules will be covered with soil along with the rape and mustard seeds at planting, minimal exposure of granules is expected. Although soil-probing birds may ingest granules either as grit or as attached to prey items (e.g, earthworms), it is unlikely that a lethal dose (i.e., 15-30 granules) would be consumed under typical foraging circumstances.

However, due to adverse effects on aquatic invertebrates likely to occur with this use (discussed below), waterfowl rearing broods are likely to be impacted in areas of terbufos use. This is especially critical given that this proposed use includes major

waterfowl production areas (the prairie pothole region), the already record low waterfowl population levels, and the significant dependence of waterfowl chicks on aquatic invertebrates for growth and survival during April-June. Similar hazards to shorebirds may also be expected. Adverse effects may be minimized by not using terbufos in watersheds of lakes, ponds, potholes, marshes and other wetlands.

Aquatic Species

Technical terbufos is very highly toxic to bluegill sunfish (LC_{50} values range from 0.77 ppb (MRID No. 00087718) to 3.8 ppb (MRID No. 0037483)), brown trout ($LC_{50} = 20$ ppb, MRID No. 00087718), rainbow trout ($LC_{50} = 9.4$ ppb, MRID No. 00037483), and channel catfish ($LC_{50} = 9.6$ ppb, MRID No. 00085176). COUNTER 15G formulated product is also considered to be very highly toxic to bluegill sunfish ($LC_{50} = 12.3$ ppb, MRID No. FEOTERO4) and rainbow trout ($LC_{50} = 59.7$ ppb, MRID No. FEOTERO5).

Terbufos is characterized as very highly toxic to freshwater invertebrates on the basis of acute toxicity data. Daphnia magna were found to have an LC_{50} of 0.31 ppb (MRID No. FEOTERO3) and crayfish an LC_{50} of 8.0 ppb (MRID No. 00085176). An acute LC_{50} study using the 15% granular formulation determined the LC_{50} for Daphnia magna to be 6.2 ppb.

Aquatic organisms may be exposed to terbufos via runoff and soil transport from treated sites. All pesticides applied within the upper 1/2 inch of the soil profile are considered available for runoff. Terbufos load (EEC) to a farm pond (6 feet deep), a pothole marsh (18 inches deep), and a shallow water wetland (6 inches deep) may be estimated by the following scenario:

$$\begin{array}{rcl}
 \text{EEC} & = & \text{application rate} \quad \times \quad \text{percent available} \quad \times \\
 (\text{load ppb}) & & (\text{lb ai/acre}) \\
 & & 0.02 \quad \times \quad 10 \text{ acre} \quad \times \\
 & & (\text{"average" 2\% runoff for} \quad (\text{"average" } \\
 & & \text{intermediate solubility}) \quad \text{watershed}) \\
 & & \text{concentration factor for water depth} \\
 & & (61 \text{ ppb/lb for 6 ft; } 245 \text{ ppb/lb for 18 inches;} \\
 & & 734 \text{ ppb/lb for 6 inches})
 \end{array}$$

Since rape and mustard seeds are typically planted no deeper than 1/2 inch, all terbufos applied with this use is considered available for runoff. At maximum application rates, the EEC for an average farm pond is then 6.1 ppb; concentrations in a pothole marsh and shallow water wetlands are estimated to be 24.5 ppb and 73.4 ppb, respectively. All aquatic ecosystem EECs exceed the LC_{50} values for bluegill and aquatic invertebrates. Therefore, adverse effects to aquatic organisms, especially invertebrates associated

with shallow water habitats, are to be expected with this exemption use.

101.3 Endangered Species Considerations

Endangered species known to occur in North Dakota include the Least Tern and the Piping Plover. Both of these shorebirds feed on aquatic invertebrates associated with ponds and wetland areas; as such, they may be affected by food supply reductions. The Least Tern is not likely to be affected because the species is known to occur only in counties west of the predominant area of terbufos use identified by this exemption request. The Piping Plover, however, is known to occur in several counties including Eddy, Nelson, Rolette, and Grand Forks in the eastern part of the state. In order to minimize adverse impacts on this species, COUNTER 5G should not be applied in watershed areas of lakes, ponds, potholes, and wetlands in the above counties.

101.4 Adequacy of Toxicity Data

The basic toxicity data available to EEB are adequate to assess the environmental hazard likely to occur with this exemption use.

101.5 Adequacy of Labeling

No proposed labeling was included with the exemption request. Precautionary labeling must include the following statement:

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish, birds and other wildlife. Treated granules exposed on soil surface may be hazardous to birds and other wildlife. Cover or incorporate granules that are spilled. Do not apply directly to water or wetlands (swamps, bogs, marshes or potholes). Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwaters.

102 Conclusions

EEB has reviewed the proposed emergency exemption for the use of COUNTER 5G on rapeseed and mustard in North Dakota. EEB concludes that the proposed use will result in adverse impacts to some species of fish and aquatic invertebrates through runoff from treated areas. Further, waterfowl and shorebirds, including the endangered Least Tern and Piping Plover, are likely to be affected through reductions in aquatic food supplies due to runoff. Therefore, COUNTER 5G should not be applied in watershed areas of lakes, ponds, potholes, marshes and other wetlands.

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Literature Cited

- Balcomb, R., R. Stevens, and C. Bowen II. 1984. Toxicity of 16 granular insecticides to wild-caught songbirds. Bull. Environ. Contam. Toxicol. 33:302-307.
- Hill, E.F. and M.B. Camardese. 1984. Toxicity of anticholinesterase insecticides to birds: technical grade versus granular formulations. Ecotoxicol. Environ. Safety 8:551-563.