RECORD NO. 242653

SHAUGHNESSEY NO. _____ REVIEW NO. _____

EEB REVIEW

DATE: IN 4-12-89 OUT MAY 16 1989

FILE OR REG. NO 89-MT-05

PETITION OR EXP. NO. _____

DATE OF SUBMISSION 3-24-89

DATE RECEIVED BY EFED 4-11-89

RD REQUESTED COMPLETION DATE 4-26-89

EEB ESTIMATED COMPLETION DATE 4-26-89

RD ACTION CODE/TYPE OF REVIEW 510

TYPE PRODUCT(S) : I, D, H, F, N, R, S Synthetic Pyrethroid

DATA ACCESSION NO(S): _____

PRODUCT MANAGER NO. D. Stubbs (41)

PRODUCT NAME(S) ASANA XL)0.66 EC)

COMPANY NAME State of Montana

SUBMISSION PURPOSE Proposed §18 for use on wheat and barley (small grains)

SHAUGHNESSEY NO.	CHEMICAL & FORMULATION	A.I.
	Esfonvalerate	

100.1 Submission Purpose

The State of Montana is requesting an emergency exemption (Section 18) for the use of esfenralerate (ASANA XL 0.66 EC) for the control of Russian Wheat aphid in wheat and barley.

100.2 Application Rate / Methods / Directions

ASANA is to be applied by certified applicators to foilage via ground equipment or by aircraft in spring and early summer. A maximum of 250,000 acres of wheat and 100,000 acres of barley are to be treated (any County East of the Continental Divide). Rate of application will be 0.03 - 0.05 lbs ai/A.

100.3 Target Organism

Russian wheat aphid (Diuraphis noxia)

100.4 Precautionary Labeling

This pesticide is toxic to wildlife and extremely toxic to fish. Use with care when applying in areas adjacent to any body of water. Do not apply directly to water. Do not apply when weather conditions favor drift from treated areas. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label.

100.5 Formulation Information

ASANA 0.66 EC, EPA Registration No. 352-502

Active Ingredients:

(S)-cyano (3phenoxyphenyl) methyl-(S)-4-chloro-alpha-(1-methylethyl) benzeacetate	8.4%
Inert Ingredients	91.6%
Total	100.0%

101.0 Hazard Assessment

ASANA XL 0.66 EC is produced by E.I du Pont de Nemours Company, Inc. This compound is the 2S - XS isomer of pydrin (esfenvalerate). Although the acute and chronic aquatic and terrestrial wildlife data base for ASANA has not been completed, some studies have shown that this isomer of pydrin appears to have similar fate and toxicity parameters. Therefore, the Agency will rely

upon the pydrin data base in evaluating the potential hazard of ASANA use to nontarget organisms.

Pydrin is currently registered for use on crops such as field corn, melons, peppers, potatoes, tomatoes, fruit and nut orchards, squash, cucumber, eggplant, beans, sweet corn, cotton, soybeans and peanuts. Pydrin is a second generation pyrethroid that is slow to degrade in soil (half-life of about 6 months) and relatively stable in water (hydrolysis after 24 days at PH 7.2). Pydrin binds to sediment and particulate resulting in a soil/water partition coefficient of greater than 15,000.

Aquatic Toxicity

Pydrin is a neurotoxicant and effector of ion permeability (Miller and Adams, 1982) and appears to interact with sodium gates (Lawrence and Casido, 1983).

Laboratory studies have shown that pydrin is very highly toxic to fish and aquatic organisms. Shimmel et al. (1983) found that pydrin was acutely toxic to mysid shrimp, Mysidops bahia, at 0.008 (0.005 - 0.01) ug/L and pink shrimp, Penacus duorarum, at 0.84 (0.66 - 1.1) ug/L. They further found acute toxicity values for estuarine fish ranging from 5.0 (0.66 - 5.3) ug/L for sheepshead minnos, minnow, Cyprinodon variegatus to 0.31 (0.21 - 0.40) ug/L for Atlantic silversides, Menidia menidia.

Evaluation of potential risk from sublethal chronic pydrin exposure to aquatic invertebrate larval development and metabolism was conducted by McKenney and Hamaker (1984). They concluded that there were alterations in metabolic-salinity patterns of larval grass shrimp, Palaemonetes pugio, exposed to 0.0001 and 0.0002 ug/L pydrin. These low levels of pydrin appeared to reduce the ecological fitness at this critical life state by limiting the organism's capacity to adapt to fluctuating salinity conditions that are normally encountered in estuarine waters.

Jarvinen et al. (1988) evaluated pydrin toxicity to fathead minnows, Pimephales promelas, following episodic and continuous exposure to the pesticide. Their results showed that a 48-hour exposure to pydrin at a concentration similar to a continuous exposure 96-hour LC_{50} can cause adverse growth effects (50% deformities) within 30 days.

An assessment of the potential environmental risk of a pesticide must include actual or estimated values of exposure. At present, DuPont Agricultural Products is conducting an aquatic mesocosm experiment in order to evaluate the ecological effects of pydrin/ASANA on non-

target aquatic organisms. Since this study has not been completed, EEB has calculated estimated environmental concentrations (EEC) of ASANA residues from wheat fields following ground and aerial application (Appendix I). These calculations suggest that at 0.05 lb ai/A, the expected concentration of ASANA from both types of application are 0.031 and 0.154 ug/L, respectively. A comparison of these values with acute and chronic toxicity values suggests that ASANA use on wheat and barley fields may result in environmental residues that are in excess of the Agency's aquatic toxicity concerns (residues may be greater that one to three orders of magnitude the acute and chronic toxicity values). However, until the Agency has more field information (i.e., mesocosm evaluation) it appears that drift and/or runoff from this ASANA use could adversely effect aquatic ecosystems.

Avian Toxicity

The available data suggests that pydrin is practically non-toxic to birds at an acute level (Mallard LC_{50} = 9932 ppm; Bobwhite quail LC_{50} = 10,000 ppm). However, avian reproductive effects were found at 25 ppm. In assessing acute toxicity of ASANA to avian wildlife, EEB has estimated the potential exposure from residues by using Hoerger and Kenaga's (1972) table of typical maximum residues on differing categories of vegetation (Table 1).

Table 1. Maximum Expected Pydrin Residues on Avian Food and Dietary Intake (ppm)

Food Type	Residue (ppm)
Sparse Foliage	14.
Dense Foliage/ Insects	2.8
Large Insects	0.06

The maximum expected residues from the consumption of vegetation and insects (application rate of 0.05 lb ai/A) are expected to range from 0.06 to 14 ppm. These values show that ASANA use on wheat and barley should not present a direct toxicity threat to birds (expected residues are 6 to 3 orders of magnitude less than acute and chronic toxicity values). However, the high toxicity of ASANA to aquatic invertebrates and the possibility of exposure to aquatic environments from runoff and drift may result in an indirect effect to waterfowl recruitment. Several species of ducks nest and feed in wetland areas adjacent to cultivated fields. Nesting birds are sensitive to nutrient fluctuations at this time

and rely upon aquatic invertebrates from these wetlands as a chief source of protein and calcium.

101.3 Endangered Species

Based upon the information found in the EEB Endangered Species file, it appers that this use of ASANA may indirectly impact the piping plover (Charadrius melodus). Although ASANA is not acutely toxic to birds, it is highly toxic to aquatic invertebrates and fish. Since aquatic invertebrates are an essential diet component for the piping plover, any disruption of this food base could be detrimental, especially during the breeding season. Since ASANA is to be applied from March to June, a time that coincides with the piping plover's mating season, spraying near critical wetlands in the Counties of Sheridan, Valley and Phillips, could effect recruitment. Therefore, before ASANA is applied in these counties of concern, the Montana Department of Agriculture must contact Carol Taylor at the U.S. Fish and Wildlife office in Helena at (408) 449-5225 for clarification as to the presence of these endangered birds.

107.0 Conclusions

EEB has completed its evaluation of this Section 18 request for the use of ASANA on wheat and barley fields in Montana. Expected environmental residues were calculated in order to assess the potential hazard of ASANA toxitity to avian and aquatic species. These expected residues from field runoff and drift exceed acute and chronic toxicity values for fish and aquatic invertebrates by one to three orders of magnitude. Therefore the use of ASANA at 0.05 lb ai/A could directly impact aquatic organisms and indirectly affect birds that feed on aquatic invertebrates in lakes and wetlands adjacent to sprayed fields. The proposed use of buffer zones (100 feet) is not endorsed by this reviewer. Variable wind patterns and applicator efficiency can result in drift that will exceed these buffer areas.

Endangered species concerns were addressed in Section 101.2. Before ASANA is used in the counties of concern (Phillips, Sheridan, and Valley), the Montana Department of Agriculture should contact Carol Taylor at the U.S. Fish and Wildlife office (406) 449-5225 for clarification as to the distribution of the piping plover.

Miachel Rexrode, Fisheries Biologist
Ecological Effects Branch
Hazard Evaluation Division (H7507D)

Doug Urban, Section Head
Ecological Effects Branch
Hazard Evaluation Division (H7507C)

for James Akerman, Chief
Ecological Effects Branch
Hazard Evaluation Division (H7507C)

Michael Rexrode
Douglas J. Urban 5/16/89
Raymond W. Matthews 5/16/89

6

APPENDIX I EEC Calculation for ASANA Use on Winter Wheat

I. Ground Application

Assumptions:

0.1% runoff
10 acre drainage basis
0.05 lb ai/A of ASANA

A) Runoff

0.05 lb ai/A x 0.001 x 10 A = 0.0005 lbs ai total runoff

EEC of 1 lb ai, direct application to 1 A pond, 6-foot deep = 61

Therefore, EEC = $\frac{61 \text{ ug/L}}{1 \text{ lb ai}} \times \frac{0.0005 \text{ lb ai}}{1} = \frac{0.031 \text{ ug/L}}{1}$

II. Aerial Appliction

Assmptions

0.1% drift
60% application efficiency
10 acre drainage basin
5% drift
0.05 lb ai/A of ASANA

A. Runoff

0.05 lb ai/A x 0.05 = 0.0025 lbs ai in total drift

B. Drift

0.05 ai/A x 0.05 = 0.0025 lbs ai in total drift

Therefore, EEC = $\frac{61 \text{ ug/L}}{1 \text{ lb ai}} \times \frac{.00253 \text{ lb ai}}{1} = \frac{0.154 \text{ ug/L}}{1}$

REFERENCES

Jarvinen, A.W.; Tonner, D.K.; Kline, E.R. 1988. Toxicity of chlorpyrifas, endrin, or fenvalerate to Fathead minnows following episodic or continuous exposure. Ecoto. and Environ. Saf. 15:78-95.

Lawrence, L.J., Casida, J.E. 1983. Stereospecific action of pyrethroid insecticides on the Y-aminobutyric and receptorionophore complex. Science 221:1399-1401.

McKenney, C.L. and Hamaker, D.B. 1984 Effects of Fenvalerate on larval development of Palaemonetes pugio (Holthuis) and on larval metabolism during asmotic stress. Aquat. Tox. 5:343-355.

Miller, T.A.; Adams, M.D. 1982. Mode of action of pryethroids. In insecticide Mode of Action (J.R. Coats, Ed.) pp. 3-24, Academic Press, New York.

Schimmel, S.C.; Gornas, R.L.; Patrick, J.M.; Moore, J.C. 1983 Acute Toxicity, bioconcentration, and persistence of AC 222,705, Benthiocarb, Chloropyriyos, Fenvalerate, Methyl Parathion and Permethrin in the estuarine environment. J. Hgric. Food Chem. 31(1) pp 104-113.

Smith, A.G.; J.H. Stoudt and J.B. Gollup, 1964. Prairie potholes and marshes. Pages 39-50 in Waterfowl Tomorrow, U.S. Government Printing Office, Washington, D.C. 770 pp.

Swanson, G.A., G. L. Krapu and J.R. Serie. 1979. Foods of laying female dabbling ducks on the breeding grounds. Pages 47-57 in Waterfowl and Wetlands: An integrated review. T. Bookout, ed. 152 pp.