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

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

OCT 13 1998

MEMORANDUM

SUBJECT: Tier I Estimated Environmental Concentrations of fenbuconazole for the highest registered use rate.
PC Code: 129011
DP Bar code: D249477, D249480, D249483

FROM: Amer Al-Mudallal, Chemist 10/13/98
Environmental Risk Branch I
Environmental Fate and Effects Division (7507C)

Through: Arnet Jones, Chief 10/13/98
James Hetrick, Soil Chemist 10/13/98
Kevin Costello, Geologist 10/13/98
Environmental Risk Branch I
Environmental Fate and Effects Division (7507C)

TO: Donna Davis, Chief
Registration Action Branch II
Health Effects Division (7509C)

Cynthia Gilles-Parker, PM 22
John Bazuin
Registration Division (7505C)

CONCLUSIONS

Tier I screening models (GENEEC version 1.2) predict that the concentrations of fenbuconazole in surface water are not likely to exceed 6.69 μg/l for the peak (acute) concentration and 3.59 μg/l for The 56-day (chronic) concentration for aerial spray applications. The SCIGROW model

(version 1.0) indicates that the acute and chronic concentrations of fenbuconazole in shallow ground water are predicted not likely to exceed 0.03 μg/l.

USAGE DATA

According to the label (INDAR 75 WSP EPA Reg. No. 707-239 and ENABLE 2F EPA Reg. No. 707-231) fenbuconazole can be applied on a number of crops among them stone fruits, pecans, and bananas. It can be applied by either aerial or ground spray. Some states limit the application method to ground spray only. The maximum allowed annual use rate is 0.75 lbs a.i./acre as in the case of pecans. A typical treatment at this rate would be 6 applications at a rate of 0.125 lb a.i./acre with a 14 day interval to produce a maximum annual use rate of 0.75 lbs a.i./acre. The label instructions prohibit direct spray over aquatic habitats and establish a 75-ft setback from these areas.

ENVIRONMENTAL FATE

The principal route of fenbuconazole dissipation appears to be adsorption to soil, with increased adsorption associated with higher soil organic matter content. Mineralization to CO_2 of the phenyl moiety and soil photolysis appear to be less important routes of dissipation. The triazole moiety of the molecule appears to be persistent.

Fenbuconazole is moderately persistent to persistent with surface degradation half-lives ranging from 79 days for soil photolysis to 367 days for aerobic soil metabolism. Degradation of fenbuconazole in subsurface soil horizons is expected to occur slowly, as the compound is stable to hydrolysis at pH 5, 7, and 9 and degrades in soil under anaerobic conditions with half-lives of 451-655 days.

Fenbuconazole appears to be slightly mobile to immobile in soil, with K_d's ranging from 5 to 115 and K_{oc}'s ranging from 2185 to 9042; adsorption increased with increasing soil organic matter. Aged residues exhibited slight potential to leach in sandy loam columns. Acceptable terrestrial field dissipation data indicate that fenbuconazole will be moderately persistent to persistent in the field (half-lives at four sites were from 157 to 407 days); minimal leaching of parent and degradates was observed.

Because of its adsorption to soil, the potential for fenbuconazole to leach to ground water appears to be slight. However, the potential to contaminate ground water may be greater at vulnerable sites (i.e. soils that are low in organic matter and shallow ground water). The long half-lives of aerobic soil and terrestrial field dissipation indicate that when fenbuconazole is applied over multiple growing seasons, it may result in soil residue accumulation. These residues may be available for rotational crop uptake or may be transported with sediments during runoff events. Fenbuconazole did not bioaccumulate significantly in bluegill sunfish; 95-98% of accumulated

2

residues were eliminated during a 14-day depuration period. Maximum BCFs were 170X, 50X, and 330X in whole fish, fillet, and viscera, respectively.

SURFACE WATER ASSESSMENT:

GENEEC[1]

The GENEEC model was used to estimate surface water concentrations for fenbuconazole from the proposed use on blueberries. The input values for GENEEC are listed in Table 1. GENEEC version 1.2 dated May 3, 1995 was used for the calculations.

Table 1. GENEEC Input Parameters

MODEL INPUT VARIABLE	INPUT VALUE	SOURCE
Chemical Name	Fenbuconazole	EFED One-liner
Solubility	2.7 ppm	EFED One-liner
Hydrolysis	$T_{1/2}$ = stable	MRID No. 41031246
Photolysis	$T_{1/2}$ = 87 days	MRID No. 41875023
Aerobic Soil Metabolism	$T_{1/2}$ = 367	MRID No. 41031247
Aerobic Aquatic Metabolism	N/A	N/A
K_{oc}	2185*	MRID No. 41031249
Application Rate	0.125 lbs a.i./acre	Label
Max. Number of Applications per year	6**	Label
Interval Between Applications	14 days	Label

** The smallest K_{oc} value was used in order to produce the highest (most conservative) exposure value.*

*** Six applications, 14 days apart, were used in order to produce the highest (most conservative) exposure value.*

The GENEEC modeling predicts that the concentrations of fenbuconazole in surface water are not likely to exceed 6.69 μg/l for the peak (acute) concentration and 3.59 μg/l for the 56-day (chronic) concentration (Table 2). These estimates are based on a total annual use rate of 0.75 lbs ai/acre (i.e.0.125 lbs a.i./acre × 6 applications). The GENEEC values represent upper-bound estimates of the concentrations that might be found in surface water due to the use of fenbuconazole.

Table 2. GENEEC Estimated Concentrations of Fenbuconazole for the Highest Registered Use Rate

APPLICATION METHOD	Peak EEC (μg/l)	4-day EEC (μg/l)	21-day EEC (μg/l)	56-day EEC (μg/l)
Aerial Application	6.69	6.39	4.94	3.59

GENEEC is a screening model designed by the Environmental Fate and Effects Division (EFED) to estimate the concentrations found in surface water for use in ecological risk assessment. As such, it provides upper-bound values on the concentrations that might be found in ecologically sensitive environments because of the use of a pesticide. It was designed to be simple to use and to only require data which is typically available early in the pesticide registration process. GENEEC is a single event model (one runoff event), but can account for spray-drift from multiple applications. GENEEC is hardwired to represent a 10-hectare field immediately adjacent to a 1-hectare pond that is 2 meters deep with no outlet. The pond receives a spray drift event from each application plus one runoff event. The runoff event moves a maximum of 10% of the applied pesticide into the pond. This amount can be reduced due to degradation on the field and the effects of soil binding in the field. Spray drift is equal to 1 and 5% of the applied rate for ground and aerial spray application, respectively.

GENEEC is not an ideal tool for drinking water risk assessments. Drinking water from surface water sources, tends to come from bodies of water that are substantially larger than a 1-hectare pond. Furthermore, GENEEC assumes that essentially the whole basin receives an application of the chemical. In virtually all cases, basins large enough to support a drinking water facility will contain a substantial fraction of area that does not receive the chemical. Furthermore, there is always at least some flow (in a river) or turn over (in a reservoir or lake) of the water so the persistence of the chemical near the drinking water facility is usually over estimated by GENEEC. Given all this, GENEEC should provide an upper bound on the concentration of

pesticide that could be found in drinking water and therefore can be appropriately used in screening calculations. If a risk assessment performed using GENEEC output does not exceed the level of concern, then one can be reasonably confident that the risk will also be below the level of concern. However, since GENEEC can substantially overestimate true drinking water concentrations, it will be necessary to refine the GENEEC estimate if the level of concern is exceeded.

GROUND WATER ASSESSMENT

The ground water assessment is based solely on SCI-GROW[2] modeling because ground-water monitoring data is not available for fenbuconazole[3]. The input values for SCI-GROW are listed in Table 3. SCI-GROW version 1.0 dated May 22, 1997 was used for the calculations.

Table 3. SCI-GROW Input Parameters

MODEL INPUT VARIABLE	INPUT VALUE	SOURCE
Chemical Name	Fenbuconazole	EFED one-liner
Aerobic Soil Metabolism	$T_{1/2} = 367$	MRID No. 41031247
K_{oc}	2884*	MRID No. 41031249
Application rate	0.125 lbs a.i./acre	Label
Max. Number of Applications/Year	6	Label

* *Median Value*

SCI-GROW Modeling predicts that the concentration of fenbuconazole in drinking water from ground sources is not likely to exceed 0.03 μg/l (Table 4).

Table 4. SCI-GROW Estimated Concentration of Fenbuconazole For the Highest Registered Use Rate		
APPLICATION METHOD	**Total Annual Use Rate* (lbs a.i./acre)**	**SCI-GROW Acute and Chronic EEC (μg/l)**
Aerial or ground Spray	0.75	0.03

* The total annual use rate is equal to the application rate times the maximum number of applications allowed per year (i.e. 0.125 lbs/acre × 6 applications = 0.75 lbs/acre).

SCI-GROW is based on the fate properties of the pesticide, the application rate, and the existing body of data from small-scale groundwater monitoring studies[3]. The model assumes that the pesticide is applied at its maximum rate in areas where the groundwater is particularly vulnerable to contamination. In most cases , a considerable portion of any use area will have ground water that is less vulnerable to contamination than the areas used to derive the SCI-GROW estimates.

REFERENCES

1- U.S. Environmental Protection Agency. 1995. *GENEEC: A Screening Model for Pesticide Environmental Exposure Assessment.* The International Symposium on Water Quality Monitoring, April 2-5 1995. American Society of Agricultural Engineers. p 485.

2- Barrett, M. Proposal For a Method to Determine Screening Concentration Estimates for Drinking Water Derived from Ground Water Studies. EFED/OPP. September 20, 1997.

3- U.S. Environmental Protection Agency. 1992. Pesticides in Ground Water Database - A Compilation of Monitoring Studies: 1971 - 1991. Office of Prevention, Pesticides, and Toxic Substances, EPA 734-12-92-001, September 1992.

4- Kellogg, Maizel and Goss; Agricultural Chemical Use and Ground Water Quality: Where Are the Potential Problem Areas? U.S. Department of Agriculture. 1992.