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MEMORANDUM

SUBJECT: Tier 1: Screen for Drinking Water Assessment of Methidathion
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RECEIVED

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The Environmental Fate and Effects Division has been requested to generate a Tier 1 Drinking Water Assessment for methidathion. This memo provides a Tier 1 drinking water assessment for methidathion. The degradates were not considered due to lack of environmental fate data. Currently, Tier 1 assessments use the EFED Screening Models: SCI-GROW and GENEEC.

The SCI-GROW (Screening Concentration in Ground Water) screening model developed in EFED is an empirical model based upon actual groundwater monitoring data collected for the registration of a number of pesticides that serves as benchmarks for the model. The current version of SCI-GROW appears to provide realistic estimates of pesticide concentrations in shallow, highly vulnerable groundwater (i.e., sites with sandy soils and depth to groundwater of 10 to 20 feet).

GENEEC is a screening model used in Tier 1 (generic high runoff site) to estimate pesticide concentrations found in surface water up to 56 days. It provides an upper-bound concentration

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value. GENEEC is a single runoff event model, but accounts for spray drift from multiple applications. GENEEC represents a 10-hectare field immediately adjacent to a 1-hectare pond that is 2-meter deep with no outlet. The pond receives a pesticide load from spray drift for each application plus what runs off in one rainfall event, usually two days after the last application. The runoff event transports a maximum of 10% of the pesticide remaining in the top 2.5-cm of soil. This amount can be reduced through soil adsorption. The amount of pesticide remaining on the field in the top 2.5-cm of soil depends on the application rate, number of applications, interval between applications, incorporation depth, and degradation rate in the soil. Spray drift is determined by method of application (5% drift for aerial spray and airblast, 1% for ground spray).

Environmental Fate:

The environmental fate data for methidathion used in the screening assessment are summarized in Table 1 (EFED One-Liner Database 10/12/94).

When only one aerobic soil metabolism half-life value is available, EFED has historically multiplied this value by three to account for uncertainty and variability. Based on one supplemental aerobic soil metabolism study (162-1), the half-life was determined to be 3 days. By multiplying the half-life value by three, a resulting half-life of 9 days was used as the model input for both SCI-GROW and GENEEC. For adsorption concerns, a median KOC value was selected for both models.

Methidathion Use:

Supracide® 25% wettable powder is the only commercially available formulation for Methidathion. The major use information is listed in Table 2, which is based on the handout from 9/29/97 SMART meeting and the proposed labels submitted by Novartis on 11/03/97. Both the maximum application rates and the typical application rates are presented.

Drinking Water Assessment:

Using the fate properties listed in Table 1 and the use information presented in Table 2, SCI-GROW was used to estimate the drinking water concentrations from ground water and GENEEC was used to estimate the drinking water concentrations from surface water. Concentrations were estimated for both the maximum and typical application rates for each of nine crops upon which methidathion is used.

SCI-GROW Results:

Based on (1) an aerobic soil metabolism half-life input of 9 days, (2) a median soil organic carbon partition coefficient of 191 L/kg, and (3) total application rate per year, the SCI-GROW results are listed in Table 3. For the maximum application rates, the estimated concentrations

range from 0.0365 ug/L to 0.3893 ug/L. Among the use pattern examined, the cotton use pattern has the highest concentration. For the typical application rates, the range is from 0.0122 ug/L to 0.0487 ug/L. Citrus use pattern has the highest concentration.

GENEEC Results:

Based on (1) an aerobic soil metabolism half-life input of 9 days, (2) a median soil organic carbon partition coefficient of 191 L/kg, (3) a water solubility of 250 mg/L, (4) no aerobic aquatic metabolism half-life, (5) a water photolysis half-life at pH 7 of 11 days, (6) a hydrolysis half-life at pH 7 of 48 days, and (7) the application information (including rate, number of applications, and interval between applications), the GENEEC results are presented in Table 4. Based on the maximum application rates, safflower usage has the minimum peak concentration of 33.95 ug/L and walnuts usage has the maximum of 268.38 ug/L. The minimum and maximum 56-day concentrations are 21.58 and 170.55 ug/L for safflower and walnuts, respectively. For the typical application rates, the minimum and maximum peak concentrations are 14.79 and 59.17 ug/l, respectively for safflower and citrus. The minimum and maximum 56-day concentrations are 9.39 and 37.57 ug/L for safflower and citrus, respectively.

TABLE 1. Summary of Selected Environmental Fate Properties for Methidathion.

Property	Range (median)	Value used in assessment	Model
Solubility	250 mg/L	250 mg/L	GENEEC
Hydrolysis $T_{1/2}$	37 days @pH 5 48 days @ pH 7 13 days @ pH 9	48 days	GENEEC
Aquatic Photolysis $T_{1/2}$	11 days @ pH 7	11 days	GENEEC
Aerobic Soil Metabolism $T_{1/2}$	3 days	9 days	GENEEC SCI-GROW
Anaerobic Soil Metabolism $T_{1/2}$	10 days	not considered	
Aerobic Aquatic Metabolism $T_{1/2}$	no data	not considered	
Kads	2.48-14.83 (4.315)	see KOC	
KOC	113 - 338 (191)	191	GENEEC/SCI-GROW

Table 2. Methidathion Use Information Based on Supracide® 25 WP Label.

Maximum Application Rates for Supracide® 25WP:

Crop	Rate Per Application	# of Applications	Total Applied	Total AI
Almonds	12	1	12	3
Artichokes	4	8	32	8
Citrus	20	2	40	10
Cotton	4	16	64	16
Olives	12	1	12	3
Pome Fruits	12	1	12	3
Stone Fruits	12	1	12	3
Safflower	2	3	6	1.5
Walnuts	12	3	36	9

Typical Application Rates for Supracide® 25WP:

Crop	Rate Per Application	# of Applications	Total Applied	Total AI
Almonds	6	1	6	1.5
Artichokes	4	2	8	2
Citrus	8	1	8	2
Cotton	2	2	4	1
Olives	6	1	6	1.5
Pome Fruits	6	1	6	1.5
Stone Fruits	6	1	6	1.5
Safflower	2	1	2	0.5
Walnuts	6	1	6	1.5

Table 3. Tier 1 (SCI-GROW) Estimates of Ground Water Concentrations for Methidathion.

Maximum Application Rates for Supracide® 25WP:

Crop	Total AI Applied (lb)	SCI-GROW Conc. (ppb)
Almonds	3	0.0730
Artichokes	8	0.1947
Citrus	10	0.2433
Cotton	16	0.3893
Olives	3	0.0730
Pome Fruits	3	0.0730
Stone Fruits	3	0.0730
Safflower	1.5	0.0365
Walnuts	9	0.2190

Typical Application Rates for Supracide® 25WP:

Crop	Total AI Applied (lb)	SCI-GROW Conc. (ppb)
Almonds	1.5	0.0365
Artichokes	2	0.0487
Citrus	2	0.0487
Cotton	1	0.0243
Olives	1.5	0.0365
Pome Fruits	1.5	0.0365
Stone Fruits	1.5	0.0365
Safflower	0.5	0.0122
Walnuts	1.5	0.0365

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Table 4. Tier 1 (GENEEC) Estimates of Surface Water Concentrations for Methidathion.

Maximum Application Rates for Supracide® 25WP:

Crop	Application Information	Peak GEEC (ppb)	Average 56 day GEEC
Almonds	1 @ 3 lb ai/ac	88.76	56.36
Artichokes	8 @ 1 lb ai/ac	59.46	37.87
Citrus	2 @ 5 lb ai/ac	182.79	116.22
Cotton	16 @ 1 lb ai/ac	124.77	79.50
Olives	1 @ 3 lb ai/ac	88.76	56.36
Pome Fruits	1 @ 3 lb ai/ac	88.76	56.36
Stone Fruits	1 @ 3 lb ai/ac	88.76	56.36
Safflower	3 @ 0.5 lb ai/ac	33.95	21.58
Walnuts	3 @ 3 lb ai/ac	268.38	170.55

Typical Application Rates for Supracide® 25WP:

Crop	Application Information	Peak GEEC (ppb)	Average 56 day GEEC
Almonds	1 @ 1.5 lb ai/ac	44.38	28.18
Artichokes	2 @ 1 lb ai/ac	47.09	29.94
Citrus	1 @ 2 lb ai/ac	59.17	37.57
Cotton	2 @ 0.5 lb ai/ac	29.05	18.46
Olives	1 @ 1.5 lb ai/ac	44.38	28.18
Pome Fruits	1 @ 1.5 lb ai/ac	44.38	28.18
Stone Fruits	1 @ 1.5 lb ai/ac	44.38	28.18
Safflower	1 @ 0.5 lb ai/ac	14.79	9.39
Walnuts	1 @ 1.5 lb ai/ac	44.38	28.18