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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Aquatic Exposure Assessment Associated with Methidathion Uses for Stone Fruits and Almonds in California and Alfalfa in Oregon.

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Exposure Summary

Modeled EECs resulting from a single aerial application of methidathion at the maximum label rate for each crop					
Use	Peak*	96-hr average	21-d average	60-d average	90-d average
CA-Fruits	15.50	14.75	12.27	9.00	7.22
CA-Almonds	14.60	13.85	12.00	8.36	6.46
OR-Alfalfa	9.77	9.40	8.46	6.08	4.90

* units in ug/L (ppb)

Background

At the request of Field and External Affairs Division(FEAD), Environmental Fate and Effects Division (EFED) is providing the Estimated Environmental Concentrations (EEC) of methidathion for uses for stone fruits and almonds in California and alfalfa in Oregon.

The tier II modeling approach was conducted on three crop scenarios. The EECs for ecological exposure were calculated using PRZM (Pesticide Root Zone Model) and EXAMS (Exposure Analysis Modeling System). PRZM is used to simulate pesticide transport as a result of runoff and erosion from an agricultural field and EXAMS estimates environmental fate and transport of pesticides in surface water. The most recent PRZM/EXAMS linkage program (PE4V01.PL) was used.

The linked PRZM and EXAMS models, with crop specific scenarios and meteorological data, were used to estimate environmental concentrations in a standard farm pond for ecological exposure. Weather and agricultural practices are simulated over 30 years so that the 10-year exceedance probability at the site can be estimated. The scenarios selected for each crop are summarized below.

Use	Scenario	Comment
CA - Fruits	Non-citrus fruit in Central valley of California (MLRA 17), Metfile: W93193.dvf, Fresno County; Soil: Exeter fine sandy loam	Application information taken from label of EPA Reg No. 10163-244 date stamped 5/6/1999
CA - Almond	Central valley of California, (MLRA 17), Metfile: W23232.dvf, San Joaquin county, Soil:Manteca fine sandy loam	Application information taken from label of EPA Reg No. 10163-236 date stamped 8/29/2000.
OR - Alfalfa*	Willamette Valley of Oregon (MLRA 2), Metfile: W24232.dvf Soil: Bashaw Clay	Application information taken from label from EPA SLN No. OR-020018. *Due to the lack of Oregon alfalfa scenario, the wheat scenario was used to provide the conservative estimates.

The appropriate PRZM and EXAMS input parameters were selected from the environmental fate data submitted by the petitioner and in accordance with US EPA-OPP EFED water model parameter selection guidelines, Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version II, February 28, 2002. The general input values for methidathion used in the model runs for PRZM and EXAMS are presented below. The input files (.pzr) for PE4 are attached at the end.

Property	Range (median)	Value used in assessment	Model
Molecular Weight	302 g/mole	302 g/mole	EXAMS
Solubility	250 mg/L	250 mg/L	EXAMS
Vapor Pressure	2.5×10^{-6} mm Hg	2.5×10^{-6} mm Hg	EXAMS
Hydrolysis $T_{1/2}$	37 days @pH 5 48 days @ pH 7 13 days @ pH 9	48 days	EXAMS
Aquatic Photolysis $T_{1/2}$	11 days @ pH 7	11 days	EXAMS
Foliar Dissipation $T_{1/2}$	no data	no foliar decay	PRZM
Aerobic Soil Metabolism $T_{1/2}$	3 and 11.3 days	19.9 days (t90 value)	PRZM EXAMS
Anaerobic Soil Metabolism $T_{1/2}$	10 days	not considered	
Aerobic Aquatic Metabolism $T_{1/2}$	no data	39.8 days (twice of soil aerobic $T_{1/2}$)	EXAMS
Anaerobic Aquatic Metabolism $T_{1/2}$	no data	20 days (twice of soil anaerobic $T_{1/2}$)	EXAMS
KOC	192 - 575 (323)	323 g/ml	PRZM EXAMS
Application Rate	1.0 lb ai/ac for alfalfa 3.0 lb ai/ac for almonds 3.0 lb ai/ac for fruits	01/10 OR (wheat scenario was used) on 03/10 on 01/07	PRZM
Application Efficiency	aerial applications	0.95	PRZM
Spray Drift	aerial applications	0.05	PRZM

For comparison, PRZM-EXAMS was also run for ground application only. In these cases, application efficiency was 0.99, and spray drift was 0.01.

Modeled EECs resulting from a single ground application of methidathion at the maximum label rate for each crop					
Use	Peak*	96-hr average	21-d average	60-d average	90-d average
CA-Fruits	10.57	10.12	8.92	6.05	4.72
CA-Almonds	9.85	9.35	7.77	5.25	4.04
OR-Alfalfa	8.56	8.21	7.34	5.26	4.19

* units in ug/L (ppb)

.pzr file for CA, fruits

Output File: MetCAFru
Metfile: w93193.dvf
PRZM scenario: CAfruitC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methidathion

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	302.3	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2.5e-6	torr	
Solubility	sol	250	mg/L	
Kd Kd		mg/L		
Koc Koc	323	mg/L		
Photolysis half-life	kdp	11	days	Half-life
Aerobic Aquatic Metabolism	kbacw	39.8	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20	days	Halfife
Aerobic Soil Metabolism	asm	19.9	days	Halfife
Hydrolysis: pH 7	48	days	Half-life	
Method: CAM 2	integer	See PRZM manual		
Incorporation Depth:	DEPI	4	cm	
Application Rate:	TAPP	3.36	kg/ha	
Application Efficiency:	APPEFF	0.950	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	07-01	dd/mm or dd/mmm or dd-mm or dd-mmm	
Record 17:	FILTRA			
IPSCND	1			
UPTKF				
Record 18:	PLVKRT	0		
PLDKRT	0.0198			
FEXTRC	0.5			
Flag for Index Res. Run	IR	Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

.pzr file for CA, almonds

Output File: MetCAAlm
Metfile: w23232.dvf
PRZM scenario: CAalmondC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methidathion

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	302.3	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2.5e-6	torr	
Solubility	sol	250	mg/L	
Kd Kd		mg/L		
Koc Koc	323	mg/L		
Photolysis half-life	kdp	11	days	Half-life
Aerobic Aquatic Metabolism	kbacw	39.8	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20	days	Halfife
Aerobic Soil Metabolism	asm	19.9	days	Halfife
Hydrolysis: pH 7	48	days	Half-life	
Method: CAM 2	integer	See PRZM manual		
Incorporation Depth:	DEPI	4	cm	
Application Rate:	TAPP	3.36	kg/ha	
Application Efficiency:	APPEFF	0.950	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	10-03	dd/mm or dd/mmm or dd-mm or dd-mmm	
Record 17:	FILTRA			
IPSCND	1			
UPTKF				
Record 18:	PLVKRT	0		
PLDKRT	0.0198			
FEXTRC	0.5			
Flag for Index Res. Run	IR	Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

.pzr file for OR, alfalfa (use wheat scenario file instead)

Output File: MetORWhe
Metfile: w24232.dvf
PRZM scenario: ORwheatC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methidathion

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	302.3	g/mol	
Henry's Law Const.	henry		atm-m^3/mol	
Vapor Pressure	vapr	2.5e-6	torr	
Solubility	sol	250	mg/L	
Kd Kd	Kd		mg/L	
Koc Koc	Koc	323	mg/L	
Photolysis half-life	kdp	11	days	Half-life
Aerobic Aquatic Metabolism	kbacw	39.8	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20	days	Halfife
Aerobic Soil Metabolism	asm	19.9	days	Halfife
Hydrolysis: pH 7	48	days	Half-life	
Method: CAM 2	integer	See PRZM manual		
Incorporation Depth:	DEPI	4	cm	
Application Rate:	TAPP	1.12	kg/ha	
Application Efficiency:	APPEFF	0.950	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	10-01	dd/mm or dd/mmm or dd-mm or dd-mmm	
Record 17:	FILTRA			
IPSCND	1			
UPTKF				
Record 18:	PLVKRT	0		
PLDKRT	0.0198			
FEXTRC	0.5			
Flag for Index Res. Run	IR	Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	