



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES,
AND TOXIC SUBSTANCES

MEMORANDUM

Date: August 30, 2004

Subject: Flumetsulam. Chronic Dietary Exposure Assessment for the Tolerance
Reassessment Eligibility Decision (TRED) Document.

DP Barcode: D306279

PC Code: 129016

Chemical Class: Triazolopyrimidine

40 CFR §: 180.468

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Executive Summary

A chronic dietary (food and water) risk assessment was conducted using the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database (DEEM-FCID™, Version 2.03), which uses food consumption data from the USDA's Continuing Surveys of Food Intakes by Individuals (CSFII) from 1994 to 1996 and 1998. The analysis was performed to support the tolerance reassessment eligibility decision for current uses and to support the proposed tolerance in/on dry beans (Petition Number: 7F4851). The chronic dietary exposure/risk analysis was conducted using current and proposed tolerance values for corn (forage, grain, and stover), soybean, and dry beans.

A conservative chronic dietary (food and water) assessment was performed using DEEM-FCID™. Tolerance level residues, default processing factors, 100% crop treated, and the highest estimated chronic drinking water concentration were used to conduct this Tier 1 (unrefined) assessment. Dietary risk estimates are provided for the general U.S. population and various population subgroups. This assessment concludes that for all supported commodities, the chronic dietary exposure estimates are below the Health Effects Division's (HED) level of concern for all population subgroups at less than 1% of the cPAD.

I. Introduction

Dietary risk assessment incorporates both exposure and toxicity of a given pesticide. For acute and chronic assessments, the risk is expressed as a percentage of a maximum acceptable dose (i.e., the dose which HED has concluded will result in no unreasonable adverse health effects). This dose is referred to as the population-adjusted dose (PAD). The PAD is equivalent to the reference dose (RfD) divided by the special Food Quality Protection Act (FQPA) Safety Factor.

For non-cancer chronic exposures, HED is concerned when estimated dietary risk exceeds 100% of the cPAD. HED is generally concerned when estimated cancer risk exceeds one in one million (i.e., the risk exceeds 1×10^{-6}). References which discuss chronic risk assessments in more detail are available on the EPA pesticides web site: "Available Information on Assessing Exposure from Pesticides, A User's Guide," June 21, 2000, web link: <http://www.epa.gov/fedrgstr/EPA-PEST/2000/July/Day-12/6061.pdf>; or see SOP 99.6 (8/20/99).

II. Residue Information

Flumetsulam, N-(2,6-difluorophenyl)-5-methyl-(1,2,4)-triazolo-[1,5a]-pyrimidine-2-sulfonamide, is a herbicide in the triazolopyrimidine chemical class. The mode of action of flumetsulam is similar to the sulfonyleurea herbicides, which are acetolactate synthase (ALS) inhibitors.

Tolerances have been established under 40 CFR §180.468 for residues of flumetsulam in/on field corn (forage, grain, and stover) and soybean at 0.05 ppm. A tolerance of 0.05 ppm for dry beans is also being proposed. The nature of residues in corn and soybeans is adequately delineated based on acceptable plant metabolism studies. The HED Metabolism Committee concluded that the residue of concern resulting from the uses on field corn and soybeans is flumetsulam *per se*

(N. Dodd, HED Metabolism Committee Memo, 4/16/93 and N. Dodd, Metabolism Committee Memo, 4/26/93). Plant metabolism studies for dry beans have not been submitted; however, metabolism data from soybeans may be translated to dry beans because of the similarities between the two crops.

The HED Metabolism Committee has not determined the residue of concern in livestock; however, based on the submitted data, the nature of the residue in livestock (goats and hens) is adequately defined because no detectable residues of flumetsulam *per se* were found in feed items.

A summary of the flumetsulam tolerance reassessment for field corn and soybeans and the assessment of the proposed tolerance for dry beans is presented in Table 1.

Table 1. Tolerance Summary for Flumetsulam.			
Commodity	Established/Proposed Tolerance (ppm)	Recommended Tolerance (ppm)	Comments (correct commodity definition)
Corn, field, forage	0.05 (established)	0.05	None
Corn, field, grain	0.05 (established)	0.05	None
Corn, field, stover	0.05 (established)	0.05	None
Soybean	0.05 (established)	0.05	None
Bean, dry	0.05 (proposed)	0.05	None

III. Drinking Water Data

The values used in the dietary risk assessment were provided by the Environmental Fate and Effects Division (EFED) in the following memo: “Drinking Water Assessment for Flumetsulam for Uses on Field Corn and Soybeans” (J. Lin and S. Syslo, D301361, 5/19/04). Water residues were incorporated in the DEEM-FCID™ into the food categories “water, direct, all sources” and “water, indirect, all sources”.

The estimated drinking water concentrations from surface water sources were calculated using Tier II PRZM (Pesticide Root Zone Model) and EXAMS (Exposure Analysis Modeling System). Based on the modeling results for surface water derived drinking water, the Mississippi corn scenario predicts the highest one in ten year peak concentration of 2.03 ppb, whereas the North Dakota corn scenario gives the highest one in ten year annual mean concentration of 0.59 ppb, and overall annual mean concentration of 0.34 ppb.

The estimated ground water concentrations were calculated using the Tier I SCI-GROW (Screening Concentration In Ground Water) model. The estimated chronic drinking water concentration from ground water sources is 0.823 ppb. The highest chronic drinking water concentration (0.823 ppb) was used for the dietary analysis.

IV. DEEM-FCID™ Program and Consumption Information

A chronic dietary exposure assessment was conducted for flumetsulam using DEEM-FCID™, Version 2.03, which incorporates consumption data from USDA's CSFII, 1994-1996 and 1998. The 1994-96, 98 data are based on the reported consumption of more than 20,000 individuals over two non-consecutive survey days. Foods "as consumed" (e.g., apple pie) are linked to EPA-defined food commodities (e.g. apples, peeled fruit - cooked; fresh or N/S; baked; or wheat flour - cooked; fresh or N/S, baked) using publicly available recipe translation files developed jointly by USDA/ARS and EPA. For chronic exposure assessments, consumption data are averaged for the entire U.S. population and within population subgroups. Based on analysis of the 1994-96, 98 CSFII consumption data, which took into account dietary patterns and survey respondents, HED concluded that it is most appropriate to report risk for the following population subgroups: the general U.S. population, all infants (less than 1 year old), children 1-2, children 3-5, children 6-12, youth 13-19, adults 20-49, females 13-49, and adults 50+ years old.

For chronic dietary exposure assessment, an estimate of the residue level in each food or food-form (e.g., orange or orange juice) on the food commodity residue list is multiplied by the average daily consumption estimate for that food/food form to produce a residue intake estimate. The resulting residue intake estimate for each food/food form is summed with the residue intake estimates for all other food/food forms on the commodity residue list to arrive at the total average estimated exposure. Exposure is expressed in mg/kg body weight/day and as a percent of the cPAD. This procedure is performed for each population subgroup.

V. Toxicological Information

On March 24, 1993, the HED RfD/Peer Review Committee evaluated the toxicology database for flumetsulam and selected Reference Doses (RfDs) and toxicological endpoints for acute and chronic dietary exposure risk assessments (G. Ghali, RfD/Peer Review Committee Memo, 3/24/93). There are no studies that identify an acute hazard based on toxic effects observed following a single oral exposure (dose) of flumetsulam. Therefore, a dose and endpoint are not proposed for the general population including infants and children or females 13-49 years of age. Flumetsulam has been classified as a "Group E" pesticide (evidence of non-carcinogenicity to humans). The toxicity endpoints pertinent for human risk assessment are summarized below in Table 2 (E. Reaves, D306277, 8/31/04).

Table 2. Summary of Toxicological Dose and Endpoints for Flumetsulam.			
Exposure Scenario	Dose (mg/kg/day)	Special FQPA SF* and Level of Concern for Risk Assessment	Endpoint for Risk Assessment
Acute Dietary (Females 13-50 years of age)	Not applicable. No hazard identified.		

Exposure Scenario	Dose (mg/kg/day)	Special FQPA SF* and Level of Concern for Risk Assessment	Endpoint for Risk Assessment
Acute Dietary (General population including infants and children)	Not applicable. No hazard identified.		
Chronic Dietary (All populations)	NOAEL= 100 mg/kg/day UF =100 Chronic RfD = 1 mg/kg/day	FQPA SF =1 cPAD = <u>chronic RfD</u> FQPA SF =1 mg/kg/day	Chronic feeding, dog LOAEL = 500 mg/kg/day based on renal inflammatory and atrophic changes secondary to renal calculi and hepatic effects (inflammation, focal necrosis, biliary stasis)
Cancer (oral, dermal, inhalation)	Flumetsulam is classified as Group E (Evidence of non-carcinogenicity for humans) (6/23/93). Not mutagenic.		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose, RfD = reference dose.

VI. Results/Discussion

As stated above, for a chronic assessment, HED is concerned when dietary risk exceeds 100% of the cPAD. The DEEM-FCID™ analysis estimates the dietary exposure of the U.S. population and various population subgroups. The chronic dietary exposure analysis results reported in Table 3 for the general U.S. population, all infants (less than 1 year old), children 1-2, children 3-5, children 6-12, youth 13-19, females 13-49, adults 20-49, and adults 50+ years. The resulting food exposure estimates are below HED's level of concern for all population subgroups, less than 1% of the cPAD.

Population Subgroup	cPAD (mg/kg/day)	Exposure (mg/kg/day)	% cPAD
General U.S. Population	1	0.000113	less than 1
All Infants (less than 1 year old)		0.000219	less than 1
Children 1-2 years old		0.000223	less than 1
Children 3-5 years old		0.000244	less than 1
Children 6-12 years old		0.000181	less than 1
Youth 13-19 years old		0.000135	less than 1
Adults 20-49 year old		0.000094	less than 1

Table 3. Summary of Chronic Dietary (food and water) Exposure and Risk for Flumetsulam.			
Population Subgroup	cPAD (mg/kg/day)	Exposure (mg/kg/day)	% cPAD
Adults 50+ years old		0.000066	less than 1
Females 13-49 year old		0.000092	less than 1

VII. Conclusions

A chronic dietary (food and water) risk assessment was conducted using the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database (DEEM-FCID™, Version 2.03), which uses food consumption data from the USDA's Continuing Surveys of Food Intakes by Individuals (CSFII) from 1994-1996 and 1998. The analysis was performed to support the tolerance reassessment eligibility decision for current uses and to support the proposed tolerance in/on dry beans (Petition Number: 7F4851). The chronic dietary exposure/risk analysis was conducted using current and proposed tolerance values for corn (forage, grain, and stover), soybean, and dry beans. Also, default processing factors, 100% crop treated for all commodities, and the highest estimated chronic drinking water concentration were used to conduct this Tier 1 (unrefined) assessment.

This assessment concludes that for all supported commodities, the chronic dietary exposure estimates are below HED's level of concern for all population subgroups at less than 1% of the cPAD.

VI. List of Attachments

- Attachment 1. Chronic Residue Input File.
- Attachment 2. Chronic Results File.

RFI: S. Ary (8/24/04); S. Kinard (8/27/04); W. Hazel (8/30/04).

Attachment 1. Chronic Food Residue Input File.

U.S. Environmental Protection Agency Ver. 2.00
 DEEM-FCID Chronic analysis for FLUMETSULAM 1994-98 data
 Residue file: C:\Documents and Settings\sary\Desktop\Flumetsulam\flumetsulam.chronic.R98
 Adjust. #2 NOT used
 Analysis Date 08-30-2004 Residue file dated: 08-30-2004/17:14:27/8
 Reference dose (RfD) = 1 mg/kg bw/day
 Comment: Food and Water

Food Crop EPA Code	Grp	Food Name	Residue (ppm)	Adj. Factors		Comment
				#1	#2	
06030300	6C	Bean, black, seed	0.050000	1.000	1.000	
06030320	6C	Bean, broad, seed	0.050000	1.000	1.000	
06030340	6C	Bean, cowpea, seed	0.050000	1.000	1.000	
06030350	6C	Bean, great northern, seed	0.050000	1.000	1.000	
06030360	6C	Bean, kidney, seed	0.050000	1.000	1.000	
06030380	6C	Bean, lima, seed	0.050000	1.000	1.000	
06030390	6C	Bean, mung, seed	0.050000	1.000	1.000	
06030400	6C	Bean, navy, seed	0.050000	1.000	1.000	
06030410	6C	Bean, pink, seed	0.050000	1.000	1.000	
06030420	6C	Bean, pinto, seed	0.050000	1.000	1.000	
15001200	15	Corn, field, flour	0.050000	1.000	1.000	
15001201	15	Corn, field, flour-babyfood	0.050000	1.000	1.000	
15001210	15	Corn, field, meal	0.050000	1.000	1.000	
15001211	15	Corn, field, meal-babyfood	0.050000	1.000	1.000	
15001220	15	Corn, field, bran	0.050000	1.000	1.000	
15001230	15	Corn, field, starch	0.050000	1.000	1.000	
15001231	15	Corn, field, starch-babyfood	0.050000	1.000	1.000	
15001240	15	Corn, field, syrup	0.050000	1.000	1.000	
15001241	15	Corn, field, syrup-babyfood	0.050000	1.000	1.000	
15001250	15	Corn, field, oil	0.050000	1.000	1.000	
15001251	15	Corn, field, oil-babyfood	0.050000	1.000	1.000	
06003470	6	Soybean, seed	0.050000	1.000	1.000	
06003480	6	Soybean, flour	0.050000	1.000	1.000	
06003481	6	Soybean, flour-babyfood	0.050000	1.000	1.000	
06003490	6	Soybean, soy milk	0.050000	1.000	1.000	
06003491	6	Soybean, soy milk-babyfood or in	0.050000	1.000	1.000	
06003500	6	Soybean, oil	0.050000	1.000	1.000	
06003501	6	Soybean, oil-babyfood	0.050000	1.000	1.000	
86010000	0	Water, direct, all sources	0.000823	1.000	1.000	
86020000	0	Water, indirect, all sources	0.000823	1.000	1.000	

Attachment 2. Chronic Results File.

U.S. Environmental Protection Agency Ver. 2.00
 DEEM-FCID Chronic analysis for FLUMETSULAM (1994-98 data)
 Residue file name: C:\Documents and Settings\sary\Desktop\Flumetsulam\flumetsulam.chronic.R98
 Adjustment factor #2 NOT used.
 Analysis Date 08-30-2004/17:14:54 Residue file dated: 08-30-2004/17:14:27/8
 Reference dose (RfD, Chronic) = 1 mg/kg bw/day
 COMMENT 1: Food and Water

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Total exposure by population subgroup

Population Subgroup	Total Exposure	
	mg/kg body wt/day	Percent of Rfd
U.S. Population (total)	0.000113	0.0%
U.S. Population (spring season)	0.000114	0.0%
U.S. Population (summer season)	0.000117	0.0%
U.S. Population (autumn season)	0.000110	0.0%
U.S. Population (winter season)	0.000110	0.0%
Northeast region	0.000098	0.0%
Midwest region	0.000118	0.0%
Southern region	0.000113	0.0%
Western region	0.000120	0.0%
Hispanics	0.000139	0.0%
Non-hispanic whites	0.000108	0.0%
Non-hispanic blacks	0.000122	0.0%
Non-hisp/non-white/non-black	0.000112	0.0%
All infants (< 1 year)	0.000219	0.0%
Nursing infants	0.000070	0.0%
Non-nursing infants	0.000275	0.0%
Children 1-6 yrs	0.000232	0.0%
Children 7-12 yrs	0.000175	0.0%
Females 13-19 (not preg or nursing)	0.000118	0.0%
Females 20+ (not preg or nursing)	0.000077	0.0%
Females 13-50 yrs	0.000101	0.0%
Females 13+ (preg/not nursing)	0.000097	0.0%
Females 13+ (nursing)	0.000105	0.0%
Males 13-19 yrs	0.000152	0.0%
Males 20+ yrs	0.000091	0.0%
Seniors 55+	0.000064	0.0%
Children 1-2 yrs	0.000223	0.0%
Children 3-5 yrs	0.000244	0.0%
Children 6-12 yrs	0.000181	0.0%
Youth 13-19 yrs	0.000135	0.0%
Adults 20-49 yrs	0.000094	0.0%
Adults 50+ yrs	0.000066	0.0%
Females 13-49 yrs	0.000092	0.0%