UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

Date: 10/22/2009

SUBJECT: Aminopyralid Chronic Aggregate Dietary (Food and Drinking Water) Exposure and Risk Assessment for the Section 3 Registration on Field Corn

PC Code: 005100	DP Number: D369212
Decision No: 401475	Registration No: 62719-519
Petition Nos.: 8F7455	Regulatory Action: Section 3 Registration
Risk Assess Type: None	Case No.: None
TXR No.: None	CAS No.: 566191-89-7
MRID No.: None	40 CFR: 180.610

FROM: Douglas Dotson, Ph.D., Chemist
Risk Assessment Branch II
Health Effects Division (7509P)

THROUGH: Donna Davis, Chemist
William Cutchin, Chemist
Dietary Exposure Science Advisory Council
Health Effects Division (7509P)

TO: Kathryn Montague/Joanne Miller, RM Team 23
Herbicide Branch
Registration Division (7505P)

Executive Summary

A chronic aggregate dietary (food and drinking water) exposure and risk assessment was conducted for the herbicide, aminopyralid, using the Dietary Exposure Evaluation Model, DEEM-FCID™, Version 2.03, which uses food consumption data from the U.S. Department of Agriculture's Continuing Surveys of Food Intakes by Individuals (CSFII). The surveys were taken from 1994-1996 and included a supplemental children's survey taken in 1998. The analysis was performed to support a Section 3 tolerance petition for the use of aminopyralid on field corn. An acute dietary assessment was not performed, as a toxicological endpoint attributable to a single dose has not been identified for aminopyralid. Aminopyralid is classified as "not likely to be carcinogenic to humans;" therefore, a cancer assessment was not performed.

The unrefined chronic assessment is based on the assumption that aminopyralid residues are present at tolerance levels in all commodities for which tolerances have been established, and that 100% of those crops are treated. DEEM™ Version 7.81 default processing factors were applied to all processed commodities for which they were available. Drinking water was incorporated directly into the dietary assessment using the estimated drinking water concentration (EDWC) for surface water generated by the Tier 1 FQPA Index Reservoir Screening Tool (FIRST) Model.

The resulting chronic dietary exposure estimates for food and water combined are well below HED's level of concern for the general U.S. population and all population subgroups. Using the DEEM-FCID software, dietary exposure is estimated at 0.000703 mg/kg/day for the U.S. population (<1% of the chronic population adjusted dose (cPAD)) and 0.002097 mg/kg/day (<1% of the cPAD) for children 1 to 2 years old, the population subgroup with the highest estimated chronic dietary exposure to aminopyralid.

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 point of departure (PoD; e.g. NOAEL, LOAEL, etc.) divided by the required uncertainty or safety factors.

For acute and non-cancer chronic exposures, HED is concerned when estimated dietary risk exceeds 100% of the PAD. References which discuss the acute and chronic risk assessments in more detail are available on the EPA/pesticides website: "Available Information on Assessing Exposure from Pesticides, A User's Guide," 21-JUN-2000, web link: http://www.epa.gov/fedrgstr/EPA-PEST/2000/July/Day-12/6061.pdf ; or see SOP 99.6 (20-AUG-1999).

II. Residue Information

Residues of Concern: The nature of the residue of aminopyralid in plants and livestock has been adequately delineated based on metabolism studies conducted with aminopyralid in wheat, grass, lactating goats, and laying hens. In metabolism studies reflecting foliar applications to grass and wheat, aminopyralid was found to be metabolized to a multi-component mixture of water-soluble complexes that consist mostly of isomeric mixtures of acid- and base-labile N-glucosides and glucose ester conjugates of aminopyralid. HED concluded that the residues of concern in grass and small grain commodities are free and conjugated aminopyralid. Metabolism studies in lactating goats and laying hens show that most of the administered dose is rapidly excreted (~80% for hens and ~95% for goat). The weight of the evidence is that the limited amount of aminopyralid that is not excreted remains as the parent compound. Therefore, the residue of concern in livestock is aminopyralid (Memo, D360100, D. Dotson, 10/22/2009).

Tolerances: Permanent tolerances have been established under 40 CFR §180.610(a) for free and conjugated residues of aminopyralid in or on grass and wheat commodities at levels ranging from 0.04 ppm in wheat grain to 50 ppm in grass hay. Permanent tolerances have also been established residues of aminopyralid in or on the following animal commodities: milk (0.03ppm), kidney of cattle, goat, horse, and sheep (0.3 ppm), and the fat, meat, and meat byproducts (except kidney) of cattle, goat, horse, and sheep (0.02 ppm).

Dow AgroSciences has proposed tolerances for residues of aminopyralid on field corn grain, forage, and stover. HED has reviewed residue data submitted to support these uses and concluded that the proposed tolerances are appropriate (Memo, D. Dotson, D360100, 10/22/2009). The tolerances are listed in Table 1, below. Field corn grain is the only human food item on this list.

Table 1. Aminopyralid Recommended Tolerances

Crop Commodity	Recommended Tolerance (ppm)
Field Corn Grain	0.20
Field Corn Forage	0.30
Field Corn Stover	0.20

Livestock: Livestock feedstuffs associated with the proposed uses include field corn grain, forage, silage, stover, and milled byproducts. Tolerances are currently in effect for animal commodities. Based on recalculated dietary burdens and the results of ruminant and poultry feeding studies, HED concluded that no changes need to be made to the animal commodity tolerances.

Residue Data used for the Chronic Assessment: The unrefined chronic dietary assessment is based on the assumption that aminopyralid residues are present at tolerance levels in all commodities for which tolerances have been established and that 100% of those crops are

treated. DEEM™ Version 7.81 default processing factors were applied to all processed commodities for which they were available. The only processed commodities in this assessment are corn syrup and dried beef. Processing studies for these two commodities were not submitted by the registrant.

III. Drinking Water Data

The drinking water residues used in the dietary risk assessment were provided by the Environmental Fate and Effects Division (EFED, Memo, R. Barris, D361926, 7/24/2009). Water residues were incorporated directly into the DEEM-FCID assessment under the food categories "water, direct, all sources" and "water, indirect, all sources."

The residue of concern in drinking water is parent aminopyralid (Memo, D301689, M. Doherty, 7/12/2005). EFED estimated residues of aminopyralid in surface water and groundwater using the FIRST and SCIGROW (Screening Concentrations in Groundwater) models, respectively. The models and their descriptions are available at the EPA internet site: http://www.epa.gov/oppefed1/models/water/. The maximum estimated drinking water concentrations (EDWCs) are presented below in Table 2.

Table 2. Maximum Aminopyralid EDWCs in Surface and Ground Water

Maximum Surface Water EDWC (ppb)		Maximum Ground Water Acute/Chronic EDWC (ppb)
Acute Value	Chronic/Cancer Value	
10.024	**1.937**	0.630

The chronic surface water EDWC was higher than the groundwater EDWC; therefore, the surface water value of 1.937 ppb was used in the chronic dietary assessment. The acute surface water value is not relevant to this dietary assessment, as a toxic effect attributable to a single dose has not been identified for aminopyralid.

IV. DEEM-FCID™ Program and Consumption Information

An aminopyralid chronic dietary exposure assessment was conducted using the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database DEEM-FCID™, Version 2.03, which incorporates consumption data from USDA's Continuing Surveys of Food Intakes by Individuals (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 assessment, consumption data are averaged for the entire U.S. population and within population subgroups, but for acute exposure assessment are retained as individual consumption events. 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 (<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

Reference: Aminopyralid. Human Health Risk Assessment for the Proposed Use on Field Corn (PP#8F7455), D359088, D. Dotson, et al., 10/22/2009.

HED has evaluated the available toxicity data for aminopyralid and determined that the following endpoints and doses are appropriate for use in the dietary risk assessment:

Table 3. Summary of Toxicological Doses and Endpoints for Aminopyralid for Use in Dietary Human Health Risk Assessments

Exposure/ Scenario	Point of Departure	Uncertainty/ FQPA Safety Factors	RfD, PAD, Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (General Population, including Infants and Children and females 13-49)	N/A	N/A	N/A	A toxic effect attributable to a single exposure was not seen in the toxicity database; therefore, an acute endpoint has not been identified.
Chronic Dietary (All Populations)	NOAEL= 50 mg/kg/day	UF_A= 10 x UF_H=10 x FQPA SF=1x	Chronic RfD = RfD=0.5 mg/kg/day cPAD 0.5 mg/kg/day	Chronic toxicity/carcinogenicity study LOAEL=500mg/kg/day based on cecal enlargement, slight mucosal hyperplasia in males and slightly decreased body weights
Cancer (oral, dermal, inhalation)	Classification: "Not likely to be Carcinogenic to Humans" based on the absence of significant tumor increases in two adequate rodent carcinogenicity studies.			

Point of Departure (PoD) = A data point or an estimated point that is derived from observed dose-response data and used to mark the beginning of extrapolation to determine risk associated with lower environmentally relevant human exposures. NOAEL = no observed adverse effect level. LOAEL = lowest observed adverse effect level. UF = uncertainty factor. UF_A = extrapolation from animal to human (interspecies). UF_H = potential variation in sensitivity among members of the human population (intraspecies). FQPA SF = FQPA Safety Factor. PAD = population adjusted dose (a = acute, c = chronic). RfD = reference dose. N/A = not applicable.

The FQPA Safety Factor has been reduced to 1x for all population subgroups for the following reasons: 1) there is no evidence of increased pre- and/or post-natal sensitivity/susceptibility to aminopyralid, 2) there is no evidence of neurotoxicity in the database (so a developmental neurotoxicity (DNT) study has not been required), and 3) the exposure values that are used in the risk assessment are conservative and are unlikely to underestimate risk.

VI. Results/Discussion

As stated above, for chronic assessments, HED is concerned when dietary risk exceeds 100% of the cPAD. The DEEM-FCID™ analyses estimate the dietary exposure of the U.S. population and various population subgroups. The results reported in Table 3 are for the general U.S. Population, all infants (<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.

Aminopyralid chronic dietary (food + water) exposure estimates using the DEEM-FCID™ software are well below HED's level of concern for the U.S. population and each of the population subgroups. Dietary exposure was estimated to be 0.000703 mg/kg/day for the U.S. population (<1% of the cPAD) and 0.002097 mg/kg/day (<1% of the cPAD) for the most highly exposed population subgroup (children, 1-2 years old). The estimated exposures and risks from residues of aminopyralid in food and water are summarized in Table 4.

Table 4. Chronic Aggregate Dietary (Food + Drinking Water) Exposure and Risk for Aminopyralid

Population Subgroup	Exposure (mg/kg/day)	% cPAD
General U.S. Population	0.000703	<1
All Infants (< 1 year old)	0.001081	<1
Children 1-2 years old	**0.002097**	**<1**
Children 3-5 years old	0.001827	<1
Children 6-12 years old	0.001266	<1
Youth 13-19 years old	0.000822	<1
Adults 20-49 years old	0.000515	<1
Adults 50+ years old	0.000359	<1
Females 13-49 years old	0.000516	<1

VII. Characterization of Inputs/Outputs

These chronic dietary exposure and risk estimates are highly conservative. They are based on the assumption that 100% of crops with tolerances are treated with aminopyralid, and that residues in foods "as eaten" are present at tolerance levels. In addition, drinking water exposure estimates are screening level estimates generated by the Tier 1 FIRST Model.

Dietary exposure estimates could be refined through the use of anticipated residues, percent crop treated data, and/or refined estimated drinking water concentrations. However, as estimated exposures and risks using conservative assumptions are well below HED's level of concern, no refinements are needed at the present time.

VIII. Conclusions

This unrefined chronic dietary exposure analysis using DEEM-FCID™ indicates that chronic dietary exposure of humans to aminopyralid from food and drinking water is well below HED's level of concern. Estimated chronic dietary exposures are less than 1% of the cPAD for the general U.S. population and all population subgroups. This assessment is unlikely to underestimate risk.

IX. List of Attachments

1. Aminopyralid Chronic Dietary Residue Input File
2. Results of Aminopyralid Chronic Dietary Exposure Analysis

Attachment 1: Aminopyralid Chronic Dietary Residue Input File

Chronic NOAEL: 50 mg/kg bw/day
Chronic PAD (cPAD): 0.50 mg/kg bw/day

DEEM FCID (Version 2.03), 1994-1996 data and 1998 Supplemental Children's Survey
Filename: C:\Documents and Settings\ddotson\My Documents\Deemfcid\Aminopyralid\AminopyralidCHR.R98
Date created/last modified: 09-15-2009/16:34:553/8

EPA Code	Crop Grp	Commodity Name	Def Res (ppm)	Adj.Factors #1	#2	Comment
15001200	15	Corn, field, flour	0.200000	1.000	1.000	
15001201	15	Corn, field, flour-babyfood	0.200000	1.000	1.000	
15001210	15	Corn, field, meal	0.200000	1.000	1.000	
15001211	15	Corn, field, meal-babyfood	0.200000	1.000	1.000	
15001220	15	Corn, field, bran	0.200000	1.000	1.000	
15001230	15	Corn, field, starch	0.200000	1.000	1.000	
15001231	15	Corn, field, starch-babyfood	0.200000	1.000	1.000	
15001240	15	Corn, field, syrup	0.200000	1.500	1.000	
15001241	15	Corn, field, syrup-babyfood	0.200000	1.500	1.000	
15001250	15	Corn, field, oil	0.200000	1.000	1.000	
15001251	15	Corn, field, oil-babyfood	0.200000	1.000	1.000	
15004010	15	Wheat, grain	0.040000	1.000	1.000	
15004011	15	Wheat, grain-babyfood	0.040000	1.000	1.000	
15004020	15	Wheat, flour	0.040000	1.000	1.000	
15004021	15	Wheat, flour-babyfood	0.040000	1.000	1.000	
15004030	15	Wheat, germ	0.040000	1.000	1.000	
15004040	15	Wheat, bran	0.100000	1.000	1.000	
21000440	M	Beef, meat	0.020000	1.000	1.000	
21000441	M	Beef, meat-babyfood	0.020000	1.000	1.000	
21000450	M	Beef, meat, dried	0.020000	1.920	1.000	
21000460	M	Beef, meat byproducts	0.020000	1.000	1.000	
21000461	M	Beef, meat byproducts-babyfood	0.020000	1.000	1.000	
21000470	M	Beef, fat	0.020000	1.000	1.000	
21000471	M	Beef,fat-babyfood	0.020000	1.000	1.000	
21000480	M	Beef, kidney	0.300000	1.000	1.000	
21000490	M	Beef, liver	0.020000	1.000	1.000	
21000491	M	Beef, liver-babyfood	0.020000	1.000	1.000	
23001690	M	Goat, meat	0.020000	1.000	1.000	
23001700	M	Goat, meat byproducts	0.020000	1.000	1.000	
23001710	M	Goat, fat	0.020000	1.000	1.000	
23001720	M	Goat, kidney	0.300000	1.000	1.000	
23001730	M	Goat, liver	0.020000	1.000	1.000	
24001890	M	Horse, meat	0.020000	1.000	1.000	
26003390	M	Sheep, meat	0.020000	1.000	1.000	
26003391	M	Sheep, meat-babyfood	0.020000	1.000	1.000	
26003400	M	Sheep, meat byproducts	0.020000	1.000	1.000	
26003410	M	Sheep, fat	0.020000	1.000	1.000	
26003411	M	Sheep, fat-babyfood	0.020000	1.000	1.000	
26003420	M	Sheep, kidney	0.300000	1.000	1.000	
26003430	M	Sheep, liver	0.020000	1.000	1.000	
27002220	D	Milk, fat	0.030000	1.000	1.000	
27002221	D	Milk, fat - baby food/infant for	0.030000	1.000	1.000	
27012230	D	Milk, nonfat solids	0.030000	1.000	1.000	
27012231	D	Milk, nonfat solids-baby food/in	0.030000	1.000	1.000	
27022240	D	Milk, water	0.030000	1.000	1.000	
27022241	D	Milk, water-babyfood/infant form	0.030000	1.000	1.000	
27032251	D	Milk, sugar (lactose)-baby food/	0.030000	1.000	1.000	
86010000	O	Water, direct, all sources	0.001937	1.000	1.000	
86020000	O	Water, indirect, all sources	0.001937	1.000	1.000	

Attachment 2: Results of Aminopyralid Chronic Dietary Exposure Analysis

Chronic NOAEL: 50 mg/kg bw/day
Chronic PAD (cPAD): 0.50 mg/kg bw/day
Adjustment factor #2 NOT used.
Residue file name: Aminopyralid\AminopyralidCHR.R98
Analysis Date 09-15-2009/16:35:19 Residue file dated: 09-15-2009/16:34:55/8

Total exposure by population subgroup

Population Subgroup	Total Exposure mg/kg body wt/day	Total Exposure Percent of Rfd
U.S. Population (total)	0.000703	0.1%
U.S. Population (spring season)	0.000709	0.1%
U.S. Population (summer season)	0.000716	0.1%
U.S. Population (autumn season)	0.000699	0.1%
U.S. Population (winter season)	0.000688	0.1%
Northeast region	0.000651	0.1%
Midwest region	0.000753	0.2%
Southern region	0.000681	0.1%
Western region	0.000732	0.1%
Hispanics	0.000820	0.2%
Non-hispanic whites	0.000686	0.1%
Non-hispanic blacks	0.000715	0.1%
Non-hisp/non-white/non-black	0.000669	0.1%
All infants (< 1 year)	0.001081	0.2%
Nursing infants	0.000319	0.1%
Non-nursing infants	0.001370	0.3%
Children 1-6 yrs	0.001877	0.4%
Children 7-12 yrs	0.001208	0.2%
Females 13-19 (not preg or nursing)	0.000705	0.1%
Females 20+ (not preg or nursing)	0.000421	0.1%
Females 13-50 yrs	0.000568	0.1%
Females 13+ (preg/not nursing)	0.000598	0.1%
Females 13+ (nursing)	0.000603	0.1%
Males 13-19 yrs	0.000937	0.2%
Males 20+ yrs	0.000494	0.1%
Seniors 55+	0.000354	0.1%
Children 1-2 yrs	0.002097	0.4%
Children 3-5 yrs	0.001827	0.4%
Children 6-12 yrs	0.001266	0.3%
Youth 13-19 yrs	0.000822	0.2%
Adults 20-49 yrs	0.000515	0.1%
Adults 50+ yrs	0.000359	0.1%
Females 13-49 yrs	0.000516	0.1%