



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM

DATE: 06/20/02

SUBJECT: **Clethodim.** Chronic Dietary Exposure Assessments for the Section 3
Registration on Spinach and Mint. PC code 121011, DP Barcode D280875,
Submission S592413.

FROM: Manying Xue, Chemist
RAB3
Health Effects Division (7509C)

THROUGH: Stephen Dapson, Branch Senior Scientist
RAB3
Health Effects Division (7509C)

and

Christina Swartz, Chemist
David Hrdy, Chemist
Dietary Exposure Science Advisory Council (DESAC)
Health Effects Division (7509C)

TO: Mary Rust, Biologist
RAB3
Health Effects Division (7509C)

The purpose of this memorandum is to summarize the results of the dietary risk assessment for the general U.S. population and various population subgroups resulting from exposure to clethodim through food. This dietary risk assessment is an updated risk analysis that has been conducted for clethodim. The previous dietary risk assessment was conducted by Manying Xue (1/30/02, D280507).

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EPA Reviewer: Manying Xue, Date 06/20/02

STUDY TYPE: Chronic Dietary Exposure Assessment for Section 3 Registration for the Use of Clethodim on spinach and mint.

ACTIVE INGREDIENT: Clethodim

SYNONYMS: Select 2 EC and Select

RESIDUE OF CONCERN: Plants: Clethodim and metabolites containing the 5-(2-(ethylthiopropyl) cyclohexene-3-one and 5-(2-(ethylthiopropyl) -5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones

Livestock: Clethodim and its metabolites containing the 2-cyclohexen-1-one moiety

Executive Summary

The Interregional Research Project No. 4 (IR-4) and Valent have submitted a petition for the establishment of permanent tolerances for the combined residues of clethodim [(E)-(±)-2-[1-[[[3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one] and 5-OH clethodim-type residues in or on spinach at 2.0 ppm and mint at 5.0 ppm (D283278, D283279, M.Xue, 05/15/02). The chronic exposure assessment was requested to determine the dietary exposure estimates associated with the use of clethodim on these commodities.

This chronic analysis used tolerance level residues for all crops and livestock commodities. The projected % crop treated (%CT) data (2% for lettuce, broccoli and cauliflower, 15% cabbage, and 1% for brussels sprouts), and the weighted average % CT data (3% for cotton, 8% for onions, 3% for peanuts 4% for soybeans, 15% for sugar beets, and 1% for tomatoes) were used for the analysis; 100% CT data was assumed for spinach, mint, and the other crops in this analysis. The estimated risks from chronic dietary exposure to clethodim as represented by %cPAD (Chronic Population Adjusted Dose) were below HED's level of concern for the general US population and all population subgroups. The chronic dietary exposure estimate for the highest exposed population subgroup, children 1-6 years old, is 62% cPAD.

I. Introduction

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Risk assessment incorporates both exposure and toxicity of a given pesticide. The risk is expressed as a percentage of a dose that could be expressed as a daily or a long term dose, to pose no unreasonable adverse effects. This is called the population adjusted dose (PAD), and is expressed as %PAD. References are available on the EPA/pesticides web site which discuss the acute and chronic risk assessments in more detail: "Available Information on Assessing Exposure from Pesticides, A User's Guide", 6/21/2000, web link: <http://www.epa.gov/fedrgstr/EPA-PEST/2000/July/Day-12/6061.pdf>; or see SOP 99.6, 8/20/99.

II. Toxicological Information

On October 16, 1997, the Health Effects Division's Hazard Identification Assessment Review Committee (HIARC) met to evaluate the toxicology data base of clethodim with special reference to the reproductive, developmental and neurotoxicity data. These data were re-reviewed specifically to address the sensitivity of infants and children from exposure to clethodim as required by the Food Quality Protection Act (FQPA). In addition, the Committee also re-assessed the doses and endpoints selected for acute dietary, chronic dietary (RfD) as well as occupational and residential exposure risk assessments (HED DOC. NO.121011, 10/24/1997).

Cancer: Clethodim has been classified as a group E carcinogen. Treatment-related increases in tumor incidence were not seen in mice (0, 20, 200, 1000 or 3000 ppm for 78 weeks; MRID No. 41030112) or in rats (0, 5, 20, 500, or 2500 ppm for 2 years; MRID No. 41030121); thus, a cancer risk assessment is not required.

The FQPA Safety Factor Committee met on July 31, 2000 to evaluate the hazard and exposure data for clethodim and recommended that the FQPA Safety Factor be removed (1x) in assessing the risk posed by this chemical (HED DOC. NO. 014309, 8/31/2000). The chronic RfD (0.01 mg/kg/day), divided by the 1x FQPA safety factor, yields the chronic population-adjusted dose (**chronic PAD**) of **0.01 mg/kg/day**, which is used in assessing the chronic dietary risk. The doses and toxicological endpoints selected are summarized in Table 1.

Table 1. Summary of Toxicological Information

Exposure Scenario	Dose (mg/kg/day)	Endpoint	Study
Acute Dietary (All Populations)	None Selected. There were no effects observed in oral toxicity studies including developmental toxicity studies in rats and rabbits that could be attributable to a single dose (exposure). Therefore, a dose and endpoint were not selected for this risk assessment.		
Chronic Dietary (All Populations)	NOAEL = 1.0 UF=100	Alterations in hematology and clinical chemistry parameters and increased absolute and relative liver weights observed at the LOAEL of 75 mg/kg/day.	Chronic Toxicity-Dog (1 year)
	Chronic RfD = 0.01 mg/kg/day		

III. Residue Information

Permanent tolerances have been established under 40 CFR §180.458(a)(1), (4), and (5) for the combined residues of the herbicide clethodim and its metabolites containing the 2-cyclohexen-1-one moiety in/on the fat, meat, and mbyop of cattle, goats, hogs, horses, poultry, and sheep at 0.20 ppm, milk at 0.05 ppm, eggs at 0.20 ppm, cottonseed at 1.0 ppm, potatoes at 0.5, soybeans at 10.0 ppm, potato flakes and granules at 1.0 ppm, cottonseed meal 2.0 ppm. In addition, permanent tolerances are established under 40 CFR §180.458(a)(3) and (6) for the combined residues of clethodim and its metabolites containing the 5-(2-ethylthiopropyl)cyclohexene-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones, expressed as clethodim, in/on dry bulb onions at 0.20 ppm, sugar beet roots at 0.20 ppm, sugar beet tops and sugar beet molasses at 1.0 ppm, the tuberous and corm vegetables crop subgroup 1c, fruiting vegetables crop group, root vegetables (except sugar beets) crop subgroup 1b, leaves of root and tuber vegetables (excluding sugar beets, crop group 2), sugar beet, tops and sugar beet, molasses at 1.0 ppm, leaf petioles crop subgroup 4b at 0.6 ppm, melon crop subgroup 9a at 2.0 ppm, squash/cucumber crop subgroup 9b and cranberry at 0.5 ppm, sugar beets, roots at 0.20 ppm, sunflower seed at 5.0 ppm, strawberry at 3.0 ppm, sunflower, meal and clover, forage at 10.0 ppm, clover, hay at 20.0 ppm, green onion and leaf lettuce at 2.0 ppm, the Head/stem Brassica Crop Subgroup 5-A at 3.0 ppm, and mustard, seed, flax and canola at 0.5 ppm.

Time limited tolerances (set to expire on 4/30/03) are established under 40 CFR §180.458(a)(2) for the combined residues of clethodim and its metabolites containing the 5-(2-ethylthiopropyl)cyclohexene-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones, expressed as clethodim, in/on alfalfa forage at 6 ppm, alfalfa hay at 10 ppm, dry beans at 2 ppm, peanuts and peanut hay at 3 ppm, peanut meal at 5 ppm, tomato paste at 3 ppm, and tomato puree at 2 ppm.

HED has recently evaluated the residue data of clethodim in/on the leafy *Brassica* greens subgroup 5-B, turnip greens, dry bean, peanuts, peanut hay, peanut meal, and alfalfa hay and

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forage; and recommended for the establishment of tolerances for the residues of clethodim and its metabolites containing the 5-(2-ethylthiopropyl)cyclohexene-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones at 3.0 ppm for peanuts, peanut hay, the leafy *Brassica* greens subgroup 5-B and turnip greens, 2.5 ppm for dry bean, 5.0 ppm for peanut meal, and 6.0 ppm for alfalfa hay and forage. In addition, HED recommended for the establishment of tolerances for the residues of clethodim and its metabolites at 2.0 ppm for spinach and 5.0 ppm for mint.

Chronic Assessment:

The chronic dietary exposure analysis was performed for the general U.S. Population and all population subgroups using tolerance level residues (livestock) and total residues of concern (plants; parent and metabolites). The %CT data for various crops were incorporated in the chronic assessment. The data were provided by BEAD on August 31, 2000 and March 23, 2001 (see attachment 1 and 2); and 100% CT data for the proposed commodities of spinach and mint.

Metabolite:

Plants: Metabolism studies for clethodim in/on carrots, soybeans, and cotton were reviewed (PP#9F3743, MRIDs 41030137 & 41030138, M. Nelson, 3/12/90). The qualitative nature of the clethodim residue in plants is adequately understood for root crops and oil seed crops. HED previously concluded that the residues of concern are clethodim and its metabolites containing the 2-cyclohexen-1-one moiety; however, the residues of concern are now described as clethodim and metabolites containing the 5-(2-(ethylthiopropyl)cyclohexene-3-one and 5-(2-(ethylthiopropyl)-5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones in order to harmonize with the Codex MRL (PP#4F4340, D203378, J. Morales, 1/31/95).

Livestock: The nature of the residue in ruminants and poultry is adequately understood. HED previously concluded that the residues of concern are clethodim and its metabolites containing the 2-cyclohexen-1-one moiety.

Processing Information:

DEEM™ default concentration factors were used for all commodities.

Residue Estimates: The chronic analysis used tolerance level residues for all crops and livestock commodities. Tolerance levels and 100% CT data for canola, flax and mustard, seed, the leafy *Brassica* greens and turnip greens crop subgroup 5-B, dry bean, peanuts, peanut meal were used for the analyses. The projected % CT data (2% for lettuce, broccoli and cauliflower, 15% cabbage, and 1% for brussels sprouts), and the weighted average % CT data (3% for cotton, 8% for onions, 3% for peanuts 4% for soybeans, 15% for sugar beets, and 1% for tomatoes), and

100% CT data (for most crops) were used for the analyses. Table 2 lists the recommended tolerance and residue values used in dietary exposure assessment. A summary of the residue information used in the chronic analysis is attached (Attachment 3).

Table 2. Recommended Tolerance and Residue Values Used in Dietary Exposure Assessment.

Commodity	Recommended Tolerance (ppm)	Residue Value in Dietary Exposure Assessment (ppm)
Plants		
Spinach	2.0	2.0
Mint	5.0	5.0

I. DEEM™ Program and Consumption Information

Clethodim chronic dietary exposure assessments were conducted using the Dietary Exposure Evaluation Model (DEEM™) software Version 7.73, which incorporates consumption data from USDA's Continuing Surveys of Food Intake by Individuals (CSFII), 1989-1992. The 1989-92 data are based on the reported consumption of more than 10,000 individuals over three consecutive days, and therefore represent more than 30,000 unique "person days" of data. Foods "as consumed" (e.g., apple pie) are linked to raw agricultural commodities and their food forms (e.g., apples-cooked/canned or wheat-flour) by recipe translation files internal to the DEEM software. Consumption data are averaged for the entire US population and within population subgroups for chronic exposure assessment, but are retained as individual consumption events for acute exposure assessment.

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

HED notes that there is a degree of uncertainty in extrapolating exposures for certain population subgroups from the general U.S. population which may not be sufficiently represented in the consumption surveys, (e.g., nursing and non-nursing infants or Hispanic females). Therefore, risks estimated for these population subgroups were included in representative populations having sufficient numbers of survey respondents (e.g., all infants or females, 13-50 years).

II. Results/Discussion/Conclusion

HED's level of concern is over 100% of the PAD. That is, estimated exposures above this level

are of concern, while estimated exposures at or below this level are not of concern. The DEEM analyses estimate the dietary exposure of the U.S. population and 26 population subgroups. The results reported in Table 3 are for the U.S. Population (total), all infants (<1 year old), children 1-6, children 7-12, females 13-50, males 13-19, males 20+, and seniors 55+. The results for the other population subgroups are not reported in Table 3. This is because the numbers of respondents in the other subgroups were not sufficient, and thus the exposure estimates for these subgroups contained higher levels of uncertainty. However, the respondents in these subgroups were also part of larger subgroups which are listed in Table 3. For example, nursing and non-nursing infants are included in all infants. The subgroups which are broken down by region, season, and ethnicity are also not included.

Table 3. Results of Chronic Dietary Exposure Analysis

Population Subgroup	Chronic Dietary	
	Dietary Exposure (mg/kg/day)	% cPAD
U.S. Population (total)	0.003053	31
All Infants (< 1 year)	0.004446	45
Children 1-6 years	0.006184	62
Children 7-12 years	0.004355	44
Females 13-50	0.002377	24
Males 13-19	0.003015	30
Males 20+ years	0.002470	25
Seniors 55+	0.002705	27

III. Conclusions

The Tier 2 chronic dietary risk assessment was conducted for all supported clethodim food uses. Dietary risk estimates are provided for the general U.S. population and various population subgroups. This assessment concludes that for all supported registered commodities, the chronic risk estimates are below the Agency's level of concern (<100% cPAD) for the general U.S. population (31% of the cPAD) and all population subgroups. The chronic dietary exposure estimate for the highest exposed population subgroup is children 1-6 years old, at 62% of the cPAD.

IV. List of Attachments

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[DP Barcode D280875]
[Clethodim PC 121001]

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- Attachment 1: Clethodim Quantitative Usage Analysis
- Attachment 2: Projected Clethodim % CT of Market Share
- Attachment 3: Chronic Dietary Residue Inputs
- Attachment 4: Chronic Dietary Exposure Estimates

cc: Petition file, M. Xue (RAB3)
RDI: DE SAC[DDotson (04/1/02), SKinard (04/1/02)]; SDapson 04/05/2002
Mxue:810F:CM#2:703 305-6198:7509C:RAB3

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Attachment 1: Clethodim Quantitative Usage Analysis

Clethodim is a systemic postemergence herbicide used mainly to control annual and perennial grasses in broadleaf crops and bulb crops (onions). The product Select Herbicide, marketed by Valent, contains the active ingredient clethodim and accounts for all agricultural usage presented in this report. Agricultural usage averaged about 409,000 lbs of clethodim applied annually to various sites (see QUA Table). Of this, soybeans account for about 75% (305,000 lbs ai) of the total usage with approximately 4% (or 2.73 million acres) of the acres planted receiving one or more treatments of clethodim; cotton accounts for about 14% (58,000 lbs ai) of total usage with approximately 3% (or 384,000 acres) of the cotton acreage treated; sugar beets account for about 5% (20,000 lbs ai) of total clethodim usage with 15% of the acreage treated; and alfalfa accounts for about 4% (15,000 lbs ai) of total clethodim usage with 1% of the acreage treated. Dry beans (3,000 lbs a.i. applied), onions (3,000 lbs a.i. applied), and peanuts (6,000 lbs a.i. applied) round out the list of sites which account for significant remaining clethodim usage in terms of lbs of a.i.. Though few lbs a.i. are applied to garlic and onions the percentages of the crops treated are significant at 5% and 8%, respectively. Clethodim is also registered for use on a variety of other crops, including apples, pears, peaches, oranges, almonds, walnuts and pecans. However, BEAD data sources indicate that little or no clethodim are applied to these crops. Clethodim is registered for use on various ornamental shrubs and trees, as well as other non-agricultural sites, such as airports, rights-of-ways, industrial sites, paved areas and roads, fence rows, etc., but available EPA data sources found insignificant or no clethodim usage on these non-agricultural sites.

Site	Acres (000) Grown	Acres (000) Treated			% of Crop Treated			Lb ai (000) applied			Average Application Rates			States of Most Usage
		Wtd Avg	Est Max	000	Wtd Avg	Est Max	%	Wtd Avg	Est Max	000	lb ai / A / yr	# appl / yr	lb ai / A / appl	
Alfalfa	23,701	116	232	0%	1%	15	30	0.13	1.00	0.13	0.13	AZ IL 84%		
Almonds	434	1	5	0%	1%	0	1	0.15	1.00	0.15	0.15	-		
Apples	452	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Cherries	95	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Cotton	13,959	384	600	3%	4%	58	90	0.15	1.22	0.12	0.12	LA MS TX AR TN AZ 83%		
Dry Beans/Peas	1,809	31	62	2%	3%	3	5	0.08	1.00	0.08	0.08	-		
Garlic	22	1	3	5%	14%	0	<1	0.15	1.11	0.13	0.13	-		
Grapes	745	0*	0*	0*	0*	0*	0*	-	-	-	-	-		
Olives	30	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Onions	153	12	32	8%	21%	3	7	0.12	1.09	0.11	0.11	CA CO 90%		
Oranges	646	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Peaches	179	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Peanuts	1,582	47	94	3%	6%	6	12	0.13	1.07	0.13	0.13	GA TX NC 84%		
Pears	71	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		
Pecans	453	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-		

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Site	Acres (000) Grown	Acres (000) Treated			% of Crop Treated			Lb ai (000) applied			Average Application Rates			States of Most Usage
		Wtd Avg	Est Max	Wtd Avg	Est Max	Wtd Avg	Est Max	Wtd Avg	Est Max	lb ai / A / yr	# appl / yr	lb ai / A / appl	% of total lb ai used on this site	
Pistachios	71	0*	0*	0*	0*	0*	0*	0*	0*	1.00	-	-	-	
Prunes (& Plums)	127	0*	0*	0*	0*	0*	0*	0*	0*	1.00	-	-	-	
Shallots	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sorghum	11,611	0*	0*	0*	0*	0*	0*	0*	0*	1.00	-	-	-	
Soybeans	63,141	2,729	3,850	4%	6%	6%	305	430	0.11	1.00	0.11	0.11	IA IL AR MS TN MO 58%	
Strawberries	50	0*	0*	0*	0*	0*	0*	0*	0*	1.00	-	-	-	
Sugar Beets	1,434	222	444	15%	31%	31%	20	40	0.09	1.37	0.07	0.07	MN ND CO 87%	
Tomatoes	456	5	10	1%	2%	2%	0	1	0.10	1.24	0.08	0.08	-	
Walnuts	181	0*	0*	0*	0*	0*	0*	0*	-	1.00	-	-	-	
Other Ag. Sites	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total (1)	-	3,548	4,440	-	-	-	409	515	-	-	-	-	-	

Weighted average--the most recent years and more reliable data are weighted more heavily.
Est Max = Estimated maximum, which is estimated from available data.
Average application rates are calculated from the weighted averages.

NOTES ON TABLE DATA

- Usage data primarily covers 1990 - 1999.
 - Calculations of the above numbers may not appear to agree because they are displayed as rounded: to the nearest 1000 for acres treated or lb. a.i. (Therefore 0 = < 500) to the nearest whole percentage point for % of crop treated. (Therefore 0.0% = < 0.05%)
 - 0* = Available EPA sources indicate that no usage is observed in the reported data for this site, which implies that there is little or no usage.
 - A dash (-) indicates that information on this site is NOT available in EPA sources or is insufficient.
 - 1 No usage of clethodim was found on registered non-agricultural sites (ornamental shrubs and trees, rights-of-way, paved areas, etc.)
- SOURCES: EPA data, USDA, and National Center for Food and Agricultural Policy

Attachment 2: Projected Clethodim % CT of Market Share

March 23, 2001

MEMORANDUM

SUBJECT: Percent Crop Treated Estimates for Clethodim

FROM: David Donaldson, Economist
Economic Analysis Branch, BEAD (7503C)

Jim Saulmon, Botanist
Herbicide Insecticide Branch, BEAD (7503C)

THRU: Art Grube, Senior Economist
Economic Analysis Branch, BEAD (7503C)

Kathy Davis, Branch Chief
Herbicide Insecticide Branch, BEAD (7503C)

TO: Shaja Brothers, RD (7505C)

We have reviewed the clethodim percent crop treated (%CT) data from the registrant and concur with their projections. We consider them to be conservatively high projections of %CT for clethodim at full market potential and appropriate for estimating chronic risk.

In addition, RD has requested the projected %CT for Brussel sprouts and cauliflower. The registrant did not provide these projections but, using the same basic methodology, we have conservatively projected %CT at full market potential for these sites. The methodology used to make these projections and to evaluate the registrants projections is outlined below

Outline of methodology

The registrant based their projected clethodim %CT for the new use sites on the share of each crop that is treated with registered herbicides that control the same pests. They then projected what part of the market they could capture from those products.

To evaluate their projections, we looked at each crop and its available postemergent annual and perennial grass herbicides. In each crop we found sethoxydim to be the most likely herbicide to be replaced by clethodim because of clethodim's ability to control the same grasses. Based on this, we chose sethoxydim as a surrogate to project clethodim's market potential.

Relying on the assumption that clethodim is unlikely to replace more than 100 percent of sethoxydim's market share, we compared the registrants projections of %CT to our estimates of sethoxydim usage on the same crops. See EPA's quantitative usage analysis (QUA) for sethoxydim from June 1, 2000. Each of the registrant's projections of clethodim usage for the four crops were either at or above EPA's estimate of %CT for sethoxydim. Based on this, we concluded that their projections are reasonable and conservative.

For the two crops that the registrant did not project %CT (Brussels sprouts, and cauliflower), we again used sethoxydim as a surrogate to project clethodim's market potential. To insure that our estimates are conservative, we used the maximum value from the sethoxydim QUA. The estimated maximum is at least as large as the highest observed %CT for sethoxydim over the last ten years.

Projected clethodim %CT

Registrants projections	
Broccoli	2%
Cabbage	15%
Onion	25%
Lettuce	2%
EPA projections	
Brussels sprouts	1%
Cauliflower	2%

Attached: Valent's 3/21/01 e-mail - clethodim %CT information

Attachment 3: Chronic Dietary Residue Inputs

Filename: C:\deem\AVM\121011.rs7 Chemical: clethodim
 RfD(Chronic): 0 mg/kg bw/day NOEL(Chronic): 0 mg/kg bw/day
 RfD(Acute): 0 mg/kg bw/day NOEL(Acute): 0 mg/kg bw/day
 Date created/last modified: 04-03-2002/15:42:39/8 Program ver. 7.76

Food Code	Crop Grp	Food Name	Def Res (ppm)	Adj. Factors #1	Adj. Factors #2
203	1CD	Artichokes-jerusalem	1.000000	1.000	1.000
497	9B	Balsam pear	0.500000	1.000	1.000
258	6C	Beans-dry-blackeye peas/cowpea	2.500000	1.000	0.020
249	6C	Beans-dry-broadbeans	2.500000	1.000	0.020
259	6C	Beans-dry-garbanzo/chick pea	2.500000	1.000	0.020
227	6C	Beans-dry-great northern	2.500000	1.000	0.020
256	0	Beans-dry-hyacinth	2.500000	1.000	0.020
228	6C	Beans-dry-kidney	2.500000	1.000	0.020
229	6C	Beans-dry-lima	2.500000	1.000	0.020
230	6C	Beans-dry-navy (pea)	2.500000	1.000	0.020
231	6C	Beans-dry-other	2.500000	1.000	0.020
251	6C	Beans-dry-pigeon beans	2.500000	1.000	0.020
232	6C	Beans-dry-pinto	2.500000	1.000	0.020
323	M	Beef-dried	0.200000	1.920	1.000
324	M	Beef-fat w/o bones	0.200000	1.000	1.000
325	M	Beef-kidney	0.200000	1.000	1.000
327	M	Beef-lean (fat/free) w/o bones	0.200000	1.000	1.000
326	M	Beef-liver	0.200000	1.000	1.000
321	M	Beef-meat byproducts	0.200000	1.000	1.000
322	M	Beef-other organ meats	0.200000	1.000	1.000
197	1AB	Beets-garden-roots	1.000000	1.000	1.000
165	2	Beets-garden-tops(greens)	1.000000	1.000	1.000
152	9B	Bitter melon	0.500000	1.000	1.000
452	5B	Bok choy	3.000000	1.000	1.000
168	5A	Broccoli	3.000000	1.000	0.020
451	5A	Broccoli-chinese	3.000000	1.000	0.020
169	5A	Brussels sprouts	3.000000	1.000	0.010
382	1AB	Burdock	1.000000	1.000	1.000
170	5A	Cabbage-green and red	3.000000	1.000	0.150
383	5B	Cabbage-savoy	3.000000	1.000	1.000
301	0	Canola oil (rape seed oil)	0.500000	1.000	1.000
198	1AB	Carrots	1.000000	1.000	1.000
143	9A	Casabas	2.000000	1.000	1.000
222	1CD	Cassava.(yuca blanca)	1.000000	1.000	1.000
171	5A	Cauliflower	3.000000	1.000	0.020
199	1AB	Celeriac	1.000000	1.000	1.000
166	4B	Celery	0.600000	1.000	1.000
384	4B	Celery juice	0.600000	1.000	1.000
366	P	Chicken-byproducts	0.200000	1.000	1.000
368	P	Chicken-fat w/o bones	0.200000	1.000	1.000
367	P	Chicken-giblets(liver)	0.200000	1.000	1.000
385	P	Chicken-giblets (excl. liver)	0.200000	1.000	1.000
369	P	Chicken-lean/fat free w/o bones	0.200000	1.000	1.000
114	1AB	Chicory	1.000000	1.000	1.000
386	9B	Christophine	0.500000	1.000	1.000
172	5B	Collards	3.000000	1.000	1.000
291	0	Cottonseed-meal	2.000000	1.000	0.030
290	0	Cottonseed-oil	1.000000	1.000	0.030
8	0	Cranberries	0.500000	1.000	1.000
9	0	Cranberries-juice	0.500000	1.100	1.000
389	0	Cranberries-juice-concentrate	0.500000	3.300	1.000
144	9A	Crenshaws	2.000000	1.000	1.000
148	9B	Cucumbers	0.500000	1.000	1.000

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154	8	Eggplant	1.000000	1.000	1.000
364	P	Eggs-white only	0.200000	1.000	1.000
363	P	Eggs-whole	0.200000	1.000	1.000
365	P	Eggs-yolk only	0.200000	1.000	1.000
292	O	Flax seed	0.500000	1.000	1.000
124	1CD	Ginger	1.000000	1.000	1.000
450	1AB	Ginseng	1.000000	1.000	1.000
330	M	Goat-fat w/o bone	0.200000	1.000	1.000
331	M	Goat-kidney	0.200000	1.000	1.000
333	M	Goat-lean (fat/free) w/o bone	0.200000	1.000	1.000
332	M	Goat-liver	0.200000	1.000	1.000
328	M	Goat-meat byproducts	0.200000	1.000	1.000
329	M	Goat-other organ meats	0.200000	1.000	1.000
164	8	Groundcherries	1.000000	1.000	1.000
334	M	Horsemeat	0.200000	1.000	1.000
126	1AB	Horseradish	1.000000	1.000	1.000
174	5B	Kale	3.000000	1.000	1.000
175	5A	Kohlrabi	3.000000	1.000	1.000
176	4A	Lettuce-leafy varieties	2.000000	1.000	0.020
141	9A	Melons-cantaloupes-juice	2.000000	1.000	1.000
142	9A	Melons-cantaloupes-pulp	2.000000	1.000	1.000
145	9A	Melons-honeydew	2.000000	1.000	1.000
146	9A	Melons-persian	2.000000	1.000	1.000
398	D	Milk-based water	0.050000	1.000	1.000
319	D	Milk-fat solids	0.050000	1.000	1.000
318	D	Milk-nonfat solids	0.050000	1.000	1.000
183	5B	Mustard greens	3.000000	1.000	1.000
130	19B	Mustard seed	0.500000	1.000	1.000
397	9B	Okra/chinese (luffa)	0.500000	1.000	1.000
206	3	Onions-dehydrated or dried	0.200000	9.000	0.080
205	3	Onions-dry-bulb (cipollini)	0.200000	1.000	0.080
262	3	Onions-green	2.000000	1.000	1.000
139	8	Paprika	1.000000	1.000	1.000
225	1AB	Parsley roots	1.000000	1.000	1.000
220	1AB	Parsnips	1.000000	1.000	1.000
403	O	Peanuts-butter	3.000000	1.890	0.030
940	O	Peanuts-hulled	3.000000	1.000	0.030
293	O	Peanuts-oil	3.000000	1.000	1.000
310	O	Peppermint	5.000000	1.000	1.000
311	O	Peppermint-oil	5.000000	1.000	1.000
156	8	Peppers-chilli incl jalapeno	1.000000	1.000	1.000
157	8	Peppers-other	1.000000	1.000	1.000
155	8	Peppers-sweet(garden)	1.000000	1.000	1.000
158	8	Pimientos	1.000000	1.000	1.000
344	M	Pork-fat w/o bone	0.200000	1.000	1.000
345	M	Pork-kidney	0.200000	1.000	1.000
347	M	Pork-lean (fat free) w/o bone	0.200000	1.000	1.000
346	M	Pork-liver	0.200000	1.000	1.000
342	M	Pork-meat byproducts	0.200000	1.000	1.000
343	M	Pork-other organ meats	0.200000	1.000	1.000
210	1C	Potatoes/white-dry	2.000000	6.500	1.000
209	1C	Potatoes/white-peeled	1.000000	1.000	1.000
211	1C	Potatoes/white-peel only	1.000000	1.000	1.000
208	1C	Potatoes/white-unspecified	1.000000	1.000	1.000
207	1C	Potatoes/white-whole	1.000000	1.000	1.000
362	P	Poultry-other-fat w/o bones	0.200000	1.000	1.000
361	P	Poultry-other-giblets(liver)	0.200000	1.000	1.000
360	P	Poultry-other-lean (fat free) w/	0.200000	1.000	1.000
149	9B	Pumpkin	0.500000	1.000	1.000
407	1AB	Radishes-japanese (daiken)	1.000000	1.000	1.000
212	1AB	Radishes-roots	1.000000	1.000	1.000
213	2	Radishes-tops	0.700000	1.000	1.000
185	4B	Rhubarb	0.600000	1.000	1.000
214	1AB	Rutabagas-roots	1.000000	1.000	1.000
215	2	Rutabagas-tops	1.000000	1.000	1.000
216	1AB	Salsify(oyster plant)	1.000000	1.000	1.000

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338	M	Sheep-fat w/o bone	0.200000	1.000	1.000
339	M	Sheep-kidney	0.200000	1.000	1.000
341	M	Sheep-lean (fat free) w/o bone	0.200000	1.000	1.000
340	M	Sheep-liver	0.200000	1.000	1.000
336	M	Sheep-meat byproducts	0.200000	1.000	1.000
337	M	Sheep-other organ meats	0.200000	1.000	1.000
307	6A	Soybeans-flour (defatted)	10.000000	1.000	0.040
306	6A	Soybeans-flour (low fat)	10.000000	1.000	0.040
305	6A	Soybeans-flour (full fat)	10.000000	1.000	0.040
304	6A	Soybeans-mature seeds dry	10.000000	1.000	0.040
297	6A	Soybeans-oil	10.000000	1.000	0.040
482	0	Soybeans-protein isolate	10.000000	1.000	0.040
255	6A	Soybeans-sprouted seeds	10.000000	0.330	0.040
312	0	Spearmint	5.000000	1.000	1.000
313	0	Spearmint-oil	5.000000	1.000	1.000
186	4A	Spinach	2.000000	1.000	1.000
150	9B	Squash-summer	0.500000	1.000	1.000
415	9B	Squash-spaghetti	0.500000	1.000	1.000
151	9B	Squash-winter	0.500000	1.000	1.000
17	0	Strawberries	5.000000	1.000	1.000
416	0	Strawberries-juice	3.000000	1.000	1.000
282	1A	Sugar-beet	0.200000	1.000	0.150
379	1A	Sugar-beet-molasses	1.000000	1.000	0.150
298	0	Sunflower-oil	5.000000	1.000	1.000
417	0	Sunflower-seeds	5.000000	1.000	1.000
218	1CD	Sweet potatoes (incl yams)	1.000000	1.000	1.000
418	2	Sweet potatoes-leaves	1.000000	1.000	1.000
187	4B	Swiss chard	0.600000	1.000	1.000
201	1CD	Taro-root	1.000000	1.000	1.000
190	2	Taro-greens	1.000000	1.000	1.000
163	8	Tomatoes-catsup	3.000000	1.000	0.010
423	8	Tomatoes-dried	1.000000	14.300	0.010
160	8	Tomatoes-juice	3.000000	1.000	0.010
162	8	Tomatoes-paste	3.000000	1.000	0.010
161	8	Tomatoes-puree	2.000000	1.000	0.010
159	8	Tomatoes-whole	1.000000	1.000	0.010
355	P	Turkey-byproducts	0.200000	1.000	1.000
357	P	Turkey-fat w/o bones	0.200000	1.000	1.000
356	P	Turkey-giblets (liver)	0.200000	1.000	1.000
358	P	Turkey-lean/fat free w/o bones	0.200000	1.000	1.000
449	P	Turkey-other organ meats	0.200000	1.000	1.000
137	1CD	Turmeric	1.000000	1.000	1.000
219	1AB	Turnips-roots	1.000000	1.000	1.000
188	2	Turnips-tops	1.000000	1.000	1.000
147	9A	Watermelon	2.000000	1.000	1.000
436	9A	Watermelon-juice	2.000000	1.000	1.000
439	9B	Wintermelon	0.500000	1.000	1.000
221	1CD	Yambean tuber (jicama)	1.000000	1.000	1.000
224	1CD	Yautia (tannier)	1.000000	1.000	1.000

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Attachment 4: Chronic Dietary Exposure Estimates

U.S. Environmental Protection Agency
 DEEM Chronic analysis for CLETHODIM
 Residue file name: C:\deem\AVM\121011.rs7
 Analysis Date 04-03-2002/15:43:28
 Reference dose (RfD, Chronic) = .01 mg/kg bw/day

Ver. 7.76
 (1989-92 data)
 Adjustment factor #2 used.
 Residue file dated: 04-03-2002/15:42:39/8

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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)	0.003053	30.5%
U.S. Population (spring season)	0.003211	32.1%
U.S. Population (summer season)	0.003282	32.8%
U.S. Population (autumn season)	0.002826	28.3%
U.S. Population (winter season)	0.002893	28.9%
Northeast region	0.003242	32.4%
Midwest region	0.003137	31.4%
Southern region	0.002931	29.3%
Western region	0.002969	29.7%
Hispanics	0.002804	28.0%
Non-hispanic whites	0.002998	30.0%
Non-hispanic blacks	0.003390	33.9%
Non-hisp/non-white/non-black	0.003954	39.5%
All infants (< 1 year)	0.004446	44.5%
Nursing infants	0.000892	8.9%
Non-nursing infants	0.005941	59.4%
Children 1-6 yrs	0.006184	61.8%
Children 7-12 yrs	0.004355	43.5%
Females 13-19 (not preg or nursing)	0.002556	25.6%
Females 20+ (not preg or nursing)	0.002450	24.5%
Females 13-50 yrs	0.002377	23.8%
Females 13+ (preg/not nursing)	0.002581	25.8%
Females 13+ (nursing)	0.003189	31.9%
Males 13-19 yrs	0.003015	30.2%
Males 20+ yrs	0.002470	24.7%
Seniors 55+	0.002705	27.0%
Pacific Region	0.002922	29.2%

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