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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

DATE: May 3, 1999

SUBJECT: Captan (081301). Reregistration Case No 0120.
Tier 3 (Monte Carlo) Acute Dietary Exposure Estimates for Captan.
MRID 44737601. DP Barcode D252405.

FROM: Sheila Piper, Chemist *Sheila Piper*
Chemistry & Exposure Branch 1
Health Effects Division (7509C)

THROUGH: Francis B. Suhre, Branch Senior Scientist *F. B. Suhre*
Chemistry & Exposure Branch 1
Health Effects Division (7509C)

TO: Ray Kent, Branch Chief
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Health Effects Division (7509C)

Action Requested

HED was requested to review and revise, as required, an acute probabilistic risk assessment for captan. The assessment was prepared by Novigen Sciences under the direction of the Captan Stewardship Task Force (CSTF), Makhteshim-Agan and Tomen Agro. This submission was prompted by a Tier 1 acute dietary risk assessment previously completed by HED (J. Wintersteen, 11/10/94) which resulted in an estimated acute risk above the Agency level of concern (>100% aRfD).

Executive Summary

The submitted acute probabilistic risk assessment (MRID 44737601) was prepared by Novigen Sciences under the direction of the Captan Stewardship Task Force (CSTF), Makhteshim-Agan and Tomen Agro. Revisions made by HED to the Novigen derived risk assessment are described in the body of this review and are incorporated into the attachments to this review.

Uses currently supported by the CSTF were included in the assessment (C.Olinger, D225245, 7/25/96). Captan residues in food items were estimated by calculating acute anticipated residues (S.Funk, D207075 and D207149, 9/22/94) from residue field trials, USDA and FDA pesticide monitoring data, and reduction/concentration factors when available. Percent crop treated data were obtained from BEAD (J.Faulkner, 2/10/99). The Dietary Exposure Evaluation Model (DEEM™) using consumption data from the USDA CSFII, 1989-92 and a no observable adverse effect level (NOAEL) from a rabbit developmental toxicity study (HIARC Document, 10/0/97) was used to estimate a distribution of acute dietary risk for females 13⁺. Based on this analysis, the acute dietary exposure for females 13⁺ at the 99.9th percentile of exposure (population adjusted dose) is **below the Agency's level of concern** (<100% PAD).

Toxicological Endpoint Selection

Acute dietary risk is expressed as a ratio of single day, oral exposure, and a no observable adverse effect level (NOAEL). For captan, a NOAEL of 10 mg/kg BW/day was selected by the HED Hazard Identification Assessment Review Committee (HIARC) from a rabbit developmental toxicity study resulting in increased skeletal effects observed at a LOAEL of 30 mg/kg/day by oral gavage. According to the HIARC, this endpoint is appropriate for assessing acute dietary exposure for females 13⁺ years, only. No endpoint was identified for other subpopulations (See HIARC Document, 10/9/97). Based on an uncertainty factor of 100x, the acute RfD is 0.1 mg/kg/day.

The HED FQPA Safety Factor Committee determined that the additional 10X factor for infants and children should be removed (See FQPA Document, 4/14/98), therefore, the population adjusted dose (PAD, or RfD adjusted using an FQPA factor) is 0.1 mg/kg/day.

It should be noted that CSTF concluded that a NOAEL of 112.5 mg/kg bw/day from an acute oral toxicity study in mice is an appropriate endpoint for estimating acute dietary risk to the US general population, infants, and children. Based on the HIARC recommendation (see above), HED limited the revised acute probabilistic dietary risk assessment described in this review to females 13⁺.

Consumption Database

Novigen Sciences, Inc. estimated the acute probabilistic dietary risk to captan using the Dietary Exposure Evaluation Model (DEEM™) software and consumption data from USDA Continuing Survey of Food Intake by Individuals (CSFII), 1994-1996. HED revised the assessment by using DEEM™ software and consumption data from USDA CSFII 1989-92.

Residue Information

Tolerances for captan residues in plant commodities are currently expressed in terms of captan (N-trichloromethylthio-4-cyclohexene-1,2-dicarboximide) per se [40 CFR 180.103]. Tolerances in animal tissues are expressed as captan and its metabolite 1,2,3,6-tetrahydrophthalimide (THPI).

Food Crops

CSTF is currently supporting the use of captan as a pre- or post-harvest treatment on almonds, apples, apricots, blueberries, cherries, dewberries, grapes, nectarines, peaches, pears, plums, raspberries, and strawberries (C.Olinger, D225245; 7/26/96).

For non-blended food items, Novigen used residue from field trials previously reviewed by HED (S.Funk, D207075 and D207149, 9/22/94). A listing of crops, source of data, residue values, and the latest percent crop treated data is presented in Table 1.

Food Item	Acute Residue Data Source ¹	Number of Samples	% Crop Treated ²	Monte Carlo Distribution ³
Almonds	Field Trial (MRID 40189802)	n=6 <0.05 <0.05 0.09 <0.05 0.10 <0.05	26	Total n= 6 Total z= 17

Table 1: Residue Data Used to Determine a Tier III Monte Carlo Assessment for Captan in Plant Commodities.						
Food Item	Acute Residue Data Source ¹	Number of Samples			% Crop Treated ²	Monte Carlo Distribution ³
Apples	Field Trial Data (MRIDs 00128355, 40189803, 40745403)	n=51			66	Total nz= 51 Total z= 26
		3.2	4	2.4		
		5.62	1.5	2.16		
		2.65	3.3	1.2		
		5.1	1.9	3.4		
		4.9	2.8	0.86		
		2.8	3.33	5.49		
		2.18	4.79	2.22		
		2.3	7.7	3.29		
		6.12	1.4	5.2		
		4.03	5.7	3.9		
		4	15.8	0.74		
		0.31	5.04	3.46		
		2.5	5.06	3.67		
		2.84	7	5.5		
2.8	0.41	3.8				
4.79	5.9	4.7				
3.61	7.74	0.42				
Apricots	Field Trial Data (MRID 40189805)	n=6			42	Total nz= 6 Total z= 8
		4.44	5.28			
		4.52	5			
6.6	6.75					
Blueberries	Field Trial Data (MRID 41039101)	n=8			69	Total nz= 8 Total z= 4
		8.25	4.8			
		1.72	10.8			
		4	8.4			
8.2	18.3					
Cherries	Field Trial Data (MRIDs 00128355, 40189808)	n=21			44	Total nz= 21 Total z= 27
		13.03	15			
		14.4	5.48			
		22.6	10.4			
		21.28	14.2			
		9.9	19			
		3.8	35.4			
		12.25	20.8			
		10.6	13			
		14.3	17.4			
20	2.1					
11.9						

Table 1: Residue Data Used to Determine a Tier III Monte Carlo Assessment for Captan in Plant Commodities.					
Food Item	Acute Residue Data Source ¹	Number of Samples		% Crop Treated ²	Monte Carlo Distribution ³
Grapes	Field Trial Data (MRIDs 00128355, 40189811, 40745405)	n=23		12	Total nz= 23 Total z= 169
		2.6	22.4		
		1.3	6.44		
		1.3	7.96		
		10.6	7.4		
		10.9	6.4		
		3.92	8.36		
		11.1	5.8		
		8.1	4.8		
		2.18	8		
		10.9	3.68		
		7.2	0.93		
		2.1			
Nectarines	Field Trial Data (MRID 40189813)	n=6		27	Total nz= 6 Total z= 16
		2.24	1.52		
		1.26	1.6		
		3.9	2.84		
Peaches	Field Trial Data (MRIDs 40189814, 40745406, 40745407)	n=25		56	Total nz= 25 Total z= 20
		9.9	7.44		
		5.56	2.58		
		10.6	2.52		
		2.88	3.4		
		13.6	8.3		
		6	4.34		
		12.3	1.44		
		10.7	6.85		
		4.28	5.84		
		11.6	2.02		
		2.88	6.15		
		0.8	2.98		
		3.56			
Pears	Field Trial Data (MRID 40189815)	n=8		5	Total nz= 8 Total z= 152
		4.72	3.04		
		11.4	10.8		
		11.4	2.6		
		2.88	6.1		
Plums	Field Trial Data (MRIDs 00128355, 40189816)	n=8		25	Total nz= 8 Total z= 24
		7.9	0.52		
		0.16	0.42		
		0.6	0.68		
		3.48	5.6		

Table 1: Residue Data Used to Determine a Tier III Monte Carlo Assessment for Captan in Plant Commodities.				
Food Item	Acute Residue Data Source ¹	Number of Samples	% Crop Treated ²	Monte Carlo Distribution ³
Raspberries (Also translated to dewberries)	Field Trial Data (MRIDs 42712801, 43086601)	n=12 6.7 38.33 12 13 7.2 17 12 14 20 16 13 13	68	Total nz= 12 Total z= 6
Strawberries	Field Trial Data (MRIDs 00128355, 40189822, 40745408)	n=26 27 1.04 2 11.5 4.36 2.96 13.2 12.9 13 5.36 1.46 7.2 0.84 8.9 8.85 4.76 5.82 7.7 2.56 6.4 0.6 1.58 11.8 3.58 3.86 15	89	Total nz= 26 Total z= 3
¹ Residue values distributions or the mean value for blended commodities. ² BEAD supplied the estimate of percent crop treated (2/10/99). ³ Total nz=non-zero; Total z= zero				

For blended/processed commodities, Novigen used mean residue values from field trials or monitoring data (USDA and FDA) and processing factors to estimate residues in food items. FDA and PDP monitoring data for parent and/or THPI are available for apricots, cherries, grapes, peaches, pears and apple juice. For blended commodities, a mean residue value was calculated and adjusted for percent crop treated. Samples reported as non-detects were assigned half the LOD for that portion of the crop which was treated, and zero for that portion of the crop that was not treated. These data along with appropriate dilution factors (0.041 from apple juice study) were used to estimate juice residues. HED has revised the following blended/processed commodities to incorporate the latest percent crop treated data. A listing of the commodity, data source, number of samples, number of detects, range of residue values, and the mean residue for blended/processed commodities is presented in Table 2.

Table 2: Anticipated Residues for Captan and/or THPI Derived from Monitoring Data

Commodity	Data Source	Number of Samples	Number of Detects	Range of Residues (ppm)	Mean Residue Value (ppm)*
Apple juice	PDP, 1996	143	7	0.01- 0.068	NA
Apricots	FDA, 1992-96	132	59	0.01- 6.10	0.547
Cherries	FDA, 1992-96	312	43	0.006- 4.70	0.075
Grapes	PDP, 1994-96	1874	681	0.1- 2.80	0.015
Peaches	PDP, 1994-96	1083	136	0.01- 1.50	0.020
Pears	FDA, 1992-96	182	6	0.02- 0.896	0.011
NA= Not applicable. Used entire distribution					
* For each commodity the mean residue values were used for each juice.					

Processing studies were available for apples, grapes, plums and strawberries. Processing factors were calculated based on parent captan residues. Average processing factors for each processed commodity were calculated for use in the acute assessment. A listing of the commodity, data source, processed commodity, and average processing factor is presented in Table 3.

Food Item (Data Source)	Processed Commodity	Average Processing Factor
Apple (MRIDs 40189804, 42296003)	Juice	0.041
	Washed Fruit	0.49
	Applesauce/Canned Slices	0.08
Grapes (MRIDs 00159601, 00162037, 42563101, 40189812)	Juice	0.043
	Washed Fruit	0.48
	Raisins, washed	0.45
Plums (MRID 40189817)	Prunes	0.13
Strawberries (MRID 00159607)	Washed Fruit	0.10
	Washed/Cooked fruit	0.001

Meat

Potential transfer of pesticide residues from treated feed items to meat is estimated by calculating a livestock dietary burden and conducting livestock feed studies at the appropriate dose level. For captan, HED has previously estimated a dietary burden to cattle, reviewed appropriate livestock feeding studies, and has reassessed livestock tolerances (C.Olinger, D178351 and D183051, 5/17/94).

It is noted that the livestock dietary burden calculated by Novigen for the submitted acute dietary assessment of captan does not agree with that calculated by HED. Novigen used almond hulls (59.56 ppm x 10% in diet) and wet apple pomace (3.35 ppm x 40% in diet) to estimate a maximum dietary burden of 7.30 ppm and estimated residues transfer in beef fat (0.005 ppm), muscle and kidney (0.08 ppm), and liver (0.04 ppm).

HED considers this dietary burden to be inappropriately calculated. HED agrees that grape pomace and raisin waste no longer need to be considered in livestock diets. However, Novigen used 3.35 ppm to reflect the livestock dietary burden from wet apple pomace, whereas, HED considers the highest average field trail (HAFT) residue of 15.9 ppm for apples to be the appropriate value to calculate a livestock dietary burden. HED estimated captan dietary burden for dairy cattle and beef cattle are 17.27 ppm and 27.72 ppm, respectively, as shown in Table 4a.

Table 4a: Estimated Dietary Burden for Determining Acute Risk

Commodity	Captan + THPI (ppm)	% in Diet		% Dry Matter	Maximum Theoretical Dietary Burden, ppm	
		Dairy	Beef		Dairy	Beef
Almond Hulls	60 ¹	10	10	90	6.67	6.67
Apple Pomace, wet	20.8 ²	20	40	40	10.40	20.80
RAC's from seed treatment (grass, corn, cottonseed, small grain etc.)	0.1 ³	40	50	20 ⁴	0.20	0.25
TOTAL		70	100		17.27	27.72

¹ The maximum residue found at a 1x rate in field trial for almond hulls was 60 ppm captan + THPI.
² The maximum residue found at a 1x rate in field trial for apples was 15.9 ppm captan + THPI. Apple pomace: 20.8 (16 x 1.3 avg. conc. factor for captan + THPI)
³ Limit of detection for THPI plus limit of detection for captan, 0.05 ppm + 0.05 ppm.
⁴ Maximizes residue. 20% is the percent dry matter for potato culls. Other rac's typically have higher percents dry matter.

A 29-day dairy cattle feeding study using THPI and calculating the total equivalent of captan was previously reviewed by HED (C.Olinger, D178351 and D183051, 5/17/94). Based on the feed consumption levels the actual dose levels were 9.0, 31.2, and 101.4 ppm. Using the results of the

30 ppm cow feeding study, the following concentrations of THPI are anticipated in the animal commodities: fat, 0.17 ppm; kidney, 0.38 ppm; liver, 0.31 pm; and muscle, 0.27 ppm (See Table 4b). No adjustment for percent of the feed crops treated were made in this assessment.

Table 4b: Summary of captan residues in cattle tissue commodities.

Feeding Levels (ppm)	Kidney (ppm)	Liver (ppm)	Fat (ppm)	Muscle (ppm)	Milk (ppm)
9.0	0.08	0.04	ND	0.08	0.04
31.2	0.38	0.31	0.17	0.27	0.17
101.4	1.11	0.82	0.89	0.88	0.89

Note: CBRS recommends the following tolerance levels for cattle, goat, sheep, horses, and hogs: meat, 0.3 ppm; meat by-products, 0.40 ppm; fat, 0.25 ppm; and milk, 0.15 ppm.

Milk

The registrant reported results from the Captan National Milk Survey and no residues above the sensitivity of the analytical method were observed for any of the analytes (M. Clifford, D201720). A total of 224 samples of milk were collected from 01/91 to 12/91 at grocery and convenience stores throughout the US and were analyzed for captan and THPI. As a conservative estimate of residue levels in milk, half the LOQ of 0.005 ppm was assumed and a residue level of 0.0025 ppm was used in the acute analyses. HED agrees that 0.0025 ppm is an appropriate residue level for milk. No adjustment for the percent of the crop treated was made in the assessment.

Seed Treatment

Novigen excluded seed treatment in their acute dietary exposure analysis, because detectable residues are not expected in the edible portion of crops grown from captan treated seed. HED does not agree with this conclusion and will revise the Novigen assessment by including seed treatments assuming residues at ½ LODs for captan + THPI (0.025 + 0.025= 0.05 ppm). Seed treatment field trials (beets, corn, oats, potatoes, rice, soybeans, spinach, and wheat) have shown nonquantifiable residues (<0.05ppm captan; <0.05 ppm THPI) in/on the rac's (S.Funk, D207075 and D207149, 9/22/94) and HED reassessed tolerances of 0.05 ppm for residues of the fungicide captan, per se, for seed treatment (C.Olinger, D2225245, 7/26/96) use on the following rac's:

- * Brassica Leafy Vegetables
- * Bulb Vegetables
- * Cereal Grains
- * Cucurbit Vegetables
- * Dill, seed
- * Foliage of Legume Veg.
- * Flax, seed/straw
- * Non-grass animal feeds (forage, fodder, straw)
- * Fruiting Vegetables
- * Grasses (forage/hay)
- * Leafy Vegetables(except Brassica)
- * Leaves of Root and Tuber
- * Legume Vegetables (succulent/dried)
- * Okra
- * Peanuts, hay
- * Rape, seed/forage/greens
- * Root and Tuber Vegetables
- * Safflower seed
- * Sesame seeds
- * Sunflower, seeds/forage

Percent Crop Treated

The Novigen assessment incorporated percent crop treated (%CT) information into their acute risk assessment obtained from BEAD (Biological Exposure Assessment Division, 3/31/94) and CSTF, giving priority to the CSTF data.

HED notes a significant difference in the %CT data used by Novigen and the latest values reported by BEAD (J.Faulkner, 2/10/99). HED will revise the Novigen acute probabilistic dietary assessment using the estimated maximum values provided by BEAD as shown in Table 5.

Table 5: Summary of %CT Data for Captan.

Commodity	EPA (%) 1994	EPA (%) 1999	CSTF (%)
Almonds	10	26	6
Apples	55	66	8
Apricots	5	42	2
Blueberries	50	69	50
Cherries	45	44	17
Dewberries	100	100	100
Grapes	35	12	2
Nectarines	100	27	100
Peaches	65	56	26
Pears	15	5	15
Plums	15	25	9
Raspberries	50	68	50
Strawberries	95	89	44

Results

Results of HED's acute dietary risk assessment for captan using the latest percent crop treated, revised anticipated residues, averages residues from field trial data and/or monitoring data, and residue reduction/concentration upon processing, are shown below.

Table 6: Acute dietary risk for captan from the RACs and seed treatments that are registered for captan. Per-capita consumption.

Subgroups	95 th Percentile		99 th Percentile		99.9 th Percentile	
	Exposure	%aPAD	Exposure	%aPAD	Exposure	%aPAD
Females (13 ⁺ /preg/not nursing)	0.006218	6.22	0.013286	13.29	0.037044	37.04
Females (13 ⁺ /nursing)	0.008277	8.28	0.029246	29.25	0.065830	65.83
Females (13-19yrs/not preg/ nursing)	0.004246	4.25	0.012764	12.76	0.045750	45.75
Females 13-50 yrs	0.004845	4.84	0.013148	13.15	0.036193	36.19

Conclusion

The acute probabilistic dietary risk for captan is **below the Agency's level of concern** (% Population Adjusted Dose <100%) for the Females 13⁺ subgroups at the 99.9th percentile of exposure.

Attachment 1: Acute Residue Information.

Attachment 2: Acute DEEM™ Analysis (S.Piper, 5/3/99)

Attachment 3: Acute Residue Distribution Files

cc: D.Hrdy (RRB2), K.Rothwell (SRRD), L.Richardson (CEB1), S.Piper, RF, SF.
 RDI: Dietary Exposure SAC: 4/29/99: FBSuhre: 5/3/99
 7509C: CEB1: CM-2: Rm 810F: 308-2717: Captan

ATTACHMENT 1: Acute Residue Information

U.S. Environmental Protection Agency
 DEEM Acute analysis for CAPTAN
 Residue file name: C:\deem\captanr.R96
 Analysis Date 05-03-1999
 Reference dose: aRfD = 0.1 mg/kg bw/day NOEL = 10 mg/kg bw/day
 Comment: Including Seed Treatment

Ver. 6.73
 1989-92 data
 Adjust. #2 used

Residue file dated: 05-03-1999/08:45:00/8

RDF indices and file names for Monte Carlo Analysis

- 1 C:\deem\081301\Apple.rdf
- 2 C:\deem\081301\Apricot.rdf
- 3 C:\deem\081301\Bluebry.rdf
- 4 C:\deem\081301\Cherry.rdf
- 5 C:\deem\081301\Dewberr.rdf
- 6 C:\deem\081301\grapes.rdf
- 7 C:\deem\081301\Nectar.rdf
- 8 C:\deem\081301\Peach.rdf
- 9 C:\deem\081301\Pears.rdf
- 10 C:\deem\081301\Plums.rdf
- 11 C:\deem\081301\Strawber.rdf
- 12 C:\deem\081301\Raspberr.rdf
- 13 C:\deem\081301\PDAppJC.rdf
- 14 C:\deem\081301\almond.rdf

Food Crop	RESIDUE	RDF	Adj. Factors Code	
Grp Food Name	(ppm)	#	#1	#2
3 13A Dewberries	38.330002	5	0.100	1.000
5 13A Raspberries				
11-Uncooked	38.330002	12	0.100	1.000
13-Baked	38.330002	12	0.001	1.000
14-Boiled	38.330002	12	0.001	1.000
31-Canned: NFS	38.330002	12	0.001	1.000
34-Canned: Boiled	38.330002	12	0.001	1.000
41-Frozen: NFS	38.330002	12	0.100	1.000
7 13B Blueberries				
11-Uncooked	18.299999	3	0.100	1.000
12-Cooked: NFS	18.299999	3	0.001	1.000
13-Baked	18.299999	3	0.001	1.000
14-Boiled	18.299999	3	0.001	1.000
15-Fried	18.299999	3	0.001	1.000
31-Canned: NFS	18.299999	3	0.001	1.000
41-Frozen: NFS	18.299999	3	0.100	1.000
13 0 Grapes				
11-Uncooked	22.400000	6	0.480	1.000
12-Cooked: NFS	22.400000	6	0.001	1.000
31-Canned: NFS	22.400000	6	0.001	1.000
41-Frozen: NFS	22.400000	6	0.480	1.000
14 0 Grapes-raisins	22.400000	6	0.450	1.000
15 0 Grapes-juice	0.015000	0	0.043	1.000
17 0 Strawberries				
11-Uncooked	27.000000	11	0.100	1.000
12-Cooked: NFS	27.000000	11	0.001	1.000
13-Baked	27.000000	11	0.001	1.000
14-Boiled	27.000000	11	0.001	1.000
31-Canned: NFS	27.000000	11	0.001	1.000
34-Canned: Boiled	27.000000	11	0.001	1.000
41-Frozen: NFS	27.000000	11	0.100	1.000
40 14 Almonds	0.100000	14	1.000	1.000
52 11 Apples				
11-Uncooked	15.800000	1	0.490	1.000
12-Cooked: NFS	15.800000	1	0.080	1.000
13-Baked	15.800000	1	0.080	1.000
14-Boiled	15.800000	1	0.080	1.000
15-Fried	15.800000	1	0.080	1.000
18-Dried	15.800000	1	8.000	1.000

		31-Canned: NFS	15.800000	1	0.080	1.000
		32-Canned: Cooked	15.800000	1	0.080	1.000
		33-Canned: Baked	15.800000	1	0.080	1.000
		34-Canned: Boiled	15.800000	1	0.080	1.000
		42-Frozen: Cooked	15.800000	1	0.080	1.000
53	11	Apples-dried	15.800000	1	0.490	1.000
54	11	Apples-juice/cider	0.068000	13	0.041	1.000
56	11	Pears				
		11-Uncooked	11.400000	9	0.490	1.000
		12-Cooked: NFS	11.400000	9	0.080	1.000
		13-Baked	11.400000	9	0.080	1.000
		14-Boiled	11.400000	9	0.080	1.000
		31-Canned: NFS	11.400000	9	0.080	1.000
57	11	Pears-dried	11.400000	9	6.250	1.000
59	12	Apricots	6.750000	2	1.000	1.000
60	12	Apricots-dried	6.750000	2	6.000	1.000
61	12	Cherries	35.400002	4	1.000	1.000
62	12	Cherries-dried	35.400002	4	4.000	1.000
63	12	Cherries-juice	0.075000	0	0.041	1.000
64	12	Nectarines	3.900000	7	1.000	1.000
65	12	Peaches	13.600000	8	1.000	1.000
66	12	Peaches-dried	13.600000	8	7.000	1.000
67	12	Plums (damsons)	7.900000	10	1.000	1.000
68	12	Plums-prunes (dried)	7.900000	10	0.130	0.250
69	12	Plums/prune-juice	2.420000	0	0.041	0.250
130	19B	Mustard seed	0.050000	0	1.000	1.000
147	9A	Watermelon	0.050000	0	1.000	1.000
148	9B	Cucumbers	0.050000	0	1.000	1.000
149	9B	Pumpkin	0.050000	0	1.000	1.000
150	9B	Squash-summer	0.050000	0	1.000	1.000
151	9B	Squash-winter	0.050000	0	1.000	1.000
154	8	Eggplant	0.050000	0	1.000	1.000
155	8	Peppers-sweet(garden)	0.050000	0	1.000	1.000
156	8	Peppers-chilli incl jalapeno	0.050000	0	1.000	1.000
157	8	Peppers-othor	0.050000	0	1.000	1.000
159	8	Tomatoes-whole	0.050000	0	1.000	1.000
160	8	Tomatoes-juice	0.050000	0	1.500	1.000
161	8	Tomatoes-puree	0.050000	0	3.300	1.000
162	8	Tomatoes-paste	0.050000	0	5.400	1.000
165	2	Beets-garden-tops(greens)	0.050000	0	1.000	1.000
168	5A	Broccoli	0.050000	0	1.000	1.000
169	5A	Brussels sprouts	0.050000	0	1.000	1.000
170	5A	Cabbage-green and red	0.050000	0	1.000	1.000
171	5A	Cauliflower	0.050000	0	1.000	1.000
172	5B	Collards	0.050000	0	1.000	1.000
174	5B	Kale	0.050000	0	1.000	1.000
176	4A	Lettuce-leafy varieties	0.050000	0	1.000	1.000
182	4A	Lettuce-unspecified	0.050000	0	1.000	1.000
187	4A	Swiss chard	0.050000	0	1.000	1.000
188	2	Turnips-tops	0.050000	0	1.000	1.000
192	4A	Lettuce-head varieties	0.050000	0	1.000	1.000
197	1AB	Beets-garden-roots	0.050000	0	1.000	1.000
198	1AB	Carrots	0.050000	0	1.000	1.000
205	3	Onions-dry-bulb (cipollini)	0.050000	0	1.000	1.000
206	3	Onions-dehydrated or dried	0.050000	0	9.000	1.000
208	1C	Potatoes/white-unspecified	0.050000	0	1.000	1.000
209	1C	Potatoes/white-peeled	0.050000	0	1.000	1.000
210	1C	Potatoes/white-dry	0.050000	0	6.500	1.000
211	1C	Potatoes/white-peel only	0.050000	0	1.000	1.000
212	1AB	Radishes-roots	0.050000	0	1.000	1.000
213	2	Radishes-tops	0.050000	0	1.000	1.000
214	1AB	Rutabagas-roots	0.050000	0	1.000	1.000
215	2	Rutabagas-tops	0.050000	0	1.000	1.000
217	3	Shallots	0.050000	0	1.000	1.000
219	1AB	Turnips-roots	0.050000	0	1.000	1.000
227	6C	Beans-dry-great northern	0.050000	0	1.000	1.000
228	6C	Beans-dry-kidney	0.050000	0	1.000	1.000
229	6C	Beans-dry-lima	0.050000	0	1.000	1.000

230 6C	Beans-dry-navy (pea)	0.050000	0	1.000	1.000
231 6C	Beans-dry-other	0.050000	0	1.000	1.000
232 6C	Beans-dry-pinto	0.050000	0	1.000	1.000
233 6B	Beans-succulent-lima	0.050000	0	1.000	1.000
234 6A	Beans-succulent-green	0.050000	0	1.000	1.000
235 6A	Beans-succulent-other	0.050000	0	1.000	1.000
236 6A	Beans-succulent-yellow/wax	0.050000	0	1.000	1.000
237 15	Corn/pop	0.050000	0	1.000	1.000
238 15	Corn/sweet	0.050000	0	1.000	1.000
240 6C	Peas (garden)-dry	0.050000	0	1.000	1.000
241 6AB	Peas (garden)-green	0.050000	0	1.000	1.000
243 6C	Lentils	0.050000	0	1.000	1.000
245 0	Okra	0.050000	0	1.000	1.000
248 0	Alfalfa sprouts	0.050000	0	1.000	1.000
249 6C	Beans-dry-broadbeans	0.050000	0	1.000	1.000
250 6B	Beans-succulent-broadbeans	0.050000	0	1.000	1.000
251 6C	Beans-dry-pigeon beans	0.050000	0	1.000	1.000
253 6	Beans-unspecified	0.050000	0	1.000	1.000
255 6A	Soybeans-sprouted seeds	0.050000	0	0.330	1.000
256 6C	Beans-dry-hyacinth	0.050000	0	1.000	1.000
257 6	Beans-succulent-hyacinth	0.050000	0	1.000	1.000
258 6C	Beans-dry-blackeye peas/cowpea	0.050000	0	1.000	1.000
259 6C	Beans-dry-garbanzo/chick pea	0.050000	0	1.000	1.000
262 3	Onions-green	0.050000	0	1.000	1.000
265 15	Barley	0.050000	0	1.000	1.000
266 15	Corn grain-endosperm	0.050000	0	1.000	1.000
267 15	Corn grain-bran	0.050000	0	1.000	1.000
268 15	Corn grain/sugar/hfcs	0.050000	0	1.500	1.000
275 15	Sorghum (including milo)	0.050000	0	1.000	1.000
289 15	Corn grain-oil	0.050000	0	1.000	1.000
290 0	Cottonseed-oil	0.050000	0	1.000	1.000
291 0	Cottonseed-meal	0.050000	0	1.000	1.000
292 0	Flax seed	0.050000	0	1.000	1.000
293 0	Peanuts-oil	0.050000	0	1.000	1.000
294 0	Safflower-seed	0.050000	0	1.000	1.000
303 6A	Soybean-other	0.050000	0	1.000	1.000
304 6A	Soybeans-mature seeds dry	0.050000	0	1.000	1.000
315 0	Grapes-wine and sherry	0.015000	0	1.000	1.000
318 D	Milk-nonfat solids	0.002500	0	1.000	1.000
319 D	Milk-fat solids	0.002500	0	1.000	1.000
320 D	Milk sugar (lactose)	0.002500	0	1.000	1.000
321 M	Beef-meat byproducts	0.380000	0	1.000	1.000
322 M	Beef-other organ meats	0.380000	0	1.000	1.000
323 M	Beef-dried	0.380000	0	1.920	1.000
324 M	Beef-fat w/o bones	0.170000	0	1.000	1.000
325 M	Beef-kidney	0.380000	0	1.000	1.000
326 M	Beef-liver	0.310000	0	1.000	1.000
327 M	Beef-lean (fat/free) w/o bones	0.380000	0	1.000	1.000
328 M	Goat-meat byproducts	0.380000	0	1.000	1.000
329 M	Goat-other organ meats	0.380000	0	1.000	1.000
330 M	Goat-fat w/o bone	0.170000	0	1.000	1.000
331 M	Goat-kidney	0.380000	0	1.000	1.000
332 M	Goat-liver	0.310000	0	1.000	1.000
333 M	Goat-lean (fat/free) w/o bone	0.270000	0	1.000	1.000
336 M	Sheep-meat byproducts	0.380000	0	1.000	1.000
337 M	Sheep-other organ meats	0.380000	0	1.000	1.000
338 M	Sheep-fat w/o bone	0.170000	0	1.000	1.000
339 M	Sheep-kidney	0.380000	0	1.000	1.000
340 M	Sheep-liver	0.310000	0	1.000	1.000
341 M	Sheep-lean (fat free) w/o bone	0.270000	0	1.000	1.000
342 M	Pork-meat byproducts	0.380000	0	1.000	1.000
343 M	Pork-other organ meats	0.380000	0	1.000	1.000
344 M	Pork-fat w/o bone	0.170000	0	1.000	1.000
345 M	Pork-kidney	0.380000	0	1.000	1.000
346 M	Pork-liver	0.310000	0	1.000	1.000
347 M	Pork-lean (fat free) w/o bone	0.270000	0	1.000	1.000
377 11	Apples-juice-concentrate	0.068000	13	0.129	1.000
383 5B	Cabbage-savoy	0.050000	0	1.000	1.000

388	15	Corn grain/sugar-molasses	0.050000	0	1.500	1.000
392	0	Grapes-juice-concentrate	0.015000	0	0.129	1.000
402	12	Peaches-juice	0.020000	0	0.041	1.000
403	0	Peanuts-butter	0.050000	0	1.890	1.000
404	11	Pears-juice	0.011000	0	0.041	1.000
405	68	Peas-succulent/blackeye/cowpea	0.050000	0	1.000	1.000
410	12	Apricot juice	0.547000	0	0.041	1.000
416	0	Strawberries-juice	7.086000	0	0.041	0.890
417	0	Sunflower-seeds	0.050000	0	1.000	1.000
423	8	Tomatoes-dried	0.050000	0	14.300	1.000
424	M	Veal-fat w/o bones	0.170000	0	1.000	1.000
425	M	Veal-lean (fat free) w/o bones	0.270000	0	1.000	1.000
426	M	Veal-kidney	0.380000	0	1.000	1.000
427	M	Veal-liver	0.310000	0	1.000	1.000
428	M	Veal-other organ meats	0.380000	0	1.000	1.000
429	M	Veal-dried	0.380000	0	1.920	1.000
430	M	Veal-meat byproducts	0.380000	0	1.000	1.000
436	9A	Watermelon-juice	0.050000	0	0.041	1.000
940	0	Peanuts-hulled	0.050000	0	1.000	1.000

ATTACHMENT 2: Acute DEEM™ Analysis

U.S. Environmental Protection Agency Ver. 6.73
 DEEM ACUTE analysis for CAPTAN (1989-92 data)
 Residue file: captanr.R96 Adjustment factor #2 used.
 Analysis Date: 05-03-1999/09:16:54 Residue file dated: 05-03-1999/08:45:00/8
 Acute Reference Dose (aRfD) = 0.100000 mg/kg body-wt/day
 NOEL (Acute) = 10.000000 mg/kg body-wt/day
 MC iterations = 1000 MC list in residue file MC seed = 10
 Run Comment: Including Seed Treatment
 =====

Summary calculations:

	95th Percentile			99th Percentile			99.9th Percentile		
	Exposure	% aRfD	MOE	Exposure	% aRfD	MOE	Exposure	% aRfD	MOE
Females (13+/preg/not nsg):									
0.006218	6.22	1608	0.013286	13.29	752	0.037044	37.04	269	
Females (13+/nursing):									
0.008277	8.28	1208	0.029246	29.25	341	0.065830	65.83	151	
Females (13-19 yrs/np/nn):									
0.004246	4.25	2355	0.012764	12.76	783	0.045750	45.75	218	
Females (13-50 years):									
0.004845	4.84	2064	0.013148	13.15	760	0.036193	36.19	276	

U.S. Environmental Protection Agency Ver. 6.73
 DEEM ACUTE analysis for CAPTAN (1989-92 data)
 Residue file: captanr.R96 Adjustment factor #2 used.
 Analysis Date: 05-03-1999/09:16:54 Residue file dated: 05-03-1999/08:45:00/8
 Acute Reference Dose (aRfD) = 0.100000 mg/kg body-wt/day
 NOEL (Acute) = 10.000000 mg/kg body-wt/day
 MC iterations = 1000 MC list in residue file MC seed = 10
 Run Comment: Including Seed Treatment

Females (13+/preg/not nsg)	Daily Exposure Analysis 1/ (mg/kg body-weight/day)	
	per Capita	per User
Mean	0.001430	0.001430
Standard Deviation	0.003115	0.003115
Margin of Exposure 2/	6,992	6,992
Percent of aRfD	1.43	1.43

Percent of Person-Days that are User-Days =100.00%

Estimated percentile of user-days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000144	0.14	69,453	10.00	0.003689	3.69	2,710
80.00	0.000226	0.23	44,311	5.00	0.006218	6.22	1,608
70.00	0.000308	0.31	32,493	2.50	0.008780	8.78	1,138
60.00	0.000400	0.40	25,002	1.00	0.013286	13.29	752
50.00	0.000560	0.56	17,856	0.50	0.017247	17.25	579
40.00	0.000761	0.76	13,135	0.25	0.023338	23.34	428
30.00	0.000984	0.98	10,161	0.10	0.037044	37.04	269
20.00	0.001381	1.38	7,240				

Estimated percentile of per-capita days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000144	0.14	69,453	10.00	0.003689	3.69	2,710
80.00	0.000226	0.23	44,311	5.00	0.006218	6.22	1,608
70.00	0.000308	0.31	32,493	2.50	0.008780	8.78	1,138
60.00	0.000400	0.40	25,002	1.00	0.013286	13.29	752
50.00	0.000560	0.56	17,856	0.50	0.017247	17.25	579
40.00	0.000761	0.76	13,135	0.25	0.023338	23.34	428
30.00	0.000984	0.98	10,161	0.10	0.037044	37.04	269
20.00	0.001381	1.38	7,240				

1/ Analysis based on all three-day participant records in CSFII 1989-92 survey.
 2/ Margin of Exposure = NOEL/ Dietary Exposure.

U.S. Environmental Protection Agency Ver. 6.73
 DEEM ACUTE analysis for CAPTAN (1989-92 data)
 Residue file: captanr.R96 Adjustment factor #2 used.
 Analysis Date: 05-03-1999/09:16:54 Residue file dated: 05-03-1999/08:45:00/8
 Acute Reference Dose (aRfD) = 0.100000 mg/kg body-wt/day
 NOEL (Acute) = 10.000000 mg/kg body-wt/day

Females (13+/nursing)	Daily Exposure Analysis (mg/kg body-weight/day)	
	per Capita	per User
Mean	0.002083	0.002083
Standard Deviation	0.006122	0.006122
Margin of Exposure	4,799	4,799
Percent of aRfD	2.08	2.08

Percent of Person-Days that are User-Days =100.00%

Estimated percentile of user-days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000193	0.19	51,744	10.00	0.004026	4.03	2,484
80.00	0.000302	0.30	33,146	5.00	0.008277	8.28	1,208
70.00	0.000405	0.41	24,674	2.50	0.014520	14.52	688
60.00	0.000511	0.51	19,584	1.00	0.029246	29.25	341
50.00	0.000623	0.62	16,039	0.50	0.043433	43.43	230
40.00	0.000850	0.85	11,766	0.25	0.055736	55.74	179
30.00	0.001190	1.19	8,404	0.10	0.065830	65.83	151
20.00	0.001780	1.78	5,619				

Estimated percentile of per-capita days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000193	0.19	51,744	10.00	0.004026	4.03	2,484
80.00	0.000302	0.30	33,146	5.00	0.008277	8.28	1,208
70.00	0.000405	0.41	24,674	2.50	0.014520	14.52	688
60.00	0.000511	0.51	19,584	1.00	0.029246	29.25	341
50.00	0.000623	0.62	16,039	0.50	0.043433	43.43	230
40.00	0.000850	0.85	11,766	0.25	0.055736	55.74	179
30.00	0.001190	1.19	8,404	0.10	0.065830	65.83	151
20.00	0.001780	1.78	5,619				

U.S. Environmental Protection Agency
 DEEM ACUTE analysis for CAPTAN (1989-92 data)
 Residue file: captanr.R96 Adjustment factor #2 used.
 Analysis Date: 05-03-1999/09:16:54 Residue file dated: 05-03-1999/08:45:00/8
 Acute Reference Dose (aRfD) = 0.100000 mg/kg body-wt/day
 NOEL (Acute) = 10.000000 mg/kg body-wt/day

Females (13-19 yrs/np/nn)	Daily Exposure Analysis (mg/kg body-weight/day)	
	per Capita	per User
Mean	0.001271	0.001273
Standard Deviation	0.003194	0.003197
Margin of Exposure	7,868	7,852
Percent of aRfD	1.27	1.27

Percent of Person-Days that are User-Days = 99.80%

Estimated percentile of user-days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000148	0.15	67,597	10.00	0.002134	2.13	4,685
80.00	0.000263	0.26	38,077	5.00	0.004250	4.25	2,353
70.00	0.000377	0.38	26,495	2.50	0.007291	7.29	1,371
60.00	0.000494	0.49	20,243	1.00	0.012771	12.77	783
50.00	0.000634	0.63	15,779	0.50	0.019318	19.32	517
40.00	0.000800	0.80	12,503	0.25	0.028228	28.23	354
30.00	0.001002	1.00	9,984	0.10	0.045774	45.77	218
20.00	0.001323	1.32	7,560				

Estimated percentile of per-capita days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000145	0.15	68,827	10.00	0.002133	2.13	4,689
80.00	0.000261	0.26	38,343	5.00	0.004246	4.25	2,355
70.00	0.000376	0.38	26,608	2.50	0.007285	7.29	1,372
60.00	0.000493	0.49	20,300	1.00	0.012764	12.76	783
50.00	0.000632	0.63	15,814	0.50	0.019305	19.31	517
40.00	0.000798	0.80	12,524	0.25	0.028210	28.21	354
30.00	0.001000	1.00	9,996	0.10	0.045750	45.75	218
20.00	0.001321	1.32	7,567				

U.S. Environmental Protection Agency Ver. 6.73
 DEEM ACUTE analysis for CAPTAN (1989-92 data)
 Residue file: captanr.R96 Adjustment factor #2 used.
 Analysis Date: 05-03-1999/09:16:54 Residue file dated: 05-03-1999/08:45:00/8
 Acute Reference Dose (aRfD) = 0.100000 mg/kg body-wt/day
 NOEL (Acute) = 10.000000 mg/kg body-wt/day

Females (13-50 years)	Daily Exposure Analysis (mg/kg body-weight/day)	
	per Capita	per User
Mean	0.001246	0.001249
Standard Deviation	0.002937	0.002940
Margin of Exposure	8,025	8,007
Percent of aRfD	1.25	1.25

Percent of Person-Days that are User-Days = 99.77%

Estimated percentile of user-days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000128	0.13	77,832	10.00	0.002288	2.29	4,370
80.00	0.000221	0.22	45,168	5.00	0.004851	4.85	2,061
70.00	0.000319	0.32	31,313	2.50	0.007717	7.72	1,295
60.00	0.000435	0.43	22,992	1.00	0.013157	13.16	760
50.00	0.000577	0.58	17,326	0.50	0.018984	18.98	526
40.00	0.000727	0.73	13,758	0.25	0.025168	25.17	397
30.00	0.000940	0.94	10,640	0.10	0.036210	36.21	276
20.00	0.001260	1.26	7,938				

Estimated percentile of per-capita days exceeding calculated exposure
 in mg/kg body-wt/day and corresponding

Perc.	Exposure	% aRfD	MOE	Perc.	Exposure	% aRfD	MOE
90.00	0.000126	0.13	79,511	10.00	0.002286	2.29	4,374
80.00	0.000220	0.22	45,527	5.00	0.004845	4.84	2,064
70.00	0.000318	0.32	31,471	2.50	0.007710	7.71	1,297
60.00	0.000433	0.43	23,078	1.00	0.013148	13.15	760
50.00	0.000575	0.58	17,376	0.50	0.018970	18.97	527
40.00	0.000725	0.73	13,785	0.25	0.025154	25.15	397
30.00	0.000938	0.94	10,657	0.10	0.036193	36.19	276
20.00	0.001258	1.26	7,947				

ATTACHMENT 3: Acute Residue Distribution Files

#1
APPLE (parent only)
%cptx = 66
TOTALZ = 26
TOTALNZ = 51
3.200
2.300
2.800
2.800
15.800
7.740
5.490
3.460
5.620
6.120
4.790
3.330
5.040
2.400
2.220
3.670
2.650
4.030
3.610
4.790
5.060
2.160
3.290
5.500
5.100
4.000
4.000
7.700
7.000
1.200
5.200
3.800
4.900
0.310
1.500
1.400
0.410
3.400
3.900
4.700
2.800
2.500
3.300
5.700
5.900
0.860
0.740
0.420
2.180
2.840
1.900

#2
APRICOT
%cptx = 42
TOTALZ = 8
TOTALNZ = 6
4.440
4.520

6.600
5.280
5.000
6.750

#3
BLUEBERRY
%cptx = 69
TOTALZ = 4
TOTALNZ = 8
8.250
1.720
4.000
8.200
4.800
10.800
8.400
18.300

#4
CHERRY
%cptx = 44
TOTALZ = 27
TOTALNZ = 21
13.030
21.280
12.250
20.000
5.480
19.000
20.800
17.400
14.400
9.900
10.600
11.900
10.400
35.400
13.000
2.100
22.600
3.800
14.300
15.000
14.200

#5
DEWBERRY (Raspberry FT data)
%cptx = 100
TOTALZ = 0
TOTALNZ = 12
6.7
7.2
20.0
38.33
17.0
14.0
16.0
13.0
12.0
12.0
13.0
13.0

#6
GRAPES
%cptx = 12
TOTALNZ = 23
TOTALZ = 169
2.600

1.300
1.300
10.600
10.900
3.920
11.100
8.100
2.180
10.900
7.200
2.100
22.400
6.440
7.960
7.400
6.400
8.360
5.800
4.800
8.000
3.680
0.930

#7
NECTARINE
%cplx = 27
TOTALNZ = 6
TOTALZ = 16
2.240
1.520
1.260
1.600
3.900
2.840

#8
PEACH
%cplx = 56
TOTALZ = 20
TOTALNZ = 25
9.900
13.600
10.700
2.880
7.440
3.400
1.440
2.020
5.560
6.000
4.280
0.800
2.580
8.300
6.850
6.150
10.600
12.300
11.600
3.560
2.520
4.340
5.840
2.980
2.880

#9
PEARS (parent) postharvest dip only
%cptx = 5
TOTALZ = 152
TOTALNZ = 8
4.720
3.040
11.400
10.800
11.400
2.600
2.880
6.100

#10
PLUMS
%cptx = 25
TOTALZ = 24
TOTALNZ = 8
7.900
0.520
0.160
0.420
0.600
0.680
3.480
5.600

#11
STRAWBERRY
%cptx = 89
TOTALZ = 3
TOTALNZ = 26
27.000
13.000
5.820
11.800
11.500
5.360
4.760
1.580
2.000
1.460
2.560
3.860
2.960
7.200
7.700
3.580
4.360
0.840
0.600
1.040
12.900
8.900
6.400
15.000
13.200
8.850

#12
RASPBERRY
%cptx = 68
TOTALZ = 6
TOTALNZ = 12

0.006
0.02
0.006
0.02
0.006
0.006
0.006
0.006
0.006
0.004
0.004
0.004
0.004
0.004
0.004
0.004
0.004
0.004
0.004
0.004
0.003
0.003
0.003
0.003
0.029

14
ALMONDS
%cptx = 26
TOTALZ = 17
TOTALNZ = 6
0.025
0.025
0.025
0.09
0.10
0.025



13544

R166186

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