



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

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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Captan - Addendum to Registration Standard.
RCB No. 2317. MRID Nos. 401898-2 through - 24
and 400105-01.

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The Captan Task Force has submitted storage stability studies and residue chemistry data in response to the Data Call-In (DCI) Notice for Captan and its metabolites dated April 29, 1985. Residue reduction data have also been submitted (April 25, 1986). This memorandum contains our review of these new studies to determine whether they satisfy the requirements of the Captan Registration Standard. In a separate memorandum, these studies are combined with preexisting residue data and FDA monitoring data to assess dietary exposure.

CONCLUSIONS AND RECOMMENDATIONS

1. The Captan Task Force has not submitted residue data in support of avocados, beans, blackberries, blueberries, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, collards, cottonseed, crabapples, cranberries, dewberries, eggplant, garlic, grapefruit, kale, kiwis, leeks, lemons, lettuce, limes, mangoes, muskmelons, mustard greens, onions, oranges, peas, peppers, pimentos, pineapples, pumpkins, quinces, raspberries,

rhubarb, rutabagas, shallots, squash, tangerines, taro, turnips, and watermelons. RCB recommends cancellation of uses on all these crops and revocation of the tolerances.

2. The nature of the residue in plants is partially understood, and the significant residues are known to be both captan and its metabolite tetrahydrophthalimide (THPI). The current tolerances are expressed in terms of captan only (40 CFR 180.103, 21 CFR 193.40, and 21 CFR 561.65) and should be amended to include THPI also. If other metabolites are found to be significant as a result of future studies, further modification of the tolerance expressions may be required.

3. The nature of the residue in animals is not completely understood, but significant residues are known to be captan and its metabolites tetrahydrophthalimide (THPI), 3-hydroxy tetrahydrophthalimide (3-OH THPI) and 5-hydroxy tetrahydrophthalimide (5-OH THPI). A separate subsection of 40 CFR 180.103 will eventually be needed to include THPI, 3-OH THPI, and 5-OH THPI in the tolerance expressions for milk, poultry, eggs, and fat, meat, and meat byproducts. Further modification may be required based on data from future studies.

4. The analytical methods used to obtain the crop residue data are adequate. The analytical method for residues in meat, milk, poultry, and eggs is not acceptable for enforcement purposes but is acceptable for obtaining data.

5. Final conclusions on storage stability will not be reached until the longer-term studies are completed. Tentatively, captan does not appear to be stable in certain of the stored macerates. However, captan and its metabolites are stable in stored samples of poultry tissue and eggs.

6. Since we do not have complete storage stability data, we are unable to make a final conclusion on appropriate tolerance levels. However, since we are recommending lower levels on a number of commodities and restricting use patterns over previously registered uses, we believe the following tolerances should appear in 180.103. The use pattern and appropriate label restrictions are also noted:

Apricots: Tolerance of 10 ppm. Maximum application rate 1 lb ai/100 gal spray with 250 gal spray, 0-day PHI. Ground applications only. Since no data are available with the dust (D) formulation, this formulation should not be used on apricots. Postharvest use must be cancelled.

Cantaloupes: Tolerance of 3 ppm. Maximum application rate 2 lb ai/A, 0-day PHI. Ground applications only. Since no data are available for the D, EC, and FLC formulations,

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cantaloupes should be removed from these labels. The preplant and postharvest uses should be cancelled.

Cherries: Tolerance of 40 ppm. Maximum of 2 lb ai/A foliar, ground applications only, 0-day PHI and postharvest dip of 1.25 lb ai/100 gal. Since no data are available for the D, EC, and FLC formulations, cherries should be removed from these labels.

Cucumbers: Tolerance of 15 ppm. Maximum of 2 lb ai/A, ground applications only, 0-day PHI. Since no data are available for the D, EC and FLC formulations, cucumbers should be removed from these labels. The preplant and postharvest uses should be cancelled.

Nectarines: Tolerance of 25 ppm. Maximum of 1 lb/100 gal spray with maximum of 400 gal of spray/A, 0-day PHI. Use should be limited to ground applications only. Since no data are available for the D or EC formulations, these labels should be revised to delete use on nectarines. The postharvest uses should be cancelled.

Peaches: Tolerance of 25 ppm. Maximum of 1 lb/100 gal spray with maximum of 400 gal/spray/A, ground applications only with a 0-day PHI. Since no data are available from the D and EC formulations, peaches should be removed from these labels. The postharvest use should be cancelled.

Pears: Tolerance of 25 ppm (no change). Maximum of 1 lb ai/100 gal spray with maximum of 400 gal spray/A, ground applications only, 0-day PHI plus a postharvest treatment of 1.25 lbs ai/100 gal. Since no data are available for the D and EC formulations for foliar use, pears should be removed from these labels. Also, no data reflecting use of the FLC formulation to pears as a postharvest treatment are available and this use should be deleted.

Plums (fresh prunes): Tolerance of 15 ppm. Also need FAT (193.40) of 30 ppm for dried prunes. Maximum of 1 lb ai/100 gal spray with the maximum of 300 gal spray/A, ground applications only with a 0-day PHI.

Strawberries: Tolerance of 25 ppm (no change). Maximum of 3 lb ai/A, ground equipment only, 0-day PHI. Since no data are available for the D and EC formulations, strawberries should be deleted from these labels. No data are available reflecting the delayed dormant use and this should be deleted.

(Note to PM: Since no data are available reflecting the use of concentrate sprays to orchard crops, this use should be prohibited.)

7. When an adequate enforcement method is available, the following tolerances should be added to 180.103. Until the method problems are resolved, there is no enforcement method to detect secondary residues that would result from use on these crops. As a result, registrations and tolerances should be cancelled for these crops at this time. (Use restrictions are noted for such time as these crops may be resubmitted.)

Almonds: Tolerance of 0.5 ppm for nuts and 75 ppm for hulls. Maximum application of 1.5 lb/100 gal of spray with a maximum of 350 gal spray/A, ground applications only and a 30-day PHI. Since no data are available for the FlC formulation, almonds should be removed from this label.

Apples: Tolerance of 25 ppm (no change). Maximum application rate of 1 lb/100 gal spray with a maximum of 400 gal spray/A, ground applications only with a 0-day PHI. Postharvest application of 1.25 lb ai/100 gal. Use of the D and EC formulations for foliar treatment and the FlC formulation for the postharvest use should be cancelled in the absence of data.

Grapes: Tolerance of 25 ppm. Maximum rate of 2 lb ai/A, ground applications only, and 0-day PHI. D and EC formulations and the postharvest use should be cancelled.

Tomatoes: Tolerance of 15 ppm for 3.75 lb ai/A, ground applications only, and a 0-day PHI. The preplant application and D formulation should be cancelled.

8. Of the six seed treatment studies, those involving beets, corn, rice, soybeans, and spinach were inconclusive because of contamination in the untreated seed. Several of the studies are being redone. In potatoes, no captan residues were found, but THPI levels of 0.06 and 0.24 ppm were reported in two of the samples. If all registered uses on potatoes other than seed treatment are cancelled, the tolerance could be lowered to 0.5 ppm.

9. Feed additive tolerances (FATs) will be needed for crops processed into feed items (such as dry apple pomace) where the residue has been shown to concentrate. These tolerances will not be determined until an adequate method for meat and milk is available.

10. The tolerance of 0.05 ppm in fat, meat, and meat by-products of cattle and hogs should be cancelled until an adequate method for determining residues in meat and milk is available. When the method problems are resolved, adequate meat, milk, poultry, and egg tolerances should be proposed.

11. The Captan Task Force still must complete (or repeat) the following items: metabolism in plants, metabolism in animals, seed treatment studies, and storage stability studies.

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NATURE OF THE RESIDUE IN PLANTS

The Captan Registration Standard requires data reflecting the distribution and metabolism of carbonyl-labeled [^{14}C] captan in lettuce following foliar treatments and in potato tubers following foliar and postharvest treatments. Application rates must be sufficiently high to permit complete ^{14}C -residue identification. The Standard also requires data reflecting the metabolism of ^{14}C -labeled trichloromethylthio moiety of the captan molecule in potato tubers and lettuce.

Data depicting the identity of metabolites of captan are available for apples (following foliar or postharvest treatment) and oranges (postharvest treatment only). Since captan and captafol have common metabolites in plants, captafol metabolism studies with tomatoes and corn (which were submitted in the Captafol Registration Standard) were compared and evaluated with the captan apple and orange studies.

The following metabolites of captan have been identified in apple fruit, apple foliage, and orange fruit: $\Delta 4$ -tetrahydrophthalimide (THPI), $\Delta 4$ -tetrahydrophthalamic acid (THPAM), 4,5-epoxyhexahydrophthalimide (THPI-epoxide), 3-hydroxy- $\Delta 4$ -tetrahydrophthalimide (3-OH THPI), 5-hydroxy- $\Delta 3$ -tetrahydrophthalimide (5-OH THPI) and N-(trichloromethylthio)-4,5-epoxyhexahydrophthalimide (captan-epoxide). The major residues are the parent, THPI, and THPAM; THPI-epoxide, captan-epoxide, and 3- and 5-OH THPI are minor residues in plants.

Tolerances are currently expressed in terms of captan only (40 CFR 180.103, 21 CFR 193.40, and 21 CFR 561.65). Based on the metabolism data discussed in the Captan Registration Standard and captan and THPI residue data received in reply to the DCI Notice dated April 29, 1985, we conclude that both captan and THPI are important residues and that the CFR sections listed above should be amended to include THPI. Depending on the results of the lettuce and potato metabolism studies still requested, certain other metabolites may be found to be significant in the future and require further modification of the tolerance expression.

NATURE OF THE RESIDUE IN ANIMALS

The Captan Registration Standard requires a carbonyl-labeled [^{14}C] captan metabolism study utilizing poultry, which will determine the nature of the residues in muscle, fat, kidney, liver, and eggs. The Captan Registration Standard also requires data reflecting the metabolism of ^{14}C -labeled trichloromethylthio moiety of the captan molecule in ruminants and chickens.

Marginal data are available from a ^{14}C -ring-labeled captan metabolism study in goats, and adequate data are available from a comparable captafol metabolism study in ruminants. Because captan and captafol have common metabolites, the combined data from both of these studies provide adequate information regarding the ring-labeled portion of the captan molecule. The following metabolites have been identified in the tissues, organs, and milk of goats: $\Delta 4$ -tetrahydrophthalimide (THPI), 4,5-epoxyhexahydrophthalimide (THPI-epoxide), 3-hydroxy- $\Delta 4$ -tetrahydrophthalimide (3-OH THPI), 5-hydroxy- $\Delta 3$ -tetrahydrophthalimide (5-OH THPI) and 4,5-dihydroxyhexahydrophthalimide (4,5-diOH HHPI). Two minor metabolites, $\Delta 4$ -tetrahydrophthalamic acid (THPAM) and phthalimide (PI), have also been identified in milk, tissues, and organs.

Tolerances are currently expressed in terms of captan only in animal commodities (40 CFR 180.103[a]). Based on the data available, we have concluded that captan, THPI, 3-OH THPI and 5-OH THPI are important residues and that 40 CFR 180.103 should be amended to include a separate subsection that also lists the three major metabolites of captan in animal commodities. Depending on the results of the studies required by the Captan Registration Standard, THPI-epoxide and 4,5-diOH HHPI may be found to be significant and thus require further modification of the tolerance expression.

ANALYTICAL METHODS

Crops

The analytical method used to obtain the residue data is the same as was used to produce the Residue Reduction Data, and is discussed in L.M. Bradley's review of July 22, 1986. Copies of the method are included in each volume. The analyses were performed by Morse Labs, and some were apparently subcontracted to Hazleton Labs, so the GC equipment used was different. Parameters are specified for both labs.

For the sake of completeness, we will repeat our earlier discussion of the analytical method. The limit of detection for both captan and THPI is 0.05 ppm. Recoveries are noted in general terms on data tables by crop--a few THPI recoveries were invalid due to unexpectedly high THPI levels in the processed commodity.

After adding H_3PO_4 , samples are macerated with water added as necessary. The sample is then extracted with ethyl acetate in the presence of Na_2SO_4 . The ethyl acetate is then washed with water filtered through Na_2SO_4 , and evaporated to dryness. Oily crop extracts are first reduced in volume prior to washing with water.

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For non-oily crops, the ethyl acetate is washed with dilute H_3PO_4 , filtered through Na_2SO_4 , and evaporated to dryness. Oily crops are taken up in acetonitrile and hexane; the acetonitrile portion is washed with hexane and the hexane then back-extracted with acetonitrile. Acetonitrile extracts are evaporated to dryness.

The dried residue is taken up in a 3:7 dichloromethane:acetone solution. Any undissolved (solid) material is removed and the solution chromatographed on gel permeation media.

The reserved portion of the GPC eluate is evaporated to dryness and then chromatographed on nuchar:silica gel in dichloromethane (CH_2Cl_2). The captan residues are eluted with 5 percent ethyl acetate in CH_2Cl_2 and the THPI eluted with 15 percent acetone in CH_2Cl_2 . Both eluates are evaporated to dryness.

The THPI fraction is then quantitated in ethyl acetate on GC. If additional cleanup seems warranted, an acid/base aqueous cleanup (discarding CH_2Cl_2 wash each time) is recommended.

Captan residues are further cleaned up on Florisil in hexane, eluted with 1 percent methanol in CH_2Cl_2 after several washes of hexane and CH_2Cl_2 . The eluate is dried, taken up in hexane, and quantitated by GC.

Recovery data for the studies contained in this submission are summarized in Table 1.

Table 1. Captan Recoveries

Crop	Captan		Tetrahydrophthalimide	
	Fortification Levels, ppm	Range of Recoveries, %	Fortification Levels, ppm	Range of Recoveries, %
almonds				
nut	0.2 - 0.5	78 - 104	0.2 - 0.5	77 - 102
hull	0.5 - 10.0	97 - 108	0.1 - 1.0	73 - 109
shell	0.5 - 2.0	77 - 105	0.2 - 0.5	71 - 102
apples	0.1 - 25.0	76 - 129	0.1 - 2.5	78 - 106
wet pomace	0.81 - 24	73 - 83	0.08 - 2.4	88 - 112
dry pomace	0.81 - 24	92 - 107	0.4 - 2.4	75 - 100
juice	1 - 25	95 - 124	0.1 - 2.5	66 - 80
apricots	2 - 10	86 - 114	0.05 - 0.2	74 - 116
beets				
seed	24	46, 89, 89, 100	2.4	84 - 100
roots	0.1	60 - 70	0.1	90 - 110
tops	0.1	80 - 90	0.1	80 - 100
cantaloupe	0.1	80 - 120	0.1	70 - 110
cherries	0.5 - 10.0	75 - 115	0.1 - 0.5	72 - 114
corn				
fresh	0.5	78	0.5	75
seed	0.1 - 2000.00	78 - 90, 202	0.1 - 1	70 - 84
forage	1.0 - 5.0	91 - 93	0.5	75 - 79
fodder	5.0	88	0.2	82
cucumbers	0.1 - 8.1	73 - 100	0.1 - 0.8	70 - 126
grapes	1 - 15	70 - 130	0.05 - 0.2	70 - 108
wet pomace	2	102	0.2	97
dry pomace	10	109	1.0	94
juice	0.1	70	0.1	83
raisins	0.2 - 20	83 - 98	1.0 - 2.0	81 - 100
nectarines	5 - 10	78 - 105	0.05 - 0.1	80 - 111
peaches	2 - 10	86 - 113	0.05 - 1.0	72 - 102
pears	2 - 15	71 - 100	0.1 - 0.5	70 - 89
plums	0.5 - 15	83 - 112	0.05 - 0.5	79 - 100
potatoes				
tuber	0.1	70 - 90	0.1	60 - 90
seed	24	88	2.4	100
rice				
seed	0.8 - 24	72 - 102	0.08 - 24	75 - 96
grain	4	82	0.4	110
straw	0.1 - 0.13	80 - 120	0.1	30, 50, 80, 80
soybeans	24	67	2.4	96
seed	4 - 24	92 - 133	0.4 - 2.4	75 - 104
forage	0.2	70 - 110	0.2	70 - 80
hay	0.25 - 0.65	84 - 85	0.2	70 - 85
spinach				
leaf	0.1	100 - 140	0.1	80 - 110
seed	4 - 24	94 - 122	0.4 - 2.4	71 - 75
strawberries	5 - 10	70 - 90	0.1 - 0.5	75 - 97
tomato	0.5 - 5	88 - 99	0.05 - 0.5	66 - 88
wet pomace	0.1	82	0.5	79
dry pomace	0.2	80	1.0	93
puree	0.1	90	0.1	85
juice	0.1	98	0.1	75
ketchup	0.2	102	0.2	111

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The recovery data are acceptable. We conclude that the analytical methods used for the crop residue data are adequate.

Meat, and Milk, Poultry, and Eggs

The requirement in our April 28, 1985 DCI letter for residue studies in animals was long since satisfied (see review of L.M. Bradley, November 11, 1985). However, the analytical method for meat, milk, poultry, and eggs is not now considered acceptable as an enforcement method. It "flunked" a method try-out (MTO) at EPA/Beltsville Laboratory. Problems were low recoveries (< .70%) in certain commodities, unavailability of standards, and uncertainty about complete derivitization for quantitation. (See F.D. Griffith review of April 16, 1987.)

Currently available feeding studies used this method. We will continue to rely on those studies for the purpose of evaluating data, since, in our estimation, the method is not fatally flawed, but simply unsuitable for enforcement purposes requiring widespread distribution. The method for animal feeding studies will need to be resolved in the future.

The Captan Task Force submitted a study for the determination of captan and 3 metabolites in chicken tissues and eggs. Samples of eggs or well-chopped and blended muscle, gizzard, fat, skin, or liver, or untreated kidney or heart are extracted with ethyl acetate in the presence of NaCl. The ethyl acetate phase is then filtered through sodium sulfate and cleaned on a column containing Bio-Sil A and granular anhydrous sodium sulfate. Eluates are evaporated to dryness, dissolved in toluene, and quantitated by GC.

Recoveries (averages) are noted in Table 2. We conclude that the analytical method used in the study is adequate for establishing residue data. However, because of the problems with the meat and milk method encountered in the MTO, we do not consider this method adequate for enforcement purposes.

Table 2

Average Recoveries from Fortifications of Control Samples with Captan and Three of its Metabolites

Sample	THPI		Captan*		3-OH THPI		5-OH THPI		5-OH THPI (B)	
	Fort. ug/g	Average Percent Recovery	Fort. ug/g	Average Percent Recovery	Fort. ug/g	Average Percent Recovery	Fort. ug/g	Average Percent Recovery	Fort. ug/g	Average Percent Recovery
Eggs	0.02	97	0.05	83	0.05	70	0.02	83	0.03	82
	2.0		0.20		0.20		0.08		0.12	
	4.8		2.0		0.48		0.19		0.29	
Muscle	0.02	91	0.05	84	0.05	83	0.02	71	0.03	67
	2.0		0.20		0.20		0.08		0.12	
Liver	0.02	95	0.05	91	0.025	71	0.02	64	0.03	44
	2.0		0.20		0.05		0.08		0.12	
					0.20					
Kidney	0.02	135	0.05	108	0.025	71	0.02	59	0.03	52
	2.0		0.20		0.20		0.08		0.12	
Heart	0.02	94	0.05	93	0.025	85	0.02	92	0.03	54
	2.0		0.20		0.20		0.08		0.12	
			2.0							
Gizzard	0.02	114	0.05	83	0.05	86	0.02	82	0.03	65
	2.0		0.20		0.20		0.08		0.12	
Fat	0.02	91	0.05	62	0.025	98	0.02	178	0.03	137
	2.0		0.20		0.20		0.08		0.12	
Skin	0.02	91	0.05	69	0.025	78	0.02	92	0.03	101
	2.0		0.20		0.20		0.08		0.12	

* As THPI.

STORAGE STABILITY STUDIES

The Captan Task Force has submitted residue data and storage stability studies as required by the Captan Registration Standard. Earlier, residue reduction data were also submitted. This memorandum contains our review of these new studies, however, we are unable to determine whether they satisfy the requirements of the Standard until all the data have been submitted.

The Captan Registration Standard states that no data are available on the storage stability of captan residues in animal or plant commodities. The following data are required:

The storage intervals and conditions of storage of samples used to support all established tolerances for residues must be submitted. These data must be accompanied by data depicting the percent decline in residues at the times and under the conditions specified. On receipt of these data, the adequacy of the aforementioned tolerances will be reevaluated.

All residue data requested in this Standard must be accompanied by data regarding storage length and conditions of storage of samples analyzed. These data must be accompanied by data depicting the stability of residues under the conditions and for the time intervals specified.

The Captan Task Force has submitted storage stability data on the amount of captan and THPI residue on almonds, apples, beets, cherries, corn, cucumbers, lemons, lettuce, potatoes, rice, soybeans, spinach, strawberries, and tomatoes. Data on fortified samples of eggs and poultry tissues are also submitted.

Recovery values for fortified unknowns are given with the data. For captan, these range from 74 to 119 percent and average 91 percent, for THPI, values range from 60 to 138 percent and average 95 percent. Recovery values for these studies are acceptable.

The attached table, "Captan Storage Stability," summarizes the data obtained from the Captan Task Force studies on crops. In most cases the data sets are not yet complete, with the 3-, 6-, 12-, 18- and 24-month samples still to be done. Also, the

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task force report pointed out that most of the crop samples used in the storage stability tests were ground prior to being frozen and stored, whereas in the field trials, crop samples were frozen and not ground until immediately before extraction. The field study samples were stored a maximum of 55 to 227 days.

Overall, each crop is represented by relatively little data and there is considerable variability. Several of the crops demonstrated that captan is not stable in them over time, converting to THPI. Among these crops were almonds, beet tops, cucumbers, and strawberries. Final conclusions on crop storage stability will not be reached until the data from the longer storage times have been submitted and analyzed.

Storage stability data are also provided with the poultry feeding study. Purchased samples fortified with captan, THPI, 3-OH THPI, or 5-OH THPI which had been stored under the same conditions as the treated samples at -20 °C were analyzed as specified in SCC Method RRC 86-62. The data indicate that THPI, 3-OH, and 5-OH THPI are stable under the storage conditions. (Captan itself had earlier been shown to convert immediately to THPI in all the tissue and egg samples.)

DISCUSSION OF DATA HANDLING

The results of the various field trials were tabulated using Lotus 1-2-3. Captan and THPI residues were summed for each sample, and percentage THPI calculated. Concentration factors, where appropriate, were calculated using average raw agricultural commodities (RAC) residue levels for that particular trial.

All nondetectable (< 0.05 ppm) residue values are recorded as 0.025 (which reads 0.03 in the tables due to rounding off). The upper 95 percent confidence limits (U95CL) were calculated using the @AVG, @VAR, and @SQRT functions of Lotus, according to the equation $U95CL = @AVG + t_{.05} (@SQRT (@VAR))/@SQRT(n)$ where $t_{.05}$ is Student's t for $n - 1$ degrees of freedom. Raw data for the present submission were reviewed, and the registrant's summary tables verified for use as "working data." The previously submitted (and reviewed) data were not reviewed in detail, but rather taken from available summary tables.

We have several comments to make concerning the present submission. For the individual study reports, the samples reported on Residue Data Sheets do not consistently correlate with the study they appear in. Almost all samples are listed on a Residue

Data Sheet somewhere in the appropriate volume, but not necessarily in the appropriate individual study. Presumably, the packages were hurriedly put together. A number of careless errors were noted, e.g., treatments occurring before the date a crop was reportedly planted, and erroneous conclusions were drawn, e.g., no detectable residues when the data clearly show residues were detected. While none of the above represent major flaws in the task force report, a careful check of the package before it was submitted should have prevented the errors from appearing.

MAGNITUDE OF THE RESIDUE IN PLANTS

Almonds (MRID No. 401898-02)
2 ppm interim tolerance, nuts
100 ppm interim tolerance, hulls

Registered Uses: Delayed dormant and foliar applications by air and ground are registered at 0.95 to 1.5 lb active/100 gal (NTE 16 lb active/A/ application), and at 2.5 to 8 lb active/A. Applications may be made at popcorn, bloom, petal fall, and up to 5 weeks after petal fall, or up to 12 days before harvest. Almond hulls may not be fed to dairy cattle or animals being finished for slaughter if captan was applied later than 5 weeks after petal fall.

Six studies on almonds are submitted in response to the DCI Notice. The studies reflect four early season applications (86794, 86132, and 86840), and half also received a fifth application later (PHI 30) (86795, 86954, and 86412). These studies are used to estimate residue levels for the two different types of applications. Two studies submitted with the Residue Reduction Data (see review of July 22, 1986) and two studies submitted with PP#3F2898 have been combined with these new studies for an estimate of residues.

The studies submitted since the Captan Registration Standard (Residue Chemistry chapter) was written have been evaluated with reference to the data requirements of the Captan Registration Standard:

Data reflecting residues of concern in or on almond nutmeats and almond hulls resulting from multiple applications with either a WP or a FlC formulation at 16 lb ai/A/application. Treatments

We have included the study submitted in 1986 with the residue reduction data, and three studies from PP#3F2898 (those reporting THPI analyses). All studies with foliar applications at all PHIs were included in the "average" calculations. Separate calculations were done for 0-to 1-, 7-, 14- to 16-, and 31-day PHIs, for dip treatments alone, and for the additional residue contribution from dips, and for a dry pomace concentration factor.

We have also evaluated the 1986 apple studies in light of the Captan Registration Requirements, which are:

tests including multiple foliar applications with a WP and a D formulation at 8 lb ai/A application, and an EC at 2 lb ai/100 gal. Treatments must begin at delayed dormant and continue at 5-day intervals through first cover, then at 7-day intervals thereafter until harvest. Samples of mature fruits must be obtained on the day of final treatment and treated postharvest with a spray or dip in a WP or FlC formulation at 1.28 lb ai/100 gal. Applications must be made using both ground and aerial equipment and these data must depict captan residues of concern.

The Captan Registration Standard states that "The available processing data indicate that concentration of residues does not occur in juice, dry pomace, or wet pomace.

Only ground applications using the 50 WP formulation are represented in these studies. As submitted, these data support the current tolerance of 25 ppm with a use pattern of weekly ground applications of up to 4 lb active/A in 50 to 400 gpa with a 0-day PHI, and a postharvest dip using 1.25 lb active/100 gal. Use of the dust and emulsifiable concentrate for foliar applications and the FlC formulation for postharvest treatment should be cancelled until data are available, as should use of aerial equipment. Revised labels must reflect the approved uses.

Data are included for apples that have been processed into dry pomace, wet pomace, and juice, with average concentration factors of 3.86, 1.08, and 0.29, respectively. These suggest that a food additive tolerance (FAT) for dry apple pomace will be needed. Based on the maximum concentration factor of about 6 and using the same postharvest dip and use pattern given above, the FAT for dry apple pomace should be 130 ppm. However, neither this FAT nor the tolerance for apples can be established until there is an adequate method for determining secondary residues in meat and milk.

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Apricots (MRID No. 401898-05)
50 ppm tolerance

Registered Uses: Delayed dormant and foliar applications are registered at 0.46 to 1.5 lb active/100 gal (not to exceed 5 lb active/A/ application), or 3 to 5 lb active/A. Treatments may be applied at red bud, bloom, 75 percent petal fall, and cover stages, using ground or aerial equipment. No PHI and no seasonal maximums are established. Postharvest dip or spray is registered at 1.19 to 1.28 lb active/100 gal.

Three studies reflecting five ground applications of 2.5 lb active/A in about 250 gallons/acre (1 lb active/100 gal) are submitted. Samples were harvested on the day of last treatment (PHI 0). One replicate for one study gave a low value for captan, but upon re-analysis gave a value more in line with other samples. Because the THPI levels for this sample, in both analyses, correspond to those found in other samples, we have not included this one low value in the residue estimate.

Data from other studies available in PP#3F2898 reflect only one or two applications, but at higher rates (3 to 6 lb/A), and have THPI analyses.

We have also evaluated these newly submitted studies in light of the requirements of the Captan Registration Standard, which are:

multiple foliar applications with, in separate tests, a D and a WP formulation at 5 lb ai/A and 1.5 lb ai/100 gal, respectively. Applications of all formulations must be made in separate tests using both aerial and ground equipment. Treatments must begin in red bud periods and continue through cover stages; the registrant must propose a maximum seasonal use rate and provide supporting data. Fruits must be obtained on the day of final treatment and immediately subjected to postharvest treatment with a WP or FLC formulation applied in a dip and as a spray (in separate tests) at 1.28 lb ai/100 gal. Data must reflect captan residues of concern.

Based on these data, and considering the other available studies, we could recommend for a 10 ppm tolerance if the use pattern were altered to allow only foliar treatments at a maximum of 5 ground applications with up to 1 lb ai/100 gal spray (250 gal maximum spray) with a PHI of 0.

Since the submitted data did not include the dust formulation, use of aerial equipment, or postharvest treatment, these should be cancelled. Appropriate label revisions should be made.

Cantaloupes (MRID No. 401898-07)
25 ppm tolerance

Registered Uses: Preplant broadcast soil applications (incorporated) use up to 6 lb active/A. Foliar applications use up to 5 lb active/A, depending on formulation, at 5- to 10-day intervals. Postharvest dip (for cantaloupe) uses 1.19 to 1.28 lb active/100 gal. Seed treatments (cantaloupe) use < 2.365 oz active/100 lb seed; for muskmelons, < 1.505 oz active/100 lb seed.

Five studies in four States are submitted in response to the DCI Notice. Each study used seven applications of 2 lb active/A, wettable powder formulation, and all PHIs were 0.

Two cantaloupe studies were submitted with the residue reduction data reviewed previously. These studies used six and nine applications. We note from these studies that the inedible peel contains most of the residue--the edible portion contains < 10 percent of the residue.

Although these data were not submitted in response to the Captan Registration Standard, we have evaluated them in light of the requirements of the Captan Registration Standard, which are:

a single preplant broadcast soil treatment with a WP formulation at 6 lb ai/A, and multiple foliar applications at 5-day intervals with a D formulation at 5 lb ai/A, a WP formulation at 1.5 lb ai/100 gal, or the maximum lb ai/A rate and with an EC at 1.2 lb ai/100 gal. A maximum lb ai/A/application rate must be proposed for the WP, FLC, and EC formulations and the requested data must reflect that rate. Also, a maximum permissible number of applications/season or lb ai/season must be proposed and represented in the data. Samples must be obtained on the day of final foliar treatment and treated postharvest with a WP or a FLC formulation at 1.28 lb ai/100 gal. These data must depict captan residues of concern in or on cantaloupes. Foliar applications must be made using both aerial and ground equipment.

Since no studies reflecting the preplant soil treatment or the postharvest use are submitted, we would recommend cancellation of those use patterns. The existing 25 ppm tolerance level would then be excessively high. We could recommend for a 3 ppm tolerance level to cover residues resulting from up to nine ground applications of 2 lb active/A with a 0-day PHI. We consider the 3 ppm level sufficient to cover any additional residue which might result from seed treatment. Since data have been submitted only on the WP formulation and only using ground equipment, we recommend cancellation of the D, EC, and FLC formulations and use of aerial equipment. Labels must be revised to reflect the conditions listed above. Also the preplant and the postharvest uses should be eliminated.

Cherries (MRID No. 401898-08)
100 ppm tolerance, sweet and sour

Registered Uses: Delayed dormant and foliar applications may be made at pink, full bloom, petal fall, shuck shed, and cover stages, using ground or aerial equipment. Rates are up to 2 lb active/100 gal (< 10 lb/A) or 1.1 to 10 lb active/A. No PHI and no seasonal maximums are in effect. Postharvest dip or spray rates are 1.19 to 1.28 lb active/100 gal.

Studies from three locations using one sour and three sweet varieties are submitted, representing one dip and seven foliar applications (0-day PHI) separately and combined. Results of another study are included, both in the raw data sheets and the summary table, but the preharvest interval is given as 0 and 10 days, depending on where one looks. We have assumed 10 days, as stated in the summary table. We have also included studies submitted in PP#3F2898. Estimates were done for pre- and postharvest treatments separately, for all 0-day treatments, and for all residue data available.

We have also evaluated these data in light of the requirements of the Registration Standard, which are:

tests must include multiple foliar applications with, in separate tests, a D formulation at 10 lb ai/A/application and an EC and WP or FLC at 2 lb ai/100 gal. All tests must reflect use of ground and aerial equipment. Treatments must begin in pink bud periods and continue through cover stages; the registrant must begin in pink bud periods, propose a maximum seasonal use rate, and provide supporting data. Samples of mature fruit must be obtained on the day of final treatment and immediately subjected to postharvest treatment with a WP or FLC formulation applied, in separate tests, in a dip and as a spray at 1.28 lb ai/100 gal. Data must reflect captan residues of concern.

Based on the available data, we could conclude that a tolerance level of 40 ppm would be adequate to cover residues resulting from up to 7 applications of 2 lb active/A using ground equipment with a 0-day PHI plus a postharvest dip using 1.25 lb active per 100 gal. Since the submitted data involved only the WP formulation in foliar applications and only use of ground equipment, the D, EC, and FLC formulations in foliar applications and use of aerial equipment should be cancelled. Similarly, FLC formulation should be cancelled for postharvest treatment. Labels must be revised to reflect the accepted use patterns.

Cucumbers (MRID No. 401898-10)
25 ppm tolerance

Registered Uses Preplant broadcast soil treatments (incorporated) use up to 6 lb active/A. Foliar applications may use 1.9 to 5 lb active/A, depending on the formulation, and be made at 5- to 10-day intervals. Postharvest dip or spray treatment uses 1.19 to 1.28 lb active/100 gal. Seed treatments use < 2.365 oz active/100 lb seed.

Five new studies on cucumbers are submitted (nos. 86076, 86472, 86279, 86517, and 86045). All used six ground applications of 2 lb active/A with PHI of 0. These studies have been combined with two previous studies submitted as residue reduction data (T-6270 and T-6313).

Since no data for the preplant broadcast soil treatment or postharvest dip treatment are submitted, we recommend removing both from the label. Data from seed treatment are not submitted, but we consider that any residue contribution from seed treatment would be negligible in comparison with that from foliar application.

Although not submitted in response to the Captan Registration Standard, we have evaluated these studies in light of the requirements of the Registration Standard, which are:

a single preplant broadcast soil treatment with a WP formulation at 6 lb ai/A, and multiple foliar applications at 5-day intervals with a D formulation at 5 lb ai/A, a WP formulation at 1.5 lb ai/100 gal or the maximum lb ai/A rate, and an EC at 1.2 lb ai/100 gal. A maximum lb ai/A/application rate must be proposed for WP, FLC, and EC formulations and the requested data must reflect that rate. Also, a maximum permissible number of applications/season or lb ai/season must be proposed and represented in the data. Samples must be obtained on the day of final foliar treatment and treated postharvest with a WP or a FLC formulation at 1.28 lb ai/100 gal. These data must depict captan residues of concern. Foliar applications must be made using both ground and aerial equipment.

Based on the available data, we would recommend for a tolerance level of 15 ppm to cover residues resulting from not more than 7 ground applications of the reduced rate of 2 lb active/A and a 0-day PHI. Neither preplant nor postharvest applications would be permitted at this tolerance level, but the seed treatment would be continued. Because the submitted data involved only the

WP formulation and only ground equipment, use of D, EC, and FlC formulations and aerial equipment are cancelled. Appropriate changes should be made on the label.

Grapes (MRID Nos. 401898-11, -12)
50 ppm tolerance, grapes
50 ppm tolerance, washed raisins

Registered Uses: Multiple applications of 0.95 to 2.1 lb active per A may be made at delayed dormancy, just before and just after bloom, and at 7- to 14-day intervals until harvest (no PHI or seasonal maximum). Application of 2.5 to 5 lb active/A may be made at delayed dormant stage, twice prebloom, once just after bloom, and up to three times before bunches close. Several regional variations of these two dosages exist. Postharvest application of 1.5 lb active/A by air or 1 lb active/A by ground may be made twice to fruit on drying trays.

Seven new studies are submitted, reflecting 5 to 6 ground applications of 2 lb active per acre in 200 gal/A and a 0-day PHI. One study includes a trial with exaggerated rate (6 lb active/A), and processing studies for raisins and juice (studies 86814, 86080, 86994, 86256, 86719, 86549, and 86218). Three studies are available from the residue reduction data reviewed earlier, and 11 studies from petitions have THPI data. Only one of the raisin studies includes a postharvest treatment.

We have evaluated these data with regard for the Registration Standard requirements, which were:

Multiple foliar applications of a WP and an EC (in separate tests) at 1.96 at 1b ai/250 gal spray/A before bloom, immediately after bloom, and at 7-day intervals thereafter), and (in separate tests) of a D formulation at 5 lb ai/A. Formulations must be applied by ground and (in separate tests) by air. Samples (grapes) must be collected immediately after the last application. Representative samples should be analyzed.

Two postharvest applications of a WP, at 1.5 lb ai/A by air, and (in separate tests) of 1 lb ai/A by ground equipment to fruit from above tests on drying trays in the field. After treatment, raisins should be processed normally and analyzed for residues.

Other comments were:

The registrant must specify whether the "pomace" data submitted in PP#2F2898 were for wet or dry pomace. If the data were for wet pomace, data depicting residues in dried pomace processed from grapes bearing measurable weathered residues are required and an appropriate feed additive tolerance proposal, if needed. The available data indicate that captan residues concentrate in juice and raisin waste by factors up to 2x and 8x, respectively. On receipt of the data requested above, appropriate food/feed additive tolerances for these processed commodities must be proposed.

We could recommend for a tolerance level of 25 ppm for grapes if the use pattern were up to 7 ground applications of up to 2 lb active/A with a 0-day PHI. Without postharvest treatment, residues in raisins would not be expected to exceed those in the RAC; we lack sufficient data to estimate the level for a raisin tolerance if postharvest application (during drying) were to be made. One study (86814) shows a fifteen-fold concentration in raisin waste; thus a 375 ppm feed additive tolerance would be appropriate. However, this is contingent upon an acceptable enforcement method for secondary residues in meat and milk, which is currently not available.

That same study shows a four-fold concentration in juice, a 1.5-fold concentration in dry pomace, and no concentration in wet pomace, although other studies show reduction of residue levels in both commodities. Additional data will be necessary.

Since the submitted data did not include the D or EC formulations, use of aerial equipment, or postharvest treatment, these uses should be cancelled and removed from the label.

Nectarines (MRID NO. 401898-3)
50 ppm tolerance

Registered Uses: Delayed dormant or foliar applications may be made at pink, bud, full bloom, petal fall, shuck shed, cover, and preharvest periods, and as a postharvest foliage spray. Rates are up to 2 lb active/100 gal or 1.875-6 lb active/A. Applications may use ground or aerial equipment; no PHI and no seasonal maximums are in effect. Postharvest dip or spray uses 1.19 to 1.28 lb active/100 gal.

Three new nectarine studies are submitted, all reflecting 6 applications of 2 lb 50 WP/100 gal using ground spraying equipment at 250 gal/A and PHIs of 0-days.

We have included three studies (those reporting both captan and THPI analyses) from PP#3F2898. Two of these studies were single applications of 6 lb ai/A with PHIs of 0, 1, 3, 7, and 14 days. The third study involved 9 applications of 3.96 lb ai/A with samples taken at 0, 1, 3, 7, and 10 days after the last application.

The Registration Standard Requirements for nectarines state that the use direction for nectarines are similar to those for peaches. No data will be required depicting residues of concern in or on nectarines since, upon submission of the requested data for peaches, the data will be translated to nectarines.

Therefore, the 1986 nectarine and peach studies have been evaluated with regard to the Registration Standard Requirements for peaches, which state that:

tests must include multiple foliar applications and a D formulation at 6 lb ai/A/application and an EC formulation at 2 lb ai/100 gal. All tests must reflect use of ground and aerial equipment, and data must reflect captan residues of concern. Treatments must begin in pink bud periods and continue through cover stages; the registrant must propose a maximum seasonal use rate and provide supporting data. Samples of mature fruit must be obtained on the day of final treatment and immediately subjected to postharvest treatment with a WP or FLC formulation applied, in separate tests, in a dip and as a spray at 1.28 lb ai/100 gal.

The newly submitted studies represent multiple foliar applications of the 50 WP formulation from full pink to mature fruit. No data have been submitted on postharvest treatment either with a dip or a spray, therefore we recommend that this use pattern be cancelled.

As submitted, the data support lowering the tolerance to 25 ppm with a use pattern of 6 ground applications of 1 lb ai/100 gal (400 gal/A spray) with a PHI of 0 days. Since the submitted data did not include the required D or EC formulations and did not include aerial equipment, these uses should be cancelled. Appropriate label revisions should be made.

Peaches (MRID No. 401898-14)
50 ppm tolerance

Registered Uses: Delayed dormant or foliar application may be made using ground or aerial equipment at pink, bud, full bloom, petal fall, shuck shed, cover, preharvest, and (postharvest) fall foliage spray. Dose rates are 0.4 to 2 lb active/100 gal or 1.875 to 6 lb active/A. There is a 1-day PHI for the 6 lb/A rate only, and no seasonal maximum. Postharvest dip or spray rates are 1.19 to 1.28 lb active/100 gal.

Six studies from four locations are submitted, each study involving eight foliar applications with the last application on the day of harvest and two of the studies including an additional postharvest dip of the fruit. Application rates are reported in the summary table as 4.0 lb ai/A for foliar applications in five of the studies. However, the data presented in one of these, the Georgia study, showed that the application rate was actually 2.0 lb ai/A. The application rate in the sixth study was 2.5 lb ai/A.

We have also included the four studies submitted in PP#3F2898 which reported both THPI and captan residues. Estimates were done for all residue data available, for all preharvest treatments, for preharvest treatments with 0-day PHIs only, and for postharvest treatments.

We have also evaluated the data with regard to the requirements of the Registration Standard, which are:

tests must include multiple foliar applications with, in separate tests, a D formulation at 6 lb ai/A/application and an EC formulation at 2 lb ai/100 gal. All tests must reflect use of ground and aerial equipment, and data must reflect captan residues of concern. Treatments must begin in pink bud periods and continue through cover stages; the registrant must propose a maximum seasonal use rate and provide supporting data. Samples of mature fruit must be obtained on the day of final treatment and immediately subjected to postharvest treatment with a WP or FLC formulation applied, in separate tests, in a dip and as a spray at 1.28 lb ai/100 gal.

Based on the available data, we could support the proposed tolerance reduction from 50 ppm to 25 ppm for residues resulting from up to 8 applications of 2 lb WP/100 gal using ground equipment at the rate of 400 gal/A with a 0-day PHI.

Since the submitted data did not include either D or EC formulations in foliar application, or FLC formulation in postharvest treatment, we recommend cancellation of these uses. No data using aerial equipment were submitted, therefore we recommend cancellation of that use as well. Label revisions will need to be made.

The two studies which included a postharvest dip of 1.25 lb ai/100 gal of 50 WP resulted in average residues of 85.72 from the dip treatment. In his letter of June-11, 1987, the Captan Task Force chairman stated that the peach-dip is being dropped from the program.

Pears (MRID No. 401898-15)
25 ppm tolerance

Registered Uses: Foliar applications are registered at 0.5 to 1 lb active/100 gal (not to exceed 8 lb active/A per application) or up to 8 lb active/A dust. No PHI is established. Applications may be repeated at 7- to 14-day intervals (no seasonal maximum), and ground or aerial equipment may be used. Postharvest dip or spray rates are 1.19 to 1.28 lb active/100 gal.

Studies from four locations are submitted, each study involving five 4 lb ai/A foliar applications and 0-day PHIs. Two of the studies also included postharvest dips of the fruit, and two studies also took samples of fruit 7 and 14 days following the last captan application.

We have included the seven studies submitted in PP#3F2898 which reported both THPI and captan residues. Estimates were made for all residue data available, for all preharvest treatments, for preharvest treatments with PHIs of 0 days and of 14 days, and for the postharvest dip treatment.

The Registration Standard for pears states that:

The data are insufficient regarding foliar applications, or combinations of foliar and postharvest treatments for the following reasons: (i) no data were submitted reflecting residues from foliar applications at the maximum rate; (ii) no data were submitted reflecting residues from foliar applications at the maximum rate followed by postharvest treatment at the maximum registered rate. The data requested for apples will be translated to assess the established tolerances covering residues in or on pears. [It should be noted, however, that translated data may not be used to support a crop group tolerance.]

Based on the available data, we could support the proposed tolerance of 25 ppm for residues resulting from 5 applications of 4.0 lb ai/A using ground equipment followed by a postharvest dip at 1.25 lb ai/100 gal. The application rates and use patterns are the same as those for apples, and the tolerance is the same also. Use of the D and EC formulations for foliar applications and the FlC formulation for postharvest treatment should be cancelled until data are available, as should use of aerial equipment. Revised labels must reflect the approved uses.

Plums/Fresh Prunes (MRID Nos. 401898-16 and 17)

50 ppm tolerance

No tolerance (FAT) for dried prunes

Registered Uses: Delayed dormant and foliar applications at 0.46 to 1.5 lb active/100 gal or 2 to 5 lb active/A may be made using ground or aerial equipment at green bud, popcorn, bloom, petal fall, cover periods, and up through harvest if conditions favor disease. No PHI and no seasonal maximums are established; no postharvest use exists.

Three studies are submitted in which 3 lb ai/A are applied to plums in California and Michigan using ground equipment and PHIs of 0 days. One of the studies also involved an application rate of 9 lb ai/A, and another of the studies included PHIs of 7 and 14 days, and also provided analysis of the processed fruit (dry prune).

The studies submitted in PP#3F2898, which analyzed for both captan and THPI residues, are also included here. These studies included varying numbers of applications, rates of application, and PHIs. Estimates were done for all applications and all PHIs, and separately for PHIs of 0, 7, and 14 days. One study provided a single residue level for dry prunes. When compared with residue levels for fresh plums in the same study, concentration factors of 1.48 (PHI = 0 only) and 1.96 (all PHIs) were found for the prune.

The Registration Standard concludes that the available data provide adequate support for the established tolerance (50 ppm). A tolerance reduction to 15 ppm for combined residues of captan and THPI in or on plums is pending (PP#3F2898)). The Registration Standard also states that:

Residue data for prunes dried from plums bearing measurable, weathered residues. Should residues concentrate upon processing, an appropriate food additive tolerance must be proposed.

The submitted data would support lowering the tolerance to 15 ppm for residues in plums resulting from up to 9 applications of 1 lb ai/100 gal spray (max 300 gal/A) using ground equipment with no PHI. One study included residue data on prunes, and yielded a concentration factor of 1.96. We therefore propose a food additive tolerance of 30 for prunes.

Strawberries (MRID No. 401898-22)
25 ppm tolerance

Registered Uses: Delayed dormant and foliar applications (7-day intervals beginning when new growth starts in spring) of 1.9 to 5 lb active/A are registered.

Seven studies on strawberries are submitted in response to the data call-in notice. The studies involve either six, seven, or eight ground applications, in most cases at 7-day intervals, with the last application made on the day of harvest in every study but one (86410), where the PHI was two days.

Two studies submitted with PP#3F2898 and three studies submitted with the Residue Reduction Data have been combined with the new studies to estimate residue levels of captan and THPI on strawberries.

The studies submitted since the Captan Registration Standard (Residue Chemistry chapter) was written have been evaluated with reference to the data requirements of the standard:

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must take place at delayed dormant, popcorn, bloom, and petal fall, and at regular intervals thereafter up to 12 days prior to harvest. Applications must be made using both ground and aerial equipment, in separate tests.

The submitted studies use the maximum registered captan concentration (1.5 lb ai/100 gal) but not the maximum rate (16 lb ai/A). One of the earlier studies used aerial application at 5 lb ai/A, but the data are very limited and not considered adequate to establish use of aerial equipment. The one residue decline study from PP 3F2898 (study A-17782) used 10 lb ai/A, but only one application.

Although these almond studies were not submitted as response to the Captan Registration Standard, we can conclude that if the maximum application rate using ground equipment was reduced to 1.5 lb ai/100 gal, 350 gal/A with the currently permitted timing (up to 5 applications), and a 30-day PHI, tolerance levels (for captan and THPI) of 0.5 ppm for nuts and 75 ppm for hulls would be appropriate. The tolerance for hulls is contingent upon an acceptable enforcement method for secondary residues in meat and milk, which is not currently available. The feeding restriction placed on almond hulls is not considered practical because this is not under the control of the grower.

Since the submitted data did not address the FLC formulation, this formulation should be cancelled. Appropriate label revisions to reflect all the above changes should be made.

Apples (MRID Nos. 401898-03 and -04)
24 ppm tolerance

Registered Uses: Delayed dormant and foliar applications are registered at 0.25 to 1 lb active/100 gal (not to exceed 8 lb active/A) or 1.1 to 8 lb active/A dust, using ground or aerial equipment. No PHI and no seasonal maximum are established. Postharvest dip or spray may use 1.19 to 1.28 lb active/100 gal.

Seven new apple studies are submitted, all reflecting eight applications of 4 lb active/A using ground equipment at 200 to 400 gallons per acre. One study has a trial at 3x rate and includes processing data on 1x and 3x rates. Two other studies include dip treatments on (foliarly) treated and untreated apples. All of these new studies have 0-day PHIs, and three include 7- and 14-day PHIs also.

Data depicting captan residues of concern in or on strawberries, from tests reflecting the following full-season treatment program (samples must be collected immediately after the last treatment).

Delayed dormant and multiple foliar application by air or (in separate tests) by ground equipment of a WP or EC formulation at 5 lb ai/250 gal/A and (in separate tests) a D formulation at 5 lb ai/A.

The registrant must propose a label restriction which gives the maximum number of foliar applications allowed per season; the data required above must reflect that number.

All 12 of the studies being considered here use multiple ground applications of the 50 percent WP formulation at an application rate of 3 lb active ingredient/acre, which is lower than the maximum rate of 4 lb ai/A in the Registration Standard. While these studies were not submitted in response to the Registration Standard, the residue levels reported in them are consistent with the currently permitted 25 ppm tolerance level. This tolerance would appear to be appropriate for the reduced application rate of 3 lb active ingredient/acre.

Since no delayed dormant data were submitted and no data on foliar applications using either the D or EC formulation, these uses should be deleted from the label. Application is also restricted to ground equipment.

Tomatoes (MRID Nos. 401898-23, -24)
25 ppm tolerance

Registered Uses: Foliar applications use 1 to 5 lb active (dust, per acre, or "applied for even, thorough coverage") using ground or aerial application. No PHI, no seasonal maximum, and no interval between applications is specified. Seed treatments use 1.885 oz/active/100 lb seed.

Seven studies on tomatoes are submitted in response to the DCI notice. The studies all used 4 ground applications of 50 WP captan at 5- to 8-day intervals. One study had a PHI of 7 days, one had a PHI of 14 days, and the remaining 5 studies had PHIs of 0 days. Tomatoes from the King City, California test (no. 86934) were processed in a normal commercial manner. Samples of whole fruit, wet pomace, dry pomace, cannery waste, puree, juice, and catsup were analyzed in order to determine what happens to the residue when tomatoes are processed.

We have evaluated the newly submitted tomato studies with regard to the Registration Standard Requirements, which are:

tests including a preplant application with a D formulation at 7.5 lb ai/A, multiple foliar applications with a WP, and a D formulation at 5 lb ai/A/application. Treatments must begin at first fruit set and continue at 5-day intervals; samples of mature fruits must be obtained on the day of final treatment. Foliar applications must be made using both ground and aerial equipment, greenhouse tests must be represented, and these data must depict captan residues of concern. Data depicting residues in or on wet and dry pomace, puree, catsup, and juice processed from tomatoes bearing measurable weathered residues are also required.

As submitted, the data support the tolerance reduction from 25 ppm to 15 ppm for combined residues of captan and THPI in or on tomatoes proposed in PP#3F2898 for a use pattern of 3.75 lb active ingredient/A applied with ground equipment at intervals of 5 to 7 days with a 0-day PHI. Data from the study with an application rate of 11.25 lb ai/A, which more than doubles the maximum rate of 5 lb ai/A specified in the standard, showed residue levels comparable to the other studies.

Since the data submitted did not include preplant application, use of the dust formulation, or use of aerial equipment, these uses should be cancelled and appropriate changes made in the label.

Data from the processed tomatoes provided dry pomace concentration factors of 3.51 at the 3.75 lb ai/A application rate and 1.89 at the 11.75 lb ai/A application rate. This suggests that a feed additive tolerance of 55 ppm for dry tomato pomace will be needed. This tolerance is contingent upon an acceptable enforcement method for secondary residues in meat and milk, which is currently not available. At the 3.75 lb ai/A application rate, concentration factors of 0.31 for wet pomace, 0.43 for puree, 0.20 for juice, and 0.77 for ketchup do not suggest the need for food/feed additive tolerances.

Seed Treatment Studies

Six seed treatment studies are submitted by the Captan Task Force: beets, corn, potatoes, rice, soybeans, and spinach. Additional studies on potato seed piece and soybean seed treatments were submitted in PP#3F2898 and are included in this assessment.

Beets (MRID No. 401898-06)

2 ppm tolerance, roots

100 ppm tolerance, greens

Registered Uses: Up to 6.56 lb active/A (1 lb ai/100 gal, 15 gal/1000 ft²) as preplant broadcast soil application. Foliar application by ground or air of 1 lb active/100 gal, repeated at 7- to 10-day intervals. Other multiple active ingredient formulations are registered at up to 12 lb active/100 gal. No PHI, maximum dose, or maximum number of applications are established. Seed treatment rates are 9 oz active (0.56 lb) per 100 lb seed.

Data for a seed treatment study on beets in New York are presented; a second study on beets in California was lost and has been reinitiated. In the New York study, seed treated with 0.3 g ai/lb seed (1.06 oz ai/100 lb seed) was found to contain 20 ppm captan and 8 ppm THPI. But tops and roots were found to contain less than 0.05 ppm of both captan and THPI, however, duplicate samples of untreated seed contained 1.50 and 0.23 ppm of captan and 0.28 and 0.08 ppm of THPI, respectively. This apparent contamination makes the results of the study questionable. Also, raw data for the tabulated recovery study in beet tops are not submitted.

Corn (MRID No. 401898-09)

2 ppm tolerance, sweet corn, kernels plus cobs with husks removed

100 ppm tolerance, "detreated" seed corn

Registered Uses (sweet corn): Preplant soil treatment 3 to 4 inches deep using 6 lb active/A dust are registered. Foliar application may be made using ground or aerial equipment and 0.75 lb ai/100 gal. A 10-day PHI is imposed and corn foliage may not be fed to dairy animals or animals being finished for slaughter. Seed treatment rates for sweet corn are 2.1 to 3.76 oz active/100 lbs.

Registered Uses (field corn): Seed treatment for field corn at rates of 1.8 to 3.21 oz active/100 lbs seed. The detreated seed corn may be used as feed for cattle and hogs up to 14 days prior to slaughter. (This is being reconsidered separately.)

Two studies reflecting seed treatments are submitted, one on sweet corn and one on field corn. The California study on sweet corn is a seed treatment with a 4F formulation at 3.25 oz ai/100 lb seed. The treated seed contained 3.52 ppm captan and 14.5 ppm THPI. Forage at 50 days PHI and sweet corn kernels at 85 days PHI contained no detectable levels (< 0.05 ppm) of captan or THPI.

The Iowa study on field corn is a seed treatment with 65 sprills formulation at 1.5 oz ai/100 lb seed. (The maximum registered rate for field corn is 3.21 oz ai/100 lb.) Duplicate samples of treated seed contained 164 and 212 ppm captan and 7.4 and 6.9 ppm THPI. Control samples of untreated seed, corn grain (116 days PHI), and corn fodder (70 days PHI) contained detectable residues of captan and THPI, although the forage sample (166 days PHI) did not. In fact, except for the seed itself, residue levels in the treated and untreated commodities were similar.

	<u>Treated</u>		<u>Untreated</u>	
	<u>Captan</u>	<u>THPI</u>	<u>Captan</u>	<u>THPI</u>
seed	164 ppm 212 ppm	7.4 ppm 6.9 ppm	0.37 ppm	0.05 ppm
grain	0.14 ppm	< 0.05 ppm	0.32 ppm	0.1 ppm
forage	0.08 ppm	< 0.05 ppm	< 0.05 ppm	< 0.05 ppm
fodder	0.28 ppm 0.21 ppm	< 0.05 ppm < 0.05 ppm	0.24 ppm	< 0.05 ppm

The summary report for corn suggests "that contamination in the untreated check lends credit to the probability that the treated samples are also contaminated." The concluding statement (p. 13) states "no detectable residues were found for captan on THPI." The careless inclusion of such a clearly erroneous statement is unfortunate.

Because low level residues in several other commodities from seed treatments are reported in this submission, we cannot disregard the Iowa study. We are thus unable to reach any conclusion about whether residues might occur in corn grown from treated seed. Several additional studies should be conducted, and the commodity kernels plus cob with husk removed should be analyzed.

Potatoes (MRID No. 401898-18)
25 ppm tolerance

Registered Uses: Foliar application of 0.95 to 6 lb active/A, made at 5- to 7-day intervals using ground or aerial equipment. No PHI or seasonal maximum is established. Postharvest dip treatments use 1 to 1.25 lb active/100 gal after washing and rinsing, prior to storage. Seed piece treatments use 0.5 to 1.5 lb active/100 gal dipping solution or 0.75 to 2.4 oz active/100 lb pieces as dust. Seed pieces should be treated within 6 hours of planting, and treated seed pieces may not be used for food or feed. If whole potatoes are treated, a second application is needed after cutting.

Two studies are submitted in which seed treater formulations are applied to cut and suberized potato pieces prior to planting. These field trials were conducted on White Rose potatoes in California and Superior potatoes in Maine. The California study used Captan 10 Dust at a rate of 1.2 oz ai/100 lb seed pieces, while the Maine study used Captan 7.5% Dust at a rate of 1.35 oz ai/100 lb seed pieces.

Treated seed pieces of White Rose potatoes were found to contain 8.70 ppm captan and 9.70 ppm THPI. Treated seed pieces of Superior potatoes were found to contain 8.40 ppm captan and 8.00 ppm THPI. Samples of potatoes were taken and analyzed at PHIs for the White Rose potatoes. No detectable residues were found in any of the potatoes grown from these seed pieces.

Five additional seed treatment studies which analyzed for both captan and THPI residues were submitted in PP#3F2898. The studies conducted in Mississippi, New York, New Jersey, and Virginia involved single applications of 1.2 oz ai/100 lb seed pieces of 10 percent dust, while the Iowa study involved both 1.2 ai and 1.6 oz ai/100 lb seed pieces of 10 percent dust. No detectable residues of captan or THPI were found in mature Pontiac tubers from the Mississippi study sampled at 112 days, the New York study sampled at 155 days, or the Iowa study sampled at 211 days. The 136-day sample of Pungo potatoes from the Virginia study showed a residue of 0.06 ppm THPI but no captan residue. One of the 140-day samples of Russet Burbanks from the New Jersey study showed 0.24 ppm THPI but no other detectable residues. If all uses other than seed treatment are cancelled, we could support lowering the tolerance to 0.5 ppm.

Rice (MRID No. 401898-19)
No tolerance

Registered Uses: Only seed treatment to rice are registered.

Data for seed treatment studies on rice in California and Mississippi are submitted. The Mississippi field trial was conducted on Shybonnet variety rice using one application of 0.79 oz ai/100 lb of seed from (30-DD formulation). No raw data sheets were provided for the California study so the only information available is what is printed in the summary table. According to the table, seed was treated in one application of 1.24 oz active ingredient/100 lb of seed with an unknown formulation.

Treated Skybonnet seed in Mississippi was found to contain residues of 53.00 ppm captan and 15.00 ppm THPI. No detectable residues (< 0.05 ppm) were found in the control samples of untreated seed, grain, or straw, or in the rice grain or straw sampled 114 days after planting the treated seed.

In the California study, residues of 102.00 ppm captan and 21.00 ppm THPI were reported on the treated seed. No detectable residues were reported in samples of grain or straw, although the date of these samples is uncertain. (The PHI days column of the table reads "N/A.") A low level captan residue (0.19 ppm) was reported in the untreated seed; no detectable residues of either captan or THPI were found in the grain or straw grown from the untreated seed. The study concludes that the residue in the untreated seed is unimportant in view of the other findings. This reviewer finds the entire study inconclusive because of suspected contamination and the lack of supporting data to verify the results.

Soybeans (MRID No. 401898-20)
2 ppm tolerance, dry and succulent
No tolerance, forage, hay, or straw

Registered Uses: At-plant soil treatments use 1 to 3 lb active/A, or for the 5% Dust formulation, 2 to 6 lb active/A assuming 12.400 linear row feet. No feeding restrictions. Seed treatments use up to 3 oz active/A or 1.8 oz active/bushel as slurry, dry, or planter box application.

Two studies are submitted in which soybean seed was treated with a single application prior to planting. The Mississippi study used captan 30-DD at a rate of 0.6 oz ai/100 lbs of Ring Around 606 soybean seed. The Iowa study used captan 65 sprills at a rate of 1.3 oz ai/100 lb of Williams 82 soybean seed.

Treated Ring Around seed was found to contain 1.20 ppm captan and 6.40 THPI, and treated Williams seed was found to contain 288.00 ppm captan and 6.40 ppm THPI. In the report discussion, the statement is made that it is not reasonable to have a 1.2 ppm residue on seed treated with 0.6 oz ai/100 lb seed and a 228 ppm result on seed treated with 1.3 oz ai/100 lb seed. This discrepancy is being investigated. No detectable residues were found in the forage, beans, or hay grown from the Ring Around seed sampled at PHIs of 70, 151, and 151 days, respectively. Similarly, no detectable residues were found in the forage or hay grown from the Williams seed sampled at PHIs of 81 and 146 days, respectively. However, Williams beans at PHI = 146 days were found to have a captan residue of 0.37 ppm, but no detectable THPI residue. This result is suspect in that no residues were found in other plant parts. It is unlikely that this residue is from the seed treatment. For both studies, low levels of contamination were found in the untreated seed (0.15 ppm in Mississippi and 0.17 ppm in Iowa) but not in the forage, beans, or hay grown subsequently. The source of the contamination is being investigated.

None of the studies from PP#3F2898 analyzed for both captan and THPI residues, but overall the levels reported for captan in beans were undetectable or low (0.10, 0.13, and 0.21 ppm).

Spinach (MRID No. 401898-21)
100 ppm tolerance

Registered Uses: Preplant broadcast applications use 2 to 6 lb active/A; in-furrow applications use 2.375 to 3.5 lb active/A. Foliar applications may be made by ground or air, using up to 4 lb active/A. No PHI or seasonal maximum is established. Seed treatments use up to 0.5 to 4.5 oz active/100 lb seed.

Two studies are submitted in which captan is applied as a preplant seed treatment to spinach seed. According to the report, the California trial was lost twice to adverse growing conditions and has been restarted. However, data said to be from that study are included in the report.

The California study reportedly used 4 Flowable 38.5% captan at a rate of 2.18 oz ai/100 lb of Resitoflay spinach seed. The New York study used Captan 50W-Dust at a rate of 1.05 oz/100 lb of Winter Bloomsdale spinach seed. Treated Resitoflay seed was found to contain 76.00 ppm captan and 30.00 ppm THPI, and treated Winter Bloomsdale was found to contain 94.00 ppm captan and 21.00 ppm THPI. No detectable residues were found in the leaf grown from Winter Bloomsdale seed sampled 70 days after planting. However, untreated Winter Bloomsdale seed apparently was contaminated and was found to contain 0.24 ppm captan and 0.10 ppm THPI. No detectable residues were found on the leaf from the untreated seed. Nevertheless, the validity of the study is in question.

The California study reported no detectable residues on the untreated seed or leaf, but did find 1.10 ppm captan and 2.60 ppm THPI on the leaf grown from the treated seed at PHI = 73 days. Because of the uncertain status of this entire study, these data are being disregarded.

MAGNITUDE OF THE RESIDUE IN MEAT, MILK, POULTRY, AND EGGS

Tolerances of 0.05 ppm have been established for residues of captan in the fat, meat, and meat byproducts of cattle and hogs from a use being cancelled. We are recommending cancellation of this tolerance because of the lack of an adequate method for determining residues in meat and milk. (We are also recommending uses on crops where animal feed items exist be cancelled).

The Captan Task Force submitted a study in which residue concentrations of captan and its metabolites THPI, 3-OH THPI, and 5-OH THPI were measured in eggs and in the muscle, liver, kidney, heart, gizzard, fat, and skin of laying hens. One hundred hens were divided into 5 groups and given oral doses of 0, 1.5, 15, 45, or 150 ppm captan daily for a 28-day period. Ten hens from each group were sacrificed on the 28th day, followed by five more from each group after a 3-day withdrawal period, and the final five from each group after a 7-day withdrawal period. Eggs were collected and analyzed the day before the study began, and on days 1, 4, 7, 10, 14, 21, 28, 32, and 35 thereafter.

Captan was found to be quantitatively converted to THPI on contact with control samples of each tissue type and with eggs. Therefore, recoveries were calculated based on the conversion of captan to THPI.

No residues of any metabolites were found in any tissues or in eggs sampled 7 days after the dosing was stopped. In samples taken 3 days after the dosing was stopped, residues were found in the 150 ppm dose groups (approximately 0.01% of the dosage level)

and in eggs of the 15, 45, and 150 ppm dose groups. No residues of any metabolites were found in low dose group samples taken on the day of slaughter. THPI residues were found in all tissue samples at the three higher dose levels. In all tissue samples except fat, residues of THPI were about 0.77 percent of the dosage level; residues in fat were about 0.2 percent of the dosage level. 3-OH THPI and 5-OH THPI levels were found only in the higher dose groups sampled on the day of slaughter and averaged 0.1 percent and 0.05 percent of the dosage level, respectively.

Residues of THPI were found in eggs at all doses beginning on dosage day 1 while residues of 3-OH and 5-OH THPI were not detected until day 4. THPI residue levels reached a plateau on day 7 and were found to be approximately 2 percent of the dosage level. The minor metabolites 3-OH and 5-OH THPI plateaued on day 10 at about 0.2 percent of the dosage level (higher dose groups only).

It is anticipated that when tolerances are established for secondary residues in poultry tissue and eggs, they will be close to or at the limits of detection.

Tissue	Captan Fed ppm	Days after Cessation of Feeding	Residue Found, ppm			
			THPI	3-OH THPI	5-OH THPI	
					A	B
M U S C L E	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.09	< 0.025	0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.23	0.58	0.03	< 0.03
		3	< 0.03	< 0.025	< 0.02	< 0.03
		7	< 0.03	< 0.025	< 0.02	< 0.03
	150	0	1.05	0.28	0.07	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
L I V E R	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.11	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.25	0.038	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	1.1	0.18	0.07	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
K I D N E Y	1.5	0	0.03	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.13	0.027	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.32	0.049	0.03	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	1.4	0.21	0.09	< 0.03
		3	0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
H E A R T	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.12	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.29	0.046	0.03	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	0.68	0.13	0.05	0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03

Tissue	Captan Fed ppm	Days after Cessation of Feeding	Residue Found, ppm			
			THPI	3-OH THPI	5-OH THPI	
					A	B
G I Z Z A R D	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.08	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.19	0.029	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	0.93	0.11	0.03	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
F A T	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.04	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.10	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	0.31	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
S K I N	1.5	0	0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.08	0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.20	0.035	0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	0.73	0.12	0.04	0.07
		3	0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
E G G S	1.5	0	< 0.02	< 0.025	< 0.02	< 0.03
		3	< 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	15	0	0.33-0.39	0.022-0.040	0.02	< 0.03
		3	> 0.02	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	45	0	0.62-1.2	0.095-0.13	0.04-0.08	0.03-0.05
		3	0.05-0.09	< 0.025	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03
	150	0	2.6-3.2	0.34-0.47	0.19-0.22	0.12-0.16
		3	0.18-0.29	0.025-0.033	< 0.02	< 0.03
		7	< 0.02	< 0.025	< 0.02	< 0.03

The Registration Standard discusses two studies on dairy cattle submitted by Stauffer Chemical Company (MRID Nos. 00096910 and 00025125), which determined the residues of captan, THPI, 3-OH THPI, and 5-OH THPI in milk and cream and cattle tissues. In study MRID No. 00096910, residues of captan were not found in any milk or cream, but residues of THPI, 3-OH THPI, and 5-OH THPI were found.

Table 1. Maximum Milk Residues

<u>Metabolite</u>	<u>Nominal Dose Level, ppm</u>		
	<u>100</u>	<u>600</u>	<u>1200</u>
THPI	0.40	7.50	31.60
3-OH THPI	0.26	2.10	3.50
5-OH THPI	0.59	2.30	2.70

[From review of L.M. Bradley, November 15, 1985]

In study MRID No. 00025125, the following residues were found]

Table 2

Tissue	Captan Level	Day of Slaughter	Residue Found, ppm		
			Captan	THPI	3-OH THPI
F A T	100 ppm	21	0.00	0.03	0.01
		29	0.00	0.02-0.03	0.01-0.01
		32 (odd)	0.00	0.10-0.12	0.04
	600 ppm	21	0.00	0.93-1.0	0.06-0.09
		29	0.00	0.36-0.41	0.13
		32	0.00	0.01-0.02	0.00
	1200 ppm	21	0.00	3.9-4.0	0.09-0.14
		29	0.00	1.1	0.22-0.25
		32	0.00	0.01	0.00-0.01
H E A R T	100 ppm	21	0.00	0.11-0.12	0.02
		29	0.00	0.01	0.00
		32	0.00	0.00	0.00
	600 ppm	21	0.00	2.5-2.9	0.15-0.16
		29	0.00	0.65	0.01
		32	0.00	0.0	0.00
	1200 ppm	21	0.00-0.03	13	0.12-0.19
		29	0.00	2.8-3.1	0.11-0.04
		32	0.00	0.00	0.00
K I D N E Y	100 ppm	21	0.00	0.04	0.02
		29	0.00	0.01-0.02	0.00
		32	0.00	0.02-0.04	0.00
	600 ppm	21	0.00	1.6-2.0	0.04-0.06
		29	0.00	0.30-0.74	0.17-0.19
		32	0.00	0.01	0.00
	1200 ppm	21	0.00	6.6-8.4	0.06-0.29
		29	0.00	3.9-4.3	0.49-0.67
		32	0.00-0.01	0.01-0.02	0.00
L I V E R	100 ppm	21	0.00	0.04-0.07	0.00-0.01
		29	0.00	0.01	0.00
		32	0.00	0.01	0.00
	600 ppm	21	0.00	0.29-1.37	0.01-0.02
		29	0.00	0.84-0.86	0.05-0.06
		32	0.00	0.01	0.00
	1200 ppm	21	0.00	5.8-10.5	0.05
		29	0.00	2.9-3.2	0.24-0.30
		32	0.00	0.01-0.02	0.00
M U S C L E	100 ppm	21	0.00	0.08-0.09	0.01
		29	0.00	0.01	0.00
		32	0.00-0.01	0.01	0.00
	600 ppm	21	0.00	2.7-2.9	0.06
		29	0.00-0.01	0.78	0.04-0.05
		32	0.00	0.00	0.00
	1200 ppm	21	0.00	12	0.18-0.20
		29	0.00	3.2-3.8	0.26-0.32
		32	0.00	0.00	0.00

[From review of L.M. Bradley, November 15, 1985]

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These data indicate that meat and milk tolerance for captan residues (metabolites) will be required when considering the feed items where use is being requested. However, until the methodological problem has been resolved, we do not believe that meat and milk tolerances should be established and in fact the current meat tolerance should be cancelled.

RCB:TS-769:N.Gray:Edited vg:CM#2:Rm 810:X77484:4/20/88
cc: S.F. (captan), Reg. Std F (captan), RF, SIS, TOX, TAS,
CIRC, Gray

RDI: Rathman, 3/18/88/ Schmitt, 3/21/88/