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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Maneb (014505) Dietary exposure to Maneb and ETU;
Additional Residue Data submitted in response to the
Maneb Special Review (Storage Stability) Data Call In
Notice of 3/31/87
Orius Associates letter of 9/30/88
[MRID Nos. 408362-01 to -08, DEB #4570]

FROM: Susan V. Hummel, Chemist
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THRU: Edward Zager, Section Head
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TO: Valerie Bael, PM#77
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Orius Associates on behalf of the Maneb Registration Group (Pennwalt Corporation) has submitted 8 additional volumes of residue data in response to the Special Review (Storage Stability) Data Call In Notice of 3/31/87. The submitted data supplement the data previously submitted. The additional data consist of additional sites for crops for which 1987 residue data were previously submitted.

A bibliography of available residue data is included in this review as Attachment I.

We have made revised estimates of maneb and ETU residues, based on the available residue data. Our revised residue estimates for maneb and ETU in raw agricultural commodities are tabulated below in the body of this review. Revised residue estimates for cooked and processed commodities will be discussed in a separate memo, and will be based on additional cooking and processing data currently under review. When our review of recently submitted processing studies is complete, we will request TAS analyses for all EBDC's. The residue estimates from our forthcoming memo, and the percent crop treated information from BUD in their memo of 5/27/88 (E. N. Pelletier, SSB; and G. Ballard,

EAB) will be used by the TAS staff in estimating dietary exposure. For meat, milk, poultry, and eggs, the residue estimates will be adjusted by the percent crop treated for apples, since maneb residues in apple pomace comprise 80-98% of the total dietary burden of maneb.

The data submitted in response to the 3/31/87 Storage Stability Data Call In Notice were not reviewed for compliance with the 4/1/87 Comprehensive Data Call In Notice. No comments are made regarding geographic representation.

Detailed Considerations

RESIDUE DATA

This Submission

The following additional residue data were submitted:

<u>Crop</u>	<u>Location</u>	<u>Rate (lb ai/A)</u>	<u>MRID No.</u>
Cucumbers	FL	1.6	408362-07
Watermelons	CA	1.6	408362-01
Peppers	NC	1.6	408362-03
Cabbage	FL	1.6	408362-02
Kale	FL	1.6	408362-05
Potatoes	CA	16	408362-08
Spinach	CA	1.6	408362-04
Green Onions	CA, FL	1.6	408362-06

All residue data submitted reflected ground application.

Previous Submission

The following residue data were submitted in response to the 3/31/87 Storage Stability Data Call In Notice:

<u>Crop</u>	<u>Location</u>	<u>Rate (lb ai/A)</u>	<u>MRID No.</u>
Cucumbers	CA, MI, NC, SC, TX	1.6	405873-01
Watermelons	GA, TX	1.6	405401-03
Peppers	CA	1.6	405401-04
Dry Beans	CA, CO, MI, ND, NE	1.6	405401-05
Succ. Beans	CA, DE, MI, NY, OR, WI	1.6	405873-03
Cabbage	MI, NY, TX	1.6	405401-06
Broccoli	CA	1.6	405401-07
Sweet Corn	GA, IL, MN, NY, WI, OR	1.6	405873-04
Kale	CA, NJ, TX	1.6	405401-08
Lettuce	CA	1.6	405401-09
Potatoes	CA, ID, ME, ND, OR	1.6	405401-10
Spinach	NJ, TN, TX	1.6	405401-11
Sugar Beets	CA, ID, MN, ND	1.6	405873-05
Tomatoes	CA, FL, MI, TX	2.4	405873-07

<u>Crop</u>	<u>Location</u>	<u>Rate (lb ai/A)</u>	<u>MRID No.</u>
Green Onions	TX	1.6	405401-13
Apples	CA,OH,NY,WV,VA	4.5	405542-02
Grapes	CA	3.2	405542-04

All residue data submitted reflected ground application except apples. Additionally, a volume of data was submitted on ground vs. aerial applications (MRID No. 405542-01).

Previously submitted residue data also include data from tolerance petitions and data submitted in response to an earlier 3c2B letter (10/19/84). Petition data did not include analyses for ETU. Petition data and residue data from the 1985 growing season were reviewed in our memo of 2/20/87 (M. Kovacs, RCB Nos. 958, 972, 1238, 1239, 1379, 1380); and were included in the Residue Chemistry Chapter for the Maneb Registration Standard (8/25/86). Some residue data from the 1986 growing season were reviewed in an update to the Residue Chemistry Chapter (3/31/87). Other residue data from the 1986 growing season had not been reviewed because of data showing poor storage stability under the conditions the residue field trial samples had been stored. (See M. Kovacs memo of 1/21/87, RCB Nos. 1703 and 1716.) These data were tabulated in our memo of 6/30/88 (S. Hummel).

DEB Comment

No residue data have been submitted in response to the 3/31/87 DCI for carrots, turnips, turnip tops, dry bulb onions, celery, endive, rhubarb, collards, mustard greens, kohlrabi, brussels sprouts, cauliflower, chinese cabbage, eggplant, squash, pumpkin, apricots, peaches, nectarines, cranberries, almonds, corn forage and silage, asparagus, bananas, figs, and papayas. No residue data were required by the 3/31/87 Special Review Data Call In Notice for the use on tobacco or the seed, seed piece, and planting stock treatments on barley, corn, cotton, flax, oats, peanuts, pineapple, rice, rye, sorghum, soybeans, sunflowers, and wheat, since there are no tolerances to cover residues resulting from these uses.

Although residue data were required for all commodities having tolerances, the registrant apparently assumed that translation of data may be done as stated in the Comprehensive Data Call In Notice of 4/1/87. The 4/1/87 DCI stated that data for collards and mustard greens may be translated from spinach; kohlrabi and brussels sprouts from broccoli; cauliflower from cabbage, eggplant from tomatoes, squash from cucumbers, pumpkin from melons, and nectarines from peaches. The registrant's assumption is reasonable.

A discussion of the registrant's correspondence regarding the data requirements and requested time extensions was included in our review of 6/30/88 (S. Hummel).

Tabulation of 1987 Residue Data

The residue data submitted to date, from the 1987 growing season are tabulated below. These data were included in this submission and in the 3/88 submission.

Maneb Residue Data from 1987 Growing Season

Commodity	Rate (lb ai/A)	#Appli- cations	PHI (days)	Max. Storage (days)	Residue (ppm)				Locations
					Ave. Maneb	Max. Maneb	Ave. ETU	Max. ETU	
Carrots	not submitted								
Potatoes	1.6	12	14	44	<0.05	<0.05	<0.01	0.02	CA, ID, ME, ND, OR
	16	12	14	36	<0.05		<0.01		CA
Sugar Beets	1.6	7	14	126	0.35	1.8	<0.01	<0.01	CA, ID, MN, ND
Sugar Beet Tops	1.6	7	14	126	42.01	179	0.07	0.50	SC
Onions, dry bulb	not submitted								
Onions, green	1.6	7	7	50	5.3	14.9	0.05	0.14	TX, CA, FL
Celery	not submitted								
Lettuce	1.6	6	10	32	0.02	0.13	<0.01	<0.01	CA
Spinach, unwashed	1.6	4-5	7	60	8.58	13.26	0.04	0.08	TX, NJ
Spinach, washed	1.6	4-5	7	60	6.44	12.21	0.03	0.04	TX, NJ
Spinach, unwashed	1.6	4-5	10-14	83	22.5	32.6	0.14	0.26	TN, CA
Spinach, washed	1.6	4-5	10-14	83	16.0	26.2	0.07	0.11	TN, CA
Broccoli	1.6	6	3	29	7.08	8.52	0.12	0.17	CA
Cabbage, untrimmed	1.6	6-8	7	49	3.0	20.4	0.02	0.11	CA, MI, NY, TX, FL
Cabbage, trimmed	1.6	6-8	7	49	1.0	2.73	<0.01	0.02	"
Kale	1.6	4	7	68	15.1	28.8	0.10	0.29	CA, NJ, TX, FL
Kale	1.2	4	7	68	11.2	22.1	0.12	0.23	CA, NJ, FL
Kale	1.6	4	10	68	14.8	57.4	0.08	0.15	CA, NJ, FL
Kale	1.2	4	10	68	9.1	15.3	0.14	0.32	CA, NJ, FL
Beans, succ.	1.6	6-7	4	90	2.08	7.58	0.05	0.16	NY, WI, MI, DE, CA,
Succ bean vines	1.6	6-7	4	90	214	802	1.16	5.95	"
Succ bean vines	1.6	6-7	7	90	429	1425	0.86	1.38	"
Beans, Dry	1.6	6-7	4	107	1.67	4.16	0.03	0.06	CA, CO, MI, ND, DE
Dry bean vines	1.6	6-7	4	107	144	468	4.12	9.56	"
Peppers	1.6	6	7	99	0.63	1.86	0.01	0.05	CA, FL, TX, NC
Tomatoes	2.4	7	3	59	0.91	3.81	<0.01	<0.01	CA, FL, MI, TX
Cucumbers	1.6	7-8	5	42	0.6	2.4	0.05	0.13	CA, MI, NC, SC, FL,
Melons	1.6	8	5	85	0.19	1.0	<0.01	0.01	GA, TX, CA
Apples	4.5	7-13	21-30	191	0.55	0.99	<0.01	<0.01	CA, OH, NY, WV, VA
Apricots	not submitted								
Peaches	not submitted								

Maneb Residue Data from 1987 Growing Season, continued

Commodity	Rate (lb ai/A)	#Appli- cations	PHI (days)	Max. Storage (days)	Residue (ppm)				Locations
					Maneb		ETU		
					Ave.	Max.	Ave.	Max.	
Grapes	3.2	5	8	17	8.6	12	0.03	0.06	CA
	3.2	3	30	53	1.7	2.3	0.01	0.01	
	2.4	3	30	53	1.3	1.9	<0.01	<0.01	
	1.2	3	30	53	0.63	0.38	<0.01	<0.01	
Almonds	not submitted								
Corn, Sweet (K+CWHR)	1.6	5	4	105	0.07	0.27	<0.01	<0.01	GA,IL,MN,NY,WI,
Corn Fodder	1.6	5	4	105	26.2	70.8	0.07	0.17	

DEB Comment

Comments regarding the length of frozen storage of the samples prior to analysis were included in our memo of 6/30/88 (S. Hummel). The samples reported on in this submission were not stored any longer than the samples included in previous reports. Thus, our conclusions regarding the length of frozen sample storage did not change. Because of the severe degradation of ETU residues in the time the samples were held before analysis, ETU residues estimates will be corrected for the loss of ETU on frozen samples storage.

Except for an exaggerated rate potato study, the rates of application were identical to data submitted previously. As noted in our previous review, except for potatoes and tomatoes, the submitted residue data did not reflect the maximum rate on registered labels. (See registered uses section of this review.) The minimum PHI on the label was not always observed. Data reflecting the maximum rate, maximum number of applications, and minimum PHI were required in the 4/1/87 Comprehensive Data Call In Notice.

Chromatograms from previously submitted 1987 residue studies have now been submitted (S. Hummel memo of 12/09/88, MRID No. 406673-01). The analyses for the samples in the recently submitted report were completed in the same general time frame as the chromatograms submitted and therefore will be sufficient. However, chromatograms will be a required part of raw data for future submissions.

The data submitted in response to the 3/31/87 Storage Stability Data Call In Notice were not reviewed for compliance with the 4/1/87 Comprehensive Data Call In Notice. No comments are made regarding geographic representation.

RESIDUE ESTIMATES IN RAW AGRICULTURAL COMMODITIES

Residue values to be used in the Special Review are the best available estimates based on the studies discussed above. We have used the average maneb residues from residue field trial data from studies closest to the maximum rate, minimum PHI, and at least the typical number of applications. If higher average residues were found in residue studies with a longer PHI or lower application rate, the higher residues were used as residue estimates. If residues from a lower application rate than the maximum application rate were used, then the residue estimate was increased proportionally to the maximum application rate. For ETU residues, we have used the average ETU residue from residue field trial data, corrected for the loss of ETU residue on sample storage when the loss on storage exceeded 20%. The correction for the loss of ETU on frozen sample storage is shown in the table. Average residue estimates will be used for chronic analysis. Maximum residue estimates will be used for acute analysis.

Average Residue Estimates in Raw Agricultural Commodities

<u>Crop</u>	Residue (ppm)	
	<u>Maneb</u>	<u>ETU</u> , with correction for loss of ETU on frozen storage
Carrots ^{1/}	9.99	0.023
Potatoes ^{2/}	0.077	<0.012
Sugar Beets ^{3/}	0.35	<0.012/0.70 = <0.017
Sugar Beet Tops ^{3/}	42.0	0.17/0.34 = 0.50
Turnips ^{1/}	13.68	0.018/0.63 = 0.29
Turnip Tops ^{1/}	47.8	0.06/0.21 = 0.29
Onions, Green ^{4/}	6.6	0.06
Onions, bulb ^{1/}	5.89	0.11/0.70 = 0.16
Celery ^{1/}	64.9	0.073/0.21 = 0.35
Lettuce, Leaf ^{1/}	22.6	0.13/0.21 = 0.62
Lettuce, Head ^{5/}	6.77	0.011/0.21 = 0.052

^{1/} 1986 residue data

^{2/} 1985 residue data with higher residue than 1987 residue data

^{3/} 1987 residue data with proportional increase for Maneb; 1985 residue data for ETU showing higher residue than 1987 residue data

^{4/} 1987 residue data with proportional increase

^{5/} 1986 and 1985 residue data

Average Residue Estimates in Raw Agricultural Commodities, continued

<u>Crop</u>	<u>Residue (ppm)</u>	
	<u>Maneb</u>	<u>ETU</u>
Spinach, unwashed ^{6/}	19.4	0.11
Spinach, washed ^{6/}	14.0	0.06
Collards ^{7/}	14.0	0.06
Mustard Greens ^{8/}	51.1	0.12/0.76 = 0.15
Broccoli, unwashed ^{8/}	19.9	0.07/0.76 = 0.092
Kohlrabi ^{9/}	19.9	0.07/0.76 = 0.092
Brussels Sprouts ^{9/}	19.9	0.07/0.76 = 0.092
Cabbage, untrimmed ^{10/}	2.98	0.04
Cabbage, trimmed ^{10/}	1.0	<0.01
Cauliflower ^{11/}	0.85	<0.01
Chinese Cabbage ^{11/}	0.85	<0.01
Kale ^{12/}	18.5	0.10
Beans, Succulent ^{12/}	3.12	0.075
Beans, Dry ^{12/}	2.50	0.045
Succulent Bean Vines ^{12/}	644	1.74
Dry bean Vines ^{12/}	216	6.18
Peppers ^{13/}	7.1	0.03
Tomatoes ^{14/}	4.25	<0.01
Eggplant ^{15/}	4.25	<0.01
Cucumbers ^{12/}	0.75	0.06
Squash ^{16/}	0.95	<0.01

^{6/} Average of 1987 field studies with proportional increase, 7-14 day PHI

^{7/} translated from spinach

^{8/} 1986 residue data

^{9/} translated from broccoli

^{10/} 1987 residue data

^{11/} translated from cabbage

^{12/} 1987 residue data with proportional increase

^{13/} 1986 residue data with higher residue

^{14/} 1985 residue data with higher residues

^{15/} translated from tomatoes

^{16/} 1985 residue data

Average Residue Estimates in Raw Agricultural Commodities continued

<u>Crop</u>	<u>Residue (ppm)</u>	
	<u>Maneb</u>	<u>ETU</u>
Melons 17/	0.19	0.012
Pumpkin 18/	0.19	0.012
Apples 19/	13.4	$0.03/0.14 = 0.21$
Apricots 20/	34.2	$0.344/0.14 = 2.46$
Peaches 20/	68.8	$0.20/0.14 = 1.42$
Nectarines 20/	20.9	$0.058/0.14 = 0.41$
Grapes 21/	10.8	$0.038/0.14 = 0.27$
Almonds 22/	0.44	<0.040
Almond Hulls 22/	117.2	<0.080
Sweet Corn (K+CWHR) 23/	0.3	<0.016
Corn Fodder 23/	42.4	0.105
Corn Cannery Waste 24/	3.83	0.048
Bananas, whole 24/	0.07	0.016
Banana, edible portion 24/	<0.05	0.018
Figs 20/	0.95	0.015
Cranberries 20/	0.32	0.01
Papayas 25/	2.8	-
Rhubarb 26/	65	0.35

17/ 1987 residue data with proportional increase

18/ translated from melons

19/ 1985 residue data showing higher residues and proportional increase

20/ 1986 residue data

21/ 1987 residue data with proportional increase

22/ 1985 residue data with proportional increase

23/ 1985 residue data with higher residues

24/ 1985 residue data

25/ PP#225

26/ translate from celery

Maximum Residue Estimates in Raw Agricultural Commodities

Crop	Residue (ppm)	
	Maneb	ETU
Carrots	18.	0.080
Potatoes	0.099	0.003
Sugar Beets	2.7	0.004
Sugar Beet Tops	179	1.7
Turnips	19	0.043
Turnip Tops	122	0.68
Onions, Green	22	0.21
Onions, bulb	12	0.16
Celery	180	1.3
Lettuce, Leaf (washed)	119	1.7
Lettuce, Head	18	0.29
Spinach	92	0.47
Collards	92	0.47
Mustard Greens	85	0.20
Broccoli, unwashed	48	0.24
Kohlrabi	48	0.24
Brussels Sprouts	48	0.24
Cabbage, untrimmed	20	0.11
Cabbage, trimmed	2.7	0.020
Chinese Cabbage	2.7	0.020
Cauliflower	2.7	0.020
Kale	57	0.32
Beans, Succulent	11	0.24
Beans, Dry	6.3	0.090
Succulent Bean Vines	2140	9.0
Dry Bean Vines	702	14
Peppers	24	0.080
Tomatoes	12	0.002
Eggplant	see tomatoes	
Cucumber	3.6	0.20
Squash	0.95	0.002
Melons	2.3	0.015
Pumpkin	2.3	0.015
Apples	30	0.51
Apricots	156	3.9
Peaches	175	5.5
Nectarines	75	2.0
Grapes	15	0.54
Almonds	2.3	0.010
Almond Hulls	368	0.10
Sweet Corn (K+CWHR)	1.9	0.016
Corn Fodder	93	0.24
Corn Cannery Waste	3.8	0.048
Bananas, whole	0.22	0.023
Banana, edible portion	0.050	0.030

Average Residue Estimates in Raw Agricultural
Commodities continued

<u>Crop</u>	<u>Residue (ppm)</u>	
	<u>Maneb</u>	<u>ETU</u>
Figs	3.2	0.066
Cranberries	0.74	0.012
Papayas	5.2	0.002
Rhubarb	180	1.3

Attachment I: Table of available residue data
attached to all copies except circu

cc: R.F., circu, S. Hummel, Maneb S.F., Maneb S.R.F. (Hummel),
Maneb R.S.F. (Hazel), V. Bael (SRB/RD), S. Lewis (PM#21),
PMSD/ISB
RDI:EZ:12/06/88:RDS:12/12/88
TS-769:RCB:RM810:CM#2:SVH:svh:12/13/88

Attachment I to DEB No. 4570

408362-01. (1988) Maneb and ethylene thiourea: Magnitude of the residue in watermelons treated by ground equipment in California. Addendum to MRID No. 405401-03. Submitted by Orius Associates, Report No. 88172. Analytical Work by Morse Laboratories.

408362-02. (1988) Maneb and ethylene thiourea: Magnitude of the residue in cabbage treated by ground equipment in Florida. Addendum to MRID No. 405401-06. Submitted by Orius Associates, Report No. 88173. Analytical Work by Morse Laboratories.

408362-03. (1988) Maneb and ethylene thiourea: Magnitude of the residue in peppers treated by ground equipment in North Carolina. Addendum to MRID No. 405401-04. Submitted by Orius Associates, Report No. 88174. Analytical Work by Morse Laboratories.

408362-04. (1988) Maneb and ethylene thiourea: Magnitude of the residue in spinach treated by ground equipment in California. Addendum to MRID No. 405401-11. Submitted by Orius Associates, Report No. 88175. Analytical Work by Morse Laboratories.

408362-05. (1988) Maneb and ethylene thiourea: Magnitude of the residue in kale treated by ground equipment in Florida. Addendum to MRID No. 405401-08. Submitted by Orius Associates, Report No. 88176. Analytical Work by Morse Laboratories.

408362-06. (1988) Maneb and ethylene thiourea: Magnitude of the residue in green onions treated by ground equipment in California and Florida. Addendum to MRID No. 405401-13. Submitted by Orius Associates, Report No. 88177. Analytical Work by Morse Laboratories.

408362-07. (1988) Maneb and ethylene thiourea: Magnitude of the residue in cucumbers treated by ground equipment in Florida. Addendum to MRID No. 405873-01. Submitted by Orius Associates, Report No. 88178. Analytical Work by Morse Laboratories.

408362-08. (1988) Maneb and ethylene thiourea: Magnitude of the residue in potatoes treated at an exaggerated rate by ground equipment in California. Addendum to MRID No. 405401-10. Submitted by Orius Associates, Report No. 88185. Analytical Work by Morse Laboratories.