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

SEP 2 1988

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: EPA Registration No. 53201-1 (RCB No. 3887) - Methyl Bromide Revised Protocol for Soil Fumigation Residue Studies (No Accession Number)

FROM: Nancy Dodd, Chemist
Tolerance Petition Section II
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THRU: John H. Onley, Ph.D., Section Head
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and

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Note: The name of Residue Chemistry Branch has been changed to Dietary Exposure Branch.

The Methyl Bromide Industry Panel (MBIP) submits a revised protocol for soil fumigation studies in response to RCB's review dated February 2, 1988 of the original protocol. In addition, a cover letter dated March 11, 1988 which lists changes that have been incorporated in the revised protocol and copies of the analytical methods (without recovery data, etc.) for analysis of MeBr (Procedure I, MeBr by Headspace, GC, Modified King Headspace Method) and for analysis of inorganic bromide (Procedure II, Inorganic Bromide Analysis with Ion Selective Electrode) are also submitted.

Summary of Deficiencies That Still Need Resolution

- A group tolerance for the small fruits and berries group should not be proposed since two representative

crops cannot be omitted. If proper representation of crops in the small fruits and berries group is not provided, then RCB suggests that all the individual small fruits and berries for which tolerances are desired be listed under "Miscellaneous" in Table 1.

- Revised labels and residue data are needed to support changes in the application rate for various crops.

- Upon submission of residue data, RCB will check that maximum residues of iBr and MBr within a proposed crop group do not vary by more than a factor of 5.

- IR-4 needs to propose application rates and geographic sites for okra.

- Table 2 is not a complete list of raw agricultural commodities (RACs) to be treated both preplant and postharvest and then processed.

- Table 2 is not a complete list of processed commodities.

- Revised labels should be submitted to conform to the protocol's minimum interval between application and planting.

- The issue of harvest to sampling time is not resolved until the MBIP analyzes the loss of MBr with time and incorporates the appropriate procedures related to sample shipment and analysis into the preplant protocol.

- The MBIP should submit validation/recovery data for the ion selective electrode method as requested in the Residue Chemistry Chapter (dated March 28, 1986) of the Methyl Bromide Registration Standard and answers to the method issues raised in RCB's July 14, 1988 review of the follow-up to the Methyl Bromide Registration Standard.

- The proposed geographic representations are adequate for celery, basil, chives, marjoram, sage, avocados, pineapples, pistachio nuts, radish, garlic, lemon, almond, oranges, and grapefruit. For the remainder of the crops, adequate geographic representation is not proposed. The MBIP should follow the "Ideal Geographic Representation from IR-4 Memorandum or RCB Files."

- o Since soybeans are a representative crop for the crop group legume vegetables, the individual remaining commodities from the legume vegetables group should be listed under "Miscellaneous."

Conclusions (Resulting from the Review of this Submission)

1a. The following processed commodities should be added to the petitioner's Table 2:

Potatoes - Add wet peel, dry peel, and processed potato waste.

Soybeans - Add hulls.

Tomatoes - Add puree.

Oranges - Add wet pulp, molasses, and oil.

Grapes - Add raisin waste.

Spice- Add dried spice.

1b. The following raw agricultural products and processed commodities should be added to table 2:

Add plums - Add prunes.

Add almonds - Add hulls.

Add sugar beet - Add molasses, dehydrated pulp, and refined sugar.

Add mustard greens - Add seeds.

Add beans - Add cannery residue.

Add sweet corn - Add cannery waste.

2. Residue data obtained using method Pr6e-64 cannot be used to support the proposed tolerances since fortification/recovery data for Pr6e-64 are not available.

3. Residue data reflecting the 240 lb ai/A rate do not support higher use rates.

4. Even though cabbage in New York may be processed to sauerkraut, residue data for cabbage in New York are still needed.

5. The petitioner has indicated that asparagus in Michigan is not grown on preplant fumigated soil. In any case, residue data from the remaining states of California, New Jersey, Washington, Massachusetts, and Illinois would be acceptable.

6. The petitioner has indicated that tobacco data are not needed since only seed beds used for transplants are fumigated preplant. However, residue data are needed on tobacco since tobacco seeds are grown to seedlings 5 to 6 inches tall with four to six leaves in fumigated beds.

7. Residue data on tomatoes should include cherry tomatoes.

Recommendations

RCB finds the submitted protocol for residue data for MBr residues to be incomplete for reasons listed under the Summary of Deficiencies That Still Need Resolution above.

Note to PM: RCB recommends that this entire review be sent to the MBIP.

Detailed Considerations

Deficiency No. 1a

The MBIP has not adequately selected the representative commodities for the crop group bulb vegetables. The representative commodities are "onion (green and bulb) and one other commodity." The MBIP has proposed obtaining data on onions (green), onions (large bulb), and onions (small bulb). The MBIP would also need to obtain data on one other commodity from the bulb vegetables group.

Petitioner's Response to Deficiency No. 1a

The MBIP has added garlic in California to Table I under "bulb vegetables."

RCB's Discussion/Conclusion re: Deficiency No. 1a

Deficiency No. 1a is resolved by inclusion of garlic in California under bulb vegetables in Table I. According to RCB's memorandum "IR-4 Crop Grouping Comments" (R. Perfetti, December 8, 1983), residue data from California are considered to be adequate for geographic representation for garlic.

Deficiency No. 1b

The MBIP has not adequately selected the representative commodities for the crop group cereal grains. The representative commodities are "corn (fresh sweet corn and dried field corn), rice, sorghum, and wheat." The MBIP has proposed obtaining data on dry corn, rice, sorghum, and wheat. The MBIP would also need to obtain data on fresh sweet corn.

Petitioner's Responses to Deficiency No. 1b

The MBIP has deleted the cereal grains group from Table I because it will not seek a preplant tolerance for the cereal grains group. However, MBIP has added "sweet corn" in California and Florida in Table I under "Miscellaneous."

RCB's Discussion/Conclusion re: Deficiency No. 1b

Deficiency No. 1b is resolved by deletion of the cereal grains group from Table I.

Note: Refer to RCB's Discussion of Deficiency No. 8 for a discussion of adequate geographic representation for sweet corn. Residue data for sweet corn should be obtained from Florida, California, New York, Texas, Ohio/Pennsylvania, Massachusetts/New Jersey, Oregon/Washington/Idaho, Michigan/Minnesota/Wisconsin, and Illinois.

Deficiency No. 1c

Crop group tolerances will not be appropriate where maximum residues of iBr or MBr vary by more than a factor of 5, as explained in 40 CFR 180.34(f)(5) and (6) below:

"(5) If maximum residues (tolerances) for the representative crops vary by more than a factor of 5 from the maximum value observed for any crop in the group, a group tolerance will ordinarily not be established. In this case individual crop tolerances, rather than group tolerances, will normally be established. By keeping the range of residues small, the Agency intends not to alter the environmental or health benefits of the present program.

"(6) Alternatively, a commodity with a residue level significantly higher or lower than the other commodities in the group may be excluded from the group tolerance (e.g., cereal grains, except corn). In this case an individual tolerance at the appropriate level for the unique commodity

> would be established, if necessary. Residue data from crops additional to those representative crops in a grouping may be required for systemic pesticides."

Petitioner's Response to Deficiency No. 1c

The MBIP will delete a crop group from Table I if maximum residues in a group vary by more than a factor of 5.

RCB's Discussion/Conclusion re: Deficiency No. 1c

Deficiency No. 1c is outstanding pending submission of residue data. At that time, RCB will check that maximum residues of iBr or MBr within a proposed crop group do not vary by more than a factor of 5.

Deficiency No. 1d

For crop group tolerances to be established the proposed uses must be similar as stated in 40 CFR 180.34(f)(3):

> "Since a group tolerance reflects maximum residues expected to occur on all individual crops within a group, the proposed or registered patterns of use for all crops in the group must be similar before a group tolerance is established. The pattern of use consists of the amount of pesticide applied, the number of times applied, the timing of the first application, the interval between applications, and the interval between the last application and harvest. The pattern of use will also include the type of application; for example, soil or foliar application, or application by ground or aerial equipment."

This is not the case with lettuce (with established application rates up to 400 lb ai/A) and celery and spinach (with proposed application rates up to 240 lb ai/A). Also, the proposed/established uses on the small fruits and berries group are not the same. Therefore, crop group tolerances for the leafy vegetables group and the small fruits and berries group are not appropriate.

Petitioner's Response to Deficiency No. 1d

"The Methyl Bromide Industry Panel will generate preplant residue data for the leafy vegetable crop group using a 300 lb/A rate for all crops. The same rate will be

used for small fruits and berries except grape and cranberry. Grapes will be in the miscellaneous category and cranberries will not be included in the test work. There will be no test work done at the 240 lb/A rate."

RCB's Discussion/Conclusion re: Deficiency No. 1d

Representative crops for the small fruits and berries group are blackberry or other Rubus spp., blueberry, cranberry, grape, and strawberry. A crop group tolerance is not appropriate since two representative crops (grapes and cranberries) would be omitted. [Under 40 CFR 180.34(f)(6), a "unique commodity" can be excluded from a crop group tolerance because of significantly higher or lower residue levels. This exclusion does not apply to two crops that would be excluded because of different proposed/established use patterns.]

Deficiency No. 1d re: the small fruits and berries crop group is not resolved. Without appropriate representation of the small fruits and berries group, RCB suggests that all of the small fruits and berries for which tolerances are desired be listed under "Miscellaneous" in Table I.

Deficiency No. 1d re: the leafy vegetable crop group can be resolved provided a label is obtained for applications to lettuce, celery, and spinach at the rate of 300 lb ai/A.

RCB's Comment No. 2a

Application rates for MBr of up to 240 lb ai/A have been proposed or established for a preplant soil application for the crop groups root and tuber vegetables, bulb vegetables, leafy vegetables except Brassica, Brassica vegetables, legume vegetables, fruiting vegetables except cucurbits, cucurbit vegetables, small fruits and berries, herbs and spices, and also for okra (refer to the Residue Chemistry Chapter [dated March 28, 1986] of the Methyl Bromide Registration Standard and to PP#5F3198, M. Firestone, April 12, 1985). Therefore, the proposed application rates for the preplant soil application of 240 lb ai/A in the protocol are adequate for broccoli, fruiting vegetables, cucurbit vegetables, and strawberries.

Petitioner's Response to Comment No. 2a

All application rates will be 300 lb/A or 870 lb/A except where indicated in Table I. We realize that some original tolerances were established on a 240 lb/A rate. Our intention now is to ask the Agency to increase that label rate to 300 lb/A. We will revise the small fruits and berries group to eliminate grapes and cranberries.

RCB's Discussion/Conclusion re: Comment No. 2a

RCB concludes that labels for the 300 lb ai/A or 870 lb ai/A rates should be provided along with the appropriate residue data to support changes in the application rates.

The MBIP should refer to Deficiency No. 1d for a discussion of the unsuitability of a crop group tolerance for the small fruits and berries group.

RCB's Comment No. 2bii

The proposed rate for asparagus of 400 lb ai/A in California and 240 lb ai/A in Maine and Washington is adequate.

Petitioner's Response to Comment No. 2bii

Table I now lists asparagus for California and Washington at 400 lb ai/A.

RCB's Discussion/Conclusion re: Deficiency No. 2bii

RCB concludes that revised labels and residue data should be provided to support rate changes.

Note: Refer to RCB's discussion of Deficiency No. 8 for a discussion of adequate geographic representation for asparagus. Residue data for asparagus should be obtained from California, New Jersey, Washington, Massachusetts, and Illinois.

RCB's Deficiency No. 2biii

The proposed rate for tobacco of 870 lb ai/A should be 872 lb ai/A.

Petitioner's Response to Deficiency No. 2biii

The MBIP has listed tobacco in Table I for a rate of 872 lb ai/A in North Carolina/Kentucky.

RCB's Discussion/Conclusion re: Deficiency No. 2biii

Deficiency 2biii is resolved. The MBIP has revised the rate for tobacco in Table I to 872 lb ai/A as requested.

Note: Refer to RCB's discussion of Deficiency No. 8 for a discussion of adequate geographic representation for tobacco. Residue data for tobacco should be obtained from North Carolina, Kentucky, Georgia, Maryland/Pennsylvania, and Wisconsin.

RCB's Deficiency No. 2biv

The rate for pineapples should be 240 lb ai/A.

Petitioner's Response to Deficiency No. 2biv

The MBIP has revised the rate for pineapples in Table I to be 300 lb ai/A since the MBIP intends to ask EPA to increase the label rate to 300 lb ai/A.

RCB's Discussion/Conclusion re: Deficiency No. 2biv

Deficiency No. 2biv remains unresolved. RCB concludes that revised labels and residue data should be provided to support a rate change.

RCB's Deficiency No. 2bv

The rate for grapes should be 600 lb ai/A. The rate for Rubus spp., blueberry, and cranberry should be 240 lb ai/A since the rate which is proposed for small fruits and berries in PP#5F3198 is apparently up to 240 lb ai/A.

Petitioner's Response to Deficiency No. 2bv

The rate in Table I is now 600 lb ai/A for grapes and 300 lb ai/A for Rubus spp., blueberry, and cranberry. The petitioner intends to ask EPA to increase the label rate for Rubus spp., blueberry, and cranberry to 300 lb ai/A.

RCB's Discussion/Conclusion re: Deficiency No. 2bv

Deficiency No. 2bv remains unresolved. RCB concludes that revised labels and residue data should be provided to support a rate change.

RCB's Comment No. 2bvi

The proposed rates for bulb vegetables of 300 lb ai/A in California and Oregon and 240 lb ai/A in Colorado, Texas, and New York are adequate.

Petitioner's Response to Comment No. 2bvi

The MBIP has submitted a revised Table I which lists a rate of 300 lb ai/A for bulb vegetables.

RCB's Discussion/Conclusion re: Comment No. 2bvi

RCB concludes that revised labels and residue data should be provided to support a rate change.

RCB's Comment No. 2bvii

The proposed rate of 400 lb ai/A in California, Arizona, and Florida for lettuce is adequate.

Petitioner's Response to Comment No. 2bvii

The MBIP has submitted a revised Table I with a rate of 300 lb ai/A for head lettuce and leaf lettuce in California, Florida, and Texas.

RCB's Discussion/Conclusion re: Comment No. 2bvii

RCB concludes that revised labels and residue data should be provided to support the proposed use.

RCB's Deficiency No. 2bviii

The proposed rate on celery of 240 lb ai/A in Florida and Maine is adequate. The rates in California for celery and the rates for spinach should also be 240 lb ai/A. (No crop group tolerance is applicable. See No. 4 below.)

Petitioner's Response to Deficiency No. 2bviii

The MBIP has submitted a revised Table I with a rate of 300 lb ai/A for celery in California, Florida, and Michigan and for spinach in California and Texas.

RCB's Discussion/Conclusion re: Deficiency No. 2bviii

Deficiency No. 2bviii remains outstanding. RCB concludes that revised labels and residue data should be provided to support a rate change.

RCB's Deficiency No. 2bix

The application rate for cabbage and mustard greens should be the same as for broccoli (i.e., 240 lb ai/A).

Petitioner's Response to Deficiency No. 2bix

The petitioner has submitted a revised Table I with a rate of 300 lb ai/A for broccoli, cabbage, and mustard greens.

RCB's Discussion/Conclusion re: Deficiency No. 2bix

Deficiency No. 2bix remains outstanding. RCB concludes that revised labels and residue data should be provided to support a rate change.

Deficiency No. 2c

The preplant soil application rate for the root and tuber vegetables group, for the legume vegetables group, and for the herbs and spices group should be 240 lb ai/A since that is the maximum rate proposed in PP#5F3198.

Petitioner's Response to Deficiency No. 2c

The application rate in Table I is now 300 lb ai/A for the root and tuber vegetables group, the legume vegetables group, and the herbs and spices group.

RCB's Discussion/Conclusion re: Deficiency No. 2c

Deficiency No. 2c remains outstanding. RCB concludes that revised labels and residue data should be provided to support a rate change.

Deficiency No. 2d

No application rates or sites have been listed on the submitted protocol for corn, rice, sorghum, and wheat and for the miscellaneous crops avocados, cocoa beans, coffee beans, copra, cottonseed, okra, peanuts, and pistachio nuts.

Petitioner's Response to Deficiency No. 2d

Rates and sites are listed in Table I for those crops which we wish to have registered for preplant use. There are no preplant soil fumigation tolerances requested in the case of field corn, rice, wheat, cocoa beans, coffee beans, copra, and cottonseed. Note that information on okra is to be submitted by IR-4.

RCB's Discussion/Conclusion re: Deficiency No. 2d

The MBIP has removed the following crops from Table I because there are no preplant soil fumigation tolerances requested for these crops: field corn, rice, sorghum, wheat, cocoa beans, coffee beans, copra, and cottonseed.

The MBIP now proposes the following rates and sites for the following miscellaneous crops:

Sweet corn	- 300 lb ai/A;	California and Florida
Avocados	- 400 lb ai/A;	California and Florida
Peanuts	- 300 lb ai/A;	Florida and Texas
Pistachio nuts	- 300 lb ai/A;	California and Texas

The MBIP indicates that IR-4 will submit the rate and site information for okra.

Deficiency No. 2 remains outstanding until IR-4 provides the requested rate and site information for okra.

Note: Adequate geographic representation is proposed for avocados and pistachio nuts. However, adequate geographic representation is not proposed for sweet corn and peanuts. The MBIP should refer to the discussion of Deficiency No. 8 (Table A).

Deficiency No. 2e

No application rate has been proposed for alfalfa and clover other than that of 240 lb ai/A listed in the submitted protocol.

Petitioner's Response to Deficiency No. 2e

The rate for alfalfa and clover is 300 lb/A.

RCB's Discussion/Conclusion re: Deficiency No. 2e

Deficiency No. 2e is resolved by proposal of a 300 lb ai/A rate for alfalfa and clover.

Note: The appropriate labels and residue data should be provided.

Deficiency No. 3

Any new iBr or MBr tolerances must be adequate to cover both the proposed preplant use and any registered postharvest applications. Crop samples grown on fumigated soil must also be fumigated postharvest when both preplant soil treatment and postharvest fumigation are to be registered. The MBIP should refer to the Residue Chemistry Chapter (dated March 28, 1986) of the Methyl Bromide Registration Standard for details.

Petitioner's Response to Deficiency No. 3

The revised protocol addresses the issue of preplant and postharvest fumigation, and both will be included in those crops where tolerances are requested for both preplant and postharvest use of MBr.

RCB's Discussion/Conclusion re: Deficiency No. 3

Deficiency No. 3 is not resolved. Table 2 is not a complete list of raw agricultural commodities (RAC's) to be treated both preplant and postharvest and then processed. The petitioner should refer to RCB's discussion of Deficiency No. 4 for a list of processed commodities/animal feeds to be added and RACs to be added.

Deficiency No. 4

The MBIP has not indicated what processed commodities and animal feeds it intends to analyze along with the RACs. The MBIP should refer to Table II of the Pesticide Assessment Guidelines, Subdivision O, Residue Chemistry (dated October 1982).

Petitioner's Response to Deficiency No. 4

The revised protocol lists those RACs which will be fumigated both preplant and postharvest, and then processed to see if residues concentrate during processing operations. (See Table 2.)

Table 2
Sampling of Crops

Raw Agricultural Commodities	Processed Into
Potato	Granules, Chips, Dried
*Soybean	Meal, Soapstock, Crude Oil, Refined Oil
Tomato	Wet Pomace, Dry Pomace, Catsup, Juice
Orange	Dry Pulp, Peel, Wet Pomace, Dry Pomace, Juice
Grape	Raisin, Juice, Wet Pomace, Dry Pomace
Peanut	Meal, Soapstock, Crude Oil, Refined Oil
Pineapple	Bran, Juice
Apple	Juice, Applesauce, Wet and Dry Pomace
Spices	Ground Spice

RCB's Discussion/Conclusion re: Deficiency No. 4

The following processed commodities/feeds should be added to Table 2:

RAC

Potatoes - Add wet peel, dry peel, and processed potato waste.

Soybeans - Add hulls.

Tomatoes - Add puree.

Orange - Add wet pulp, molasses, and oil.

Add plums - Add prunes.

Add almonds - Add hulls.

Add sugar beets - Add molasses, dehydrated pulp, and refined sugar.

Add mustard greens - Add seeds.

Add beans (succulent and dry) - Add cannery residues.

Grapes - Add raisin waste.

Add sweet corn - Add cannery waste.

Spices - Add dried spice. (For spices, the RAC is fresh spice and the processed commodity is dried spice.)

Note: If a tolerance is not being sought for soybeans (see Table 1 of this submission), then a processing study on soybeans is not needed.

Note: RCB understands that clover is not to be treated postharvest. However, residues in both fresh clover and clover hay should be determined in connection with the soil fumigation use.

RCB concludes that Deficiency No. 4 remains outstanding pending addition of the above processed commodities.

Deficiency No. 5

The protocol allows the ground to be covered by a polyethylene film for 48 hours after application and then removal of the film to allow aeration for 12 days before planting. Some proposed/established uses do not specify a minimum interval between application and planting. The labels should be changed to conform to the protocol or the protocol should be changed.

Petitioner's Response to Deficiency No. 5

The revised protocol specifies a minimum 14- to 16-day interval between application of the fumigant and planting the crops. MBr labeling will conform to the protocol.

RCB's Discussion/Conclusion re: Deficiency No. 5

Deficiency No. 5 remains outstanding pending submission of revised MBr labels to conform to the protocol's minimum interval between application and planting.

Deficiency No. 6a

RCB has previously indicated that residues of MBr per se should be analyzed "as soon as possible (perhaps within 12 hours) after sampling and/or that samples must be stored in impermeable containers" since storage stability data show that MBr can be lost significantly from fumigated raw and processed crop products. (See the Methyl Bromide Registration Standard and also RCB's February 19, 1986 review of PP#5F3300.) If the petitioner finds that he needs 18 hours between harvest and analyses, he should investigate how much MBr per se would be lost during that time period.

Petitioner's Response to Deficiency No. 6a

A prestudy is being conducted to ascertain the importance of time intervals between sample collection and analysis. Various time periods of up to 24 hours between collection of samples and their analyses will be chosen and losses of MBr will be determined. This will be the basis for procedures which will then be written into the preplant protocol as they relate to sample shipment and analysis time frames.

RCB's Discussion/Conclusion re: Deficiency No. 6a

Deficiency No. 6a remains outstanding pending the MBIP's analysis of loss of MBr with time and incorporation of the appropriate procedures related to sample shipment and analysis into the preplant protocol.

Deficiency No. 6b

The protocol does not spell out analyses of control samples for background bromide. This needs to be done so that the Agency can compare background bromide exposure to the higher exposure resulting from the use of MBr.

Petitioner's Response to Deficiency No. 6b

The revised protocol covers the analysis of control samples for determination of background levels of MBr.

RCB's Discussion/Conclusion re: Deficiency No. 6b

The protocol contains the following statement under Section 2.2, "Treatment Procedure":

> "Sites will be divided into two equal portions, one portion will be fumigated and one portion will remain as the control (untreated)."

Section 2.3, "Cultural Practices," contains the following statements concerning controls for annual and perennial crops:

> "For annual crops, all plantings will occur across both the treated and control areas (See Figure 1). Each planting will consist of at least 4 rows per crop. All cultural practices will be consistent with normal agronomic practices for those crops.
>
> "For perennial crops such as grapes, nut trees, etc., the Panel proposes to use commercial plantings that have been planted and are approaching first harvest. Controls will consist of plantings of the same crop on an equivalent soil in the same region as the treated crop. In both the controls and treated areas, soils and water will be analyzed and compared for similarity. Because these crops will be commercial plantings, they will be maintained according to normal agronomic practices."

RCB concludes that Deficiency No. 6b is resolved by the above statements.

Deficiency No. 7b

Fortification/recovery data for method Pr6e-64 will be needed before EPA can validate that method for analysis of the bromide ion.

Petitioner's Response to Deficiency No. 7b

The MBIP has chosen to revise the method of analysis of iBr. The Pr6e-64 method will not be used and is to be replaced by the ion selective electrode method. Fortification/recovery data will be provided.

RCB's Discussion/Conclusion re: Deficiency No. 7b

RCB indicated in the Residue Chemistry Chapter (dated March 28, 1986) of the Methyl Bromide Registration Standard that fortification/recovery data are necessary to validate the ion selective electrode method of Abdalla and Lear. RCB also indicated that individual values must be reported for each food/feed analyzed.

In a recent review of a follow-up to the Methyl Bromide Registration Standard (C. Deyrup, July 14, 1988), RCB reviewed the method "Inorganic Bromide Analysis with Ion Selective Electrode" and made the following comments/conclusions:

"The description of the methodology should specify if the ion selective electrode can be attached to an ordinary pH meter.

"The description of the analysis of bromide should be rewritten so that the operations and calculations are more comprehensible.

"The current instructions refer to both the standards and the test material as "samples." When standards are being measured, they should be referred to as standards. The current directions say to "Add 1 ml of working standard #1 to sample beaker"; confusion may arise because both standards and test materials are called samples.

"The directions should clarify that the determination of bromide is carried out by first measuring the test sample, adding three consecutive aliquots of standard to the test sample, and plotting the 4 resulting points vs the concentration of added Br^-. RCB suggests that it would be helpful to provide an explanatory summary preceding the step-by-step instructions. A sample calculation of Br^- should be included in the revised version to illustrate the use of the

graph and the equation. The MBIP should verify that the submitted equation is correct.

"The limit of determination was not specified. MBIP should provide the limit of determination and should support the claimed limit of determination with appropriate fortification and recovery data. Without this information, RCB cannot judge the adequacy of the method for the collection of data.

"If the validation data are adequate, RCB will recommend that the ion selective electrode method be published in PAM II as a letter method, after MBIP has rewritten the method so that the instructions can be more easily understood."

RCB concludes that Deficiency No. 7b concerning method Pr6e-64 is resolved by substitution of another method. The petitioner should be aware, however, that any residue data which were previously obtained using the method Pr6e-64 cannot be used to support the proposed tolerances since fortification/recovery data for Pr6e-64 are not available.

Concerning the ion selection electrode method, RCB will need the validation/recovery data requested in the Residue Chemistry Chapter (dated March 28, 1986) of the Methyl Bromide Registration Standard and answers to the method issues raised in RCB's July 14, 1988 review of the follow-up to the Methyl Bromide Registration Standard.

Deficiency No. 8

Some crops do not have adequate geographic representation. The MBIP should review the table in this review which compares the available sites and proposed sites with the ideal geographic representation, and also review the specific requirements for sites which were given for some crops in the Methyl Bromide Registration Standard and are repeated in this review.

The specific requirements from the Methyl Bromide Registration Standard are repeated below for convenience:

Celery (A Member of the Leafy Vegetables Crop Group)

The preplant soil fumigation data are limited to California. Additional residue data are needed from Florida and Michigan. Also, soil was fumigated at less than the maximum rate. Tests should be conducted at the maximum rate. Residues of MBr per se were not determined. Residues of MBr per se should be determined as well as iBr.

Dried Beans, Succulent Beans, and Succulent Peas

Additional residue data are needed from crops grown in soil fumigated at the maximum rate in the major growing areas and analyzed for iBr and MBr per se. (The Registration Standard calls for these samples to be postharvest fumigated as well.) If the soybean tolerance is not revoked, then a processing study must be conducted to determine if iBr or MBr per se concentrates in any processed product(s). (Processed products must be derived from soybeans bearing measurable weathered residues of MBr and iBr.) Calibration curves must be submitted for all crops analyzed for MBr per se by the method of King et al. for validation purposes.

Broccoli

Broccoli must be analyzed for iBr and MBr per se following preplant soil fumigation at 240 lb ai/A in California and Arizona.

Cabbage

Studies must be conducted in California, Texas, New York, and Wisconsin. iBr and MBr per se must be determined.

Cauliflower

Cauliflower must be analyzed for iBr and MBr per se following preplant soil fumigation at 240 lb ai/A in California, Arizona, New York, and Oregon.

Mustard Greens

Additional residue data are needed for iBr and MBr per se in California, Texas, and Arizona.

Cantaloupe, Cucumber, Summer Squash

Residue data from Arizona, California, and Texas from preplant soil treatments at the rate of 240 lb ai/A are needed for each of these crops. Residues of iBr and MBr per se should be determined. (The Registration Standard calls for this to be done in conjunction with postharvest fumigations.)

[If a crop group tolerance is not established for the cucurbit vegetables group, additional residue data for the individual commodities (i.e., squash, zucchini, and pumpkin in PP#5F3198) for both iBr and MBr per se would also be needed.]

Raspberries

Additional residue data are needed. Both iBr and MBr per se should be analyzed.

Herbs and Spices

Additional residue data are needed since very small amounts of MBr per se were apparently detected in some samples of basil, dill, marjoram, and sage grown in California soil fumigated preplant at 400 or 800 lb ai/A (1.67 to 3.33X the maximum proposed rate). Those samples containing $\leq$ 0.018 ppm MBr per se may be false positives.

Onions

Bulb onions must be grown in soil fumigated at 300 lb ai/A in California and Oregon, and at 240 lb ai/A in Colorado, New York, and Texas (before postharvest fumigation).

Lettuce (Leaf and Head)

MBr per se must be determined after preplant soil application at the 400 lb ai/A rate (1X) in California.

If use is not to be limited to California, then studies must be conducted in Arizona and Florida.

Peppers

Additional residue data are needed from Florida, New Jersey, and Texas.

Cucumbers, Melons, and Summer Squash

Additional residue data are needed from Arizona, California, and Texas.

Sweet Oranges, Lemons, and Grapefruit

Residue data are needed for oranges in Arizona, California, and Florida; grapefruit in California, Florida, and Texas; and lemons in Arizona and California.

Grapes

Residue data on grapes are needed from soil treated at 600 lb ai/A.

Strawberries

Residue data are needed from California, Florida, and Oregon.

Asparagus

Residue data are needed for California (at 400 lb ai/A) and for Michigan and Washington (at 240 lb ai/A).

Tobacco

Residue data are needed for North Carolina and Kentucky at 872 lb ai/A.

Petitioner's Response to Deficiency No. 8

Concerning preplant soil application deficiencies identified in the Residue Chemistry Chapter of the Methyl Bromide Registration Standard (March 28, 1986), the MBIP responds as follows:

Celery

Additional residue data will be obtained from California, Florida, and Michigan.

Dried Beans, Succulent Beans, and Succulent Peas

Additional residue data will be obtained using maximum rates in California, Michigan, and Washington. A processing study will be conducted on soybeans.

Broccoli

Additional residue data will be obtained in California and Texas. Arizona will not be included as IR-4 listings show Arizona and Texas to be identical.

Cabbage

Additional residue data will be obtained in California, Texas, and Wisconsin. New York will not be included as the bulk of the cabbage grown there goes into the production of sauerkraut.

Cauliflower

Will not be grown as it is not one of the representative crops for the crop group.

Mustard Greens

Additional residue data will be obtained in California and Texas. Arizona will not be included as IR-4 listings show Arizona and Texas to be identical.

Cantaloupe, Cucumber, and Summer Squash

Additional residue data will be obtained in California and Texas. Arizona will not be included as IR-4 listings show Arizona and Texas to be identical.

Raspberries

Additional residue data will be obtained in California and Washington. California is included as growers in this State wish to use MBr.

Herbs and Spices

Additional residue data are to be obtained in the major growing areas.

Onions

Additional residue data will be obtained in California, Oregon, and Texas. The MBIP believes the three states are totally representative of the major growing areas.

Lettuce (Leaf and Head)

Additional residue data will be obtained in California, Florida, and Texas. Arizona will not be included as IR-4 listings show Arizona and Texas to be identical.

Peppers

Additional residue data will be obtained in California, Florida, and Texas. The MBIP believes the three states are totally representative of the major growing areas.

Oranges, Lemons, and Grapefruit

Additional residue data will be obtained for oranges in California and Florida. There are no fumigated tree sites in Arizona. Additional data for lemons will be obtained in Arizona and California. Additional data for grapefruit will be obtained in California and Florida. There are no fumigated tree sites in Texas.

Grapes

Additional residue data will be obtained in major growing areas using the rate of 600 lb of MBr per acre.

Strawberries

Additional residue data will be obtained in California, Florida, and Oregon.

Asparagus

Additional residue data will be obtained in California and Washington. Asparagus from Michigan are not grown on preplant fumigated soil.

Tobacco

Data are not required as only seed beds used for transplants are fumigated preplant.

Table I, which follows, summarizes the MPIP's growing sites and proposed rates:

Table 1

Crop Group		States and Dosage lb/A									
		Calif.	Florida	Oregon	Wash.	Texas	Michigan	Arizona	Idaho	Hawaii	Misc. States
Root and Tuber	Carrot	300	---	---	---	300	---	---	---	---	---
	Potato	300	---	---	300	---	---	---	---	---	---
	Radish	300	300	---	---	---	---	---	---	---	---
	Sugar beet	300	---	---	300	---	---	---	---	---	---
Bulb Vegetables	Onion (green)	300	---	300	---	300	---	---	---	---	---
	Onion (large bulb)	300	---	300	---	300	---	---	---	---	---
	Onion (small bulb)	300	---	300	---	300	---	---	---	---	---
	Garlic	300	---	---	---	---	---	---	---	---	---
Leafy Vegetables	Head lettuce	300	300	---	---	300	---	---	---	---	---
	Leaf lettuce	300	300	---	---	300	---	---	---	---	---
	Celery	300	300	---	---	---	300	---	---	---	---
	Spinach	300	---	---	---	300	---	---	---	---	---
Brassica	Broccoli	300	---	---	---	300	---	---	---	---	---
	Cabbage	300	---	---	---	300	---	---	---	---	WI
	Mustard greens	300	---	---	---	300	---	---	---	---	---
Legume Vegetables (except soybeans)	Beans (succulent)	300	---	---	---	---	300	---	---	---	---
	Beans (dry)	300	---	---	---	---	300	---	---	---	---
	Peas (succulent)	300	---	---	300	---	---	---	---	---	---
	Peas (dry)	300	---	---	300	---	---	---	---	---	---
Fruiting Vegetables	Tomatoes										
	Field	300	300	---	---	---	---	---	---	---	---
	Greenhouse	300	---	---	---	---	---	---	---	---	---
	Peppers	300	300	---	---	300	---	---	---	---	---
Cucurbit Vegetables	Cucumbers	300	---	---	---	300	---	---	---	---	---
	Melons	300	---	---	---	300	---	---	---	---	---
	Summer squash	300	---	---	---	300	---	---	---	---	---
Citrus Fruits	Sweet orange	870	870	---	---	---	---	---	---	---	---
	Lemon	870	---	---	---	---	---	870	---	---	---
	Grapefruit	870	870	---	---	---	---	---	---	---	---

Table 1 (cont'd)

Crop Group		States and Dosage lb/A									
		Calif.	Florida	Oregon	Wash.	Texas	Michigan	Arizona	Idaho	Hawaii	Misc. States
Pome Fruits	Apple	870	---	---	870	---	---	---	---	---	---
	Pear	870	---	---	870	---	---	---	---	---	---
Stone Fruits	Cherry	870	---	---	870	---	---	---	---	---	---
	Peach	870	---	---	870	---	---	---	---	---	---
	Plums	870	---	---	870	---	---	---	---	---	---
Small Fruits and Berries (except Grape and Cranberry)	Rubus spp.	300	---	---	300	---	---	---	---	---	---
	Blueberry	300	---	---	300	---	---	---	---	---	---
	Strawberry	300	300	300	---	---	---	---	---	---	---
Tree Nuts	Almond	870*	---	---	---	---	---	---	---	---	---
	Pecan	870	---	---	---	870	---	---	---	---	---
	English walnut	870*	---	---	---	---	---	---	---	---	---
Nongrass Animal Feed	Alfalfa	300	---	---	---	300	---	---	---	---	---
	Clover	300	---	---	---	300	---	---	---	---	---
Herbs and Spices	Basil	300*	---	---	---	---	---	---	---	---	---
	Chives	300*	---	---	---	---	---	---	---	---	---
	Dill	300*	---	---	---	---	---	---	---	---	---
	Marjoram	300*	---	---	---	---	---	---	---	---	---
	Sage	300*	---	---	---	---	---	---	---	---	---
Miscellaneous	Asparagus	400	---	---	400	---	---	---		---	---
	Avocados	400	400	---	---	---	---	---	---	---	---
	Grape	600	---		600						
	Peanuts	---	300	---	---	300	---	---	---	---	---
	Pineapples	---	300	---	---	---	---	---	---	300	---
	Pistachio nuts	300	---	---	---	300	---	---	---	---	---
	Sweet corn	300	300	---	---	---	---	---	---	---	---
	Tobacco	---	---	---	---	---	---	---	---	---	---
	Okra**										NC/KY 872

*2 crop sites.
**To be submitted by IR-4.

RCB's Discussion/Conclusion re: Deficiency No. 8

The geographical representations for residue data as proposed by the MBIP with its March 11, 1988 letter are compared with RCB's "Ideal Geographic Representations" in Table A that follows at the end of this discussion/conclusion re: Deficiency #8.

Some of the available residue data (which were reviewed in PP#5F3198 and in the Methyl Bromide Registration Standard) were obtained at rates of approximately 240 lb ai/A. These data will not support the higher proposed use rates of 300 lb ai/A. For this reason, additional residue data which were not requested in the Methyl Bromide Registration Standard may be needed for some crops. Residue data must reflect the proposed use.

The petitioner has made some specific statements concerning preplant soil application deficiencies identified in the Methyl Bromide Registration Standard to which RCB would like to discuss:

1. The petitioner has indicated that residue data on cabbage from New York are not needed since the majority of the cabbage grown in New York is processed to sauerkraut. However, RCB still requires residue data on raw cabbage from New York.

2. The petitioner has indicated that there are no fumigated tree sites for oranges in Arizona or for grapefruit in Texas. RCB will forego the requirement for residue data on grapefruits grown in Texas and for oranges in Arizona. Therefore, oranges should be grown in California and Florida, grapefruit in California and Florida, and lemons in Arizona and California.

3. The petitioner has indicated that asparagus from Michigan are not grown on preplant fumigated soil. RCB concludes, however, that the two states of California and Washington are not sufficient. Residue data should be obtained from California, New Jersey, Washington, Maine, and Illinois.

4. The petitioner has indicated that tobacco data are not needed since only seed beds used for transplants are fumigated preplant. RCB concludes that data are needed on tobacco since tobacco seeds are grown to seedlings 5 to 6 inches tall with four to six leaves in fumigated beds.

RCB concludes that the geographical representations as proposed by the MBIP with the March 11, 1988 letter are adequate for the following crops: celery, basil, chives, marjoram, sage, avocados, pineapples, pistachio nuts, radish, garlic, lemon, almond, oranges, and grapefruit.

However, Deficiency No. 8 is not resolved. RCB suggests that the MBIP follow the "Ideal Geographic Representation from IR-4 Memorandum or RCB Files" for the remainder of the crops not listed above.

Table A

Comparison of Available and Proposed Sites With Ideal Geographic Representation

Crop	Available[2/] Residue Data iBr	Available[2/] Residue Data MeBr	MBIP's 3/11/88 Proposed Sites For Additional Residue Data	Ideal Geographic Representation from IR-4 Memorandum or RCB Files
Carrot	IN	CA	CA, TX	CA, TX/AZ, MI/WI, WA/OR, NY/NJ, OH, MI, MN
Potato	IN, WA, CA, FL	IN, WA, CA, FL	CA, WA	ID, OR/WA, ND, MN, WI, ME, CA, CO
Radish	Root: IN, FL, OK	Root: IN, FL	CA, FL	FL, CA
Sugar beet	IN[1/]		CA, WA	CA, MN/ND, ID, WA, NE, WY, MI
Onion, green	***	***	CA, OR, TX	TX, CA, AZ/NM
Onion, bulb	*** CA	***	CA, OR, TX	NY, MI, OR/WA, ID, CO
Garlic			CA	CA
Lettuce (head and leaf)	IN, FL, CA	IN, CA	CA, FL, TX	CA, FL, TX/AZ, NY/NJ, CO, WA
Celery	CA		CA, FL, MI	CA, FL, MI, WA
Spinach			CA, TX	CA, TX/OK, NJ, MD/VA, CO/AR
Broccoli	FL,GA, MI	FL, GA, CA	CA, TX	CA, TX/AZ, OR
Cabbage	GA, FL	FL, GA	CA, TX, WI	NY, CA, FL, TX, WI, NJ, SC/NC/ GA/TN

Table A

Comparison of Available and Proposed Sites With Ideal Geographic Representation (Cont'd)

Crop	Available Residue Data[2/] iBr	MeBr	MBIP's 3/11/88 Proposed Sites For Additional Residue Data	Ideal Geographic Representation from IR-4 Memorandum or RCB Files
Summer squash	FL, GA		CA, TX	CA, FL, TX, NJ/MA/NY, OR, GA/SC, MI
Orange			CA, FL	FL, CA, AZ/TX
Lemon			CA, AZ	CA, AZ
Grapefruit			CA, FL	FL, TX, CA
Apple			CA, WA	CA, MI, NY, PA/WV, VA/NC, WA/OR
Pear			CA, WA	CA, MI, NY, WA
Cherry			CA, WA	CA, OR/WA, MI, UT/MT/ID, NY/PA
Peach			CA, WA	CA, GA/SC, MI, NJ/PA, WA
Plums			CA, WA	CA, ID, MI, OR/WA
Rubus spp.			CA, WA	WA, OR
ex. Raspberry	OH			
Blueberry			CA, WA	MI, NJ, ME, NC, WA/OR
Grape			CA, WA	CA, NY, WA, MI, NC

Table A

Comparison of Available and Proposed Sites With Ideal Geographic Representation (Cont'd)

Crop	Available[2/] Residue Data iBr	Available[2/] Residue Data MeBr	MBIP's 3/11/88 Proposed Sites For Additional Residue Data	Ideal Geographic Representation from IR-4 Memorandum or RCB Files
Strawberry	CA, MD, MI, NY		CA, FL, OR	CA, FL, OR/WA, IN/MI, NY/OH, LA
Almond			CA	CA
Pecan			CA, TX	AL/GA/LA/MS, NM/TX/OK
English walnut			CA	CA, OR
Alfalfa			CA, TX	All areas across the country.
Clover			CA, TX	All areas across the country.
Basil	CA	CA	CA	CA
Chives	None		CA	CA

Table A

Comparison of Available and Proposed Sites With Ideal Geographic Representation (Cont'd)

Crop	Available[2] Residue Data iBr	Available[2] Residue Data MeBr	MBIP's 3/11/88 Proposed Sites For Additional Residue Data	Ideal Geographic Representation from IR-4 Memorandum or RCB Files
Mustard greens	FL, OK, GA, IN	GA, FL, IN	CA, TX	CA, TX/AZ, MI/OH/IN, FL, LA/GA/TN
Beans (succulent)	IN, CA, GA[4]	GA[4], CA	CA, MI	NJ/NY, TN/NC/VA, CA, MI, FL
Beans (dry)	OK, GA	GA, CA	CA, MI	CA, ID, MI, CO, NE, ND
Peas (succulent)	IN	IN	CA, WA	CA, DE, ID, MN, WI, OR/WA
Peas (dry)	GA[3], OK[3], MS[3],	GA[3]	CA, WA	WA/OR, ID
Tomatoes[7]	GA, IN, CA, MD, MI, NY	GA, IN, CA	CA, FL	CA, FL, OH/PA, NJ, IN, MI, SC/TN
Peppers	GA, IN, MI, CA, OK	GA, IN	CA, FL, TX	CA, FL, TX, NC, NJ
Cucumbers	IN, FL, OK, MS, GA	GA, IN, CA	CA, TX	CA, FL, TX, MI, NY/NJ, NC/SC, OH
Melons[5]	GA, FL, OK, MI, NY	GA	CA, TX	CA, TX/AZ, IN, MI, GA/SC

Table A

Comparison of Available and Proposed Sites With Ideal Geographic Representation (Cont'd)

Crop	Available[2] Residue Data iBr	MeBr	MBIP's 3/11/88 Proposed Sites For Additional Residue Data	Ideal Geographic Representation from IR-4 Memorandum or RCB Files
Dill	CA	CA	CA	southern region and western region
Marjoram	CA	CA	CA	CA
Sage	CA	CA	CA	CA
Asparagus	CA		CA, WA	CA, NJ, WA, MA, IL/MI
Avacados			CA, FL	CA, FL
Okra	MS, FL OK, GA	GA	[6]	GA/AL, TX, TN, FL
Peanuts			FL, TX	GA/AL/FL, VA/NC, TX/OK, NM
Pineapples			FL, HI	HI, FL
Pistachio Nuts			CA, TX	CA, AZ/NM/TX
Sweet Corn			CA, FL	FL, CA, NY, TX, OH/PA, MA/NJ, OR/WA/ID, MI/MN/WI, IL
*Tobacco			NC/KY	NC, KY, GA, MD/PA, WI

*Data needed on green tobacco, cured or dried tobacco, pyrolysis products, and residue level in smoke.

1/The study in Indiana is on beets. This may not be sugar beets.

2/Includes data cited in the Registration Standard and PP#5F3198. These data may not reflect the proposed/registered application rates.

3/Data are on southern peas, which are not a representative crop for the legume vegetables groups.

4/It is not clear whether these are dry or succulent snap beans.

5/For crop group purposes, "melons" refers to cantaloupe or muskmelon.

*** A study was conducted on onions in Indiana, but it is not clear whether the study was on dry bulb onions or green onions.

6/To be submitted by IR-4.

7/RCB now requires data on tomatoes to include cherry tomatoes.

Other Deficiency

The petitioner has deleted soybeans from the crop group "legume vegetables" on the revised Table I submitted on March 11, 1988. Since soybeans are a representative crop, RCB recommends that the individual remaining commodities from the legume vegetables group be listed under "Miscellaneous."

cc: N. Dodd (RCB), PP#5F3198, E. Eldredge (ISB/PMSD), Circulation (7), RF, Methyl Bromide Registration Standard File - W. Boodee

RDI:JHOnley:8/15/88:RDSchmitt:8/15/88
TS-769C:RCB:CM#2:Rm800D:X1681:N.Dodd:Kendrick&Co.:8/22/88