METHYL BROMIDE CRITICAL USE NOMINATION
FOR POST HARVEST USE ON DRY CURED PORK PRODUCTS

FOR ADMINISTRATIVE PURPOSES ONLY:
DATE RECEIVED BY OZONE SECRETARIAT:
YEAR: CUN:

NOMINATING PARTY:	The United States of America
BRIEF DESCRIPTIVE TITLE OF NOMINATION:	Methyl Bromide Critical Use Nomination for Post Harvest Use on Dry Cured Pork Products (Prepared in 2005)

NOMINATING PARTY CONTACT DETAILS

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Following the requirements of Decision IX/6 paragraph (a)(1), the United States of America has determined that the specific use detailed in this Critical use Nomination is critical because the lack of availability of methyl bromide for this use would result in a significant market disruption.

☐Yes ☐ No

Signature Name Date

Title:

CONTACT OR EXPERT(S) FOR FURTHER TECHNICAL DETAILS

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LIST OF DOCUMENTS SENT TO THE OZONE SECRETARIAT IN OFFICIAL NOMINATION PACKAGE

List all paper and electronic documents submitted by the Nominating Party to the Ozone Secretariat

1. PAPER DOCUMENTS: Title of Paper Documents and Appendices	Number of Pages	Date Sent to Ozone Secretariat

2. ELECTRONIC COPIES OF ALL PAPER DOCUMENTS: Title of Electronic Files	Size of File (kb)	Date Sent to Ozone Secretariat

TABLE OF CONTENTS

List of Tables

PART A: SUMMARY

1. NOMINATING PARTY

The United States of America (U.S.)

2. DESCRIPTIVE TITLE OF NOMINATION

Methyl Bromide Critical Use Nomination For Post Harvest Use on Dry Cured Pork Products (Prepared in 2005)

3. SITUATION OF NOMINATED METHYL BROMIDE USE

This sector is for the production of cured meat products, such as country hams. These are produced primarily in the southern U.S. This sector has no viable alternatives available. Heat would destroy the product and phosphine does not control mites on the curing hams.

4. METHYL BROMIDE NOMINATED

TABLE 4.1: METHYL BROMIDE NOMINATED

YEAR	NOMINATION AMOUNT (KG)	NOMINATION VOLUME (1,000 M^3)
2007	**40,854**	**2040**

5. BRIEF SUMMARY OF THE NEED FOR METHYL BROMIDE AS A CRITICAL USE

Currently there are no viable alternatives to methyl bromide for the dried meat industry: phosphine does not control mites (a major pest) and heat would alter the product. In U.S. pork processing plants that produce dry-cured pork products there are several factors that make the potential alternatives to methyl bromide unsuitable. These include:

- Pest control efficacy of alternatives: the efficacy of alternatives may not be comparable to MB, making these alternatives technically and/or economically infeasible. Phosphine, alone or in combination with carbon dioxide does not control mites, a major pest on cured hams.
- Geographic distribution of the facilities: Facilities included in this nomination are located in the southern U.S. where mild temperatures and high relative humidity result in key pest pressures that are moderate to severe. These ambient conditions require that pests be killed because they will only reinfest the facility after fumigation.
- Age and type of facility: older food processing facilities, especially those constructed of wood, experience more frequent and severe pest infestations that must be controlled by fumigation. In the U.S. it is usual for dry-cured processed pork to be produced in traditional facilities. These facilities are usually constructed of wood and many are decades old, if not older. Many newer facilities are constructed using the older facilities as models.

- Constraints of the alternatives: some types of commodities (e.g., those containing high levels of fats and oils) prevent the use of heat as an alternative because of its effect on the final product (e.g., rancidity). All of the pork products are relatively high fat products so rancidity would be a problem. In addition, using heat will alter the character of the final product, producing, for example, a cooked pork product rather than a dry-cured pork product with the attendant flavor differences.
- Transition to newly available alternatives: Sulfuryl fluoride recently received a Federal registration for certain commodities and structures, such as cereal mills. At present, pork and pork products are not included among the legal uses of sulfuryl fluoride, so this chemical is not an option for these facilities.
- Delay in plant operations: e.g., the use of some alternatives can add a delay to production by requiring additional time to complete the fumigation process. Production delays can result in significant economic impacts to the processors.

It is common for producers of cured pork products to experience pest pressure from insects such as the ham skipper, the red legged ham beetle, dermestid beetles, and mites. These insects infest and feed on meat as it cures and ages. Environmental conditions (temperature and humidity) in and around the facility strongly influence the level of pest pressure. Under favorable ambient conditions, such as those seen in silo curing, pest pressure increases and a regular fumigation schedule is recommended. In the U.S., the Food and Drug Administration (FDA) regulates the maximum levels of live or dead insects or insect parts that may be present in stored food products. Food commodities that exceed maximum limits allowed are considered adulterated by FDA and thus unfit for human consumption. There are currently no alternatives registered for use on hams in the U.S. that would provide the same level of pest control.

TABLE A.1: EXECUTIVE SUMMARY

	National Country Ham Association	***American Association of Meat Processors***	***Nahunta Pork Center***
AMOUNT OF REQUEST			
2007 Kilograms	1,242	168,283	145
AMOUNT OF NOMINATION*			
2007 Kilograms	709	40,000	145

* See Appendix A for complete description of how the nominated amount was calculated.

6. METHYL BROMIDE CONSUMPTION FOR PAST 5 YEARS AND AMOUNT REQUIRED IN THE YEAR(S) NOMINATED:

TABLE 6.1: METHYL BROMIDE CONSUMPTION FOR THE PAST 5 YEARS AND THE AMOUNT REQUIRED IN THE YEAR(S) NOMINATED

	Historical Use[1]						Requested Use
For each year specify:	**1998**	**1999**	**2000**	**2001**	**2002**	**2003[2]**	**2007**
Amount of MB (kg)	1,139	1,112	803	1,020	899		169,670
Volume Treated 1000 m^3	48	46	35	40	35		7,087
Formulation of MB	Information not provided						Information not provided
Dosage Rate (kg/1000 m^3)	24	24	23	25	25		42.4
Actual (A) or Estimate (E)	Information not provided						Information not provided

[1] American Association of Meat Processors did not provide historical data.
[2] None of Applicants provided data for 2003.

7. LOCATION OF THE FACILITIES WHERE THE PROPOSED CRITICAL USE OF METHYL BROMIDE WILL TAKE PLACE:

There more than 1,650 pork production facilities in the United States. Of these, approximately 850 facilities require the use of methyl bromide to fumigate dry cured pork products. The other facilities smoke their products and smoking prevents insects from invading their facilities.

The specific name and physical address of each facility was not requested in the forms filled out by the applicants in the United States. However, general location information for the following facilities is known: Kentucky (Cadiz, Greenville counties), Missouri (California county), North Carolina (Boone, Goldsboro, Smithfield, Wayne counties), Virginia (Surry county), Tennessee (various locations), and South Carolina (various locations).

The USG has sent out an additional survey requesting this information, after receipt, compilation, analysis, and fact checking, this information will be sent to MBTOC. In addition, a full list of all processing plants that apply any registered pesticide in the U.S. is available from the U.S. Department of Labor, Occupational Safety and Health Administration website located at http://www.osha.gov/pls/imis/sicsearch.html. EPA's Facility Registry System is publicly available and is located at http://www.epa.gov/enviro/html/fii/ez.html. This information was previously submitted in August of 2004.

PART B: SITUATION CHARACTERISTICS AND METHYL BROMIDE USE

GENUS AND SPECIES FOR WHICH THE USE OF METHYL BROMIDE IS CRITICAL	COMMON NAME	SPECIFIC REASON WHY METHYL BROMIDE IS NEEDED
Necrobia rufipes – common pest	Red Legged Ham Beetle ("Ham Borer")	The adults feed on the cured meat. The larvae burrow into the meat and/ or fat. Insect infested meat is adulterated and cannot be sold.[1]
Piophila casei – common pest	Cheese/Ham Skipper	The Skippers are larval stages of small flies that burrow into the cured meat.
Dermestes spp-common pests	Dermested beetles	
Mite species -- common pest	Ham Mites	These mites feed and breed on the surface of cured meats. Uncontrolled, mite populations can increase rapidly, reaching enormous numbers.

[1] FDA regulations can be found at: http://www.fda.gov/opacom/laws/fdcact/fdcact4.htm and http://www.cfsan.fda.gov/~dms/dalbook.html.

TABLE B.1: CHARACTERISTIC OF SECTOR

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Raw Material In	X	X	X	X	X	X	X	X	X	X	X	X
Fumigation Schedule (MB)	X	X	X	X	X	X	X	X	X	X	X	X
Retail Target Market Window	X	X	X	X	X	X	X	X	X	X	X	X

Raw pork product material can come into a curing facility in any month of the year.

The Methyl Bromide fumigation schedule will vary depending on several factors such as:

1. Type of pork product - Bone-in products have a higher probability of pest infestation since the pests are attracted to the bone, and these products typically age for longer periods of time.

2. Type of structure/facility - Typically, older curing facilities have a higher probability of pest infestations, which could be attributed to the lack of air tightness of the facility. A majority of the newer facilities have lower pest pressure due to increased air tightness. Additionally, silo facilities, those that are two to three stories in height, have a higher probability of insect infestations when compared to a single story facility.

A single curing and ham storage operation can typically process 10,307,878 kilograms (11,362.5 U.S. tons) of pork products each year. The curing facilities are fumigated with methyl bromide when pests are detected in the product or the smokehouses. This fumigation typically occurs about three to five times during a typical year. During this process, the curing house, typically a small building (e.g. four stories), is covered with tarp and fumigated while full of hams.

3. Type of curing - Curing can be achieved by either temperature controlled room curing, or by ambient curing. Ambient curing, which involves uncontrolled environmental conditions, typically requires a regular fumigation schedule due to consistently high levels of pest infestations.

4. Location/climate of structure/facility - These curing facilities are located in southeastern states, where the temperature and humidity are higher for longer periods of time throughout the year and, therefore, there is a greater opportunity for pests to be active for longer periods of time. As the pest pressure increases, so does the need to fumigate with methyl bromide. Curing facilities are located near slaughter houses and feed lots, thereby having high insect populations nearby.

The retail target market window varies, but there are higher demands for cured pork products around holidays such as Thanksgiving, Christmas, and Easter.

9. Summary of the Circumstances in which Methyl Bromide is Currently Being Used

Table 9.1(a.): Dry Cured Pork Products

Methyl Bromide Dosage (g/m^3)	Exposure Time (*hours*)	Temp. (^oC)	Number of Fumigations per Year	Proportion of Product Treated at this Dose	Fixed (F), mobile (M) or Stack (S)
32	Varies	Varies with facility, but typically in excess of 27°C (80°F)	Varies from 2-8 fumigations per year. 3-5 times per year common	Up to 100% in some facilities.	Fixed

Table 9.1(b.): Fixed Facilities

Type of Construction and Approximate Age in Years	Vol (m^3) or Range	Number of Facilities (e.g. 5 silos)	Gastightness Estimate*
More than 850 curing facilities use methyl bromide. The age of the facilities varies.	Varies	Ranges from 1 story to silo facilities.	Varies

10. LIST ALTERNATIVE TECHNIQUES THAT ARE BEING USED TO CONTROL KEY TARGET PEST SPECIES IN THIS SECTOR

Currently, no alternative techniques are being used.

PART C: TECHNICAL VALIDATION

11. SUMMARIZE THE ALTERNATIVE(S) TESTED STARTING WITH THE MOST PROMISING ALTERNATIVE(S):

Phosphine, alone and in combination with carbon dioxide, does not control mites, a major pest in cured pork products. Additionally, according to the phosphine label, the state of North Carolina has further restricted the use of this alternative. According to state regulations, phosphine may only be used to control rats and mice, but not insects.

12.SUMMARIZE TECHNICAL REASONS, IF ANY, FOR EACH ALTERNATIVE NOT BEING FEASIBLE OR AVAILABLE FOR YOUR CIRCUMSTANCES (*For economic constraints, see Question 15*):

TABLE 12.1. SUMMARY OF TECHNICAL REASON FOR EACH ALTERNATIVE NOT BEING FEASIBLE OR AVAILABLE

NO.	METHYL BROMIDE ALTERNATIVE	TECHNICAL REASON (IF ANY) FOR THE ALTERNATIVE NOT BEING FEASIBLE	ESTIMATED MONTH/YEAR WHEN THE TECHNICAL CONSTRAINT COULD BE SOLVED
1	Phosphine alone & in combination	Does not control mites. North Carolina has more restrictions.	The applicants did not provide any information on this topic.
2	Propylene oxide	Not registered for this use in the U.S.	
3	Contact insecticides	None registered for this use in the U.S.	
4	Irradiation	See Note below	
5	Sulfuryl fluoride	Not registered for this use. Sulfuryl fluoride adsorbs to fats, so anticipated residues would likely be high.	

Further details on why an alternative was not technically feasible:

Note: Irradiation does not readily kill exposed insects, but rather prevents further feeding and reproduction. Although unable to feed or reproduce, the surviving insects would still create phytosanitary problems and the high doses required to kill exposed insects may affect product quality. Consumer acceptance of irradiated food would hinder the adoption of this method.

PART D: EMISSION CONTROL

13. HOW HAS THIS SECTOR REDUCED THE USE AND EMISSIONS OF METHYL BROMIDE IN THE SITUATION OF THE NOMINATION?

No information on how this sector has reduced the use and emission of methyl bromide was provided by the applicants.

PART E: ECONOMIC ASSESSMENT

14. COSTS OF ALTERNATIVES COMPARED TO METHYL BROMIDE OVER 3-YEAR PERIOD

No alternatives are currently registered for use on cured pork products in the U.S. therefore no economic analysis was conducted

15. SUMMARIZE ECONOMIC REASONS, IF ANY, FOR EACH ALTERNATIVE NOT BEING FEASIBLE OR AVAILABLE FOR YOUR CIRCUMSTANCES

TABLE 15.1. SUMMARY OF ECONOMIC REASONS FOR EACH ALTERNATIVE NOT BEING FEASIBLE OR AVAILABLE

No information was provided by the applicants.

MEASURES OF ECONOMIC IMPACTS OF METHYL BROMIDE ALTERNATIVES

TABLE E.1: ECONOMIC IMPACTS OF METHYL BROMIDE ALTERNATIVES

There are no legal or technically feasible alternatives available for this sector.

PART F: FUTURE PLANS

16. PROVIDE A DETAILED PLAN DESCRIBING HOW THE USE AND EMISSIONS OF METHYL BROMIDE WILL BE MINIMIZED IN THE FUTURE FOR THE NOMINATED USE.

17. PROVIDE A DETAILED PLAN DESCRIBING WHAT ACTIONS WILL BE UNDERTAKEN TO RAPIDLY DEVELOP AND DEPLOY ALTERNATIVES FOR THIS USE:

No alternatives have been researched.

18. ADDITIONAL COMMENTS

No additional comments were provided by the applicants.

19. CITATIONS

Bell, C.H. 2000. Fumigation in the 21st Century. Crop Protection, 19:563-69.

APPENDIX A. 2007 Methyl Bromide Usage Numerical Index (BUNI).

Methyl Bromide Critical Use Exemption Process **Date:** 1/28/2005 **Average Volume in the US:** Not Available

2007 Bromide Usage Numerical Index (BUNI) **Sector:** HAM **% of Average Volume Requested:**

2007 Amount of Request				2001 & 2002 Average Use			Quarantine and Pre-Shipment	Regional Volume		Research Amount (kgs)
HAM ASSOCIATION	Kilograms (kgs)	Volume ($1000m^3$)	Use Rate ($kg/1000m^3$)	Kilograms (kgs)	Volume ($1000m^3$)	Use Rate ($kg/1000m^3$)		2001 Volume	% of Volume	
NATIONAL COUNTRY HAM ASSOCIATION	1,242	15	83	796	31	26	0%	Est. 40,000 kgs		0
NAHUNTA PORK CENTER	145	7	20	163	7	23	0%			
AMERICAN ASSOCIATION OF MEAT PROCESSORS	168,283	7,004	24	40,000	1,998	20	0%			
TOTAL OR AVERAGE	169,670	7,026	24	40,960	2,036	20	0%			

2007 Nomination Options	Subtractions from Requested Amounts (kgs)					Combined Impacts Adjustment (kgs)		MOST LIKELY IMPACT VALUE		
HAM ASSOCIATION	2007 Request	(-) Double Counting	(-) Growth	(-) Use Rate Adjustment	(-) QPS	HIGH	LOW	Amount (kgs)	Volume ($1000m^3$)	Use Rate ($kg/1000m^3$)
NATIONAL COUNTRY HAM ASSOCIATION	1,242	-	446	87	-	709	709	709	35	20
NAHUNTA PORK CENTER	145	-	-	-	-	145	145	145	7	20
AMERICAN ASSOCIATION OF MEAT PROCESSORS	168,283	-	128,283	-	-	40,000	40,000	40,000	1,998	20
Nomination Amount	169,670	169,670	40,941	40,854	40,854	40,854	40,854	40,854	2,040	20
% Reduction from Initial Request	0%	0%	76%	76%	76%	76%	76%	76%	71%	17%

Adjustments to Requested Amounts	Use Rate ($kg/1000m^3$)		(%) Key Pest Distribution		(%) Adopt New Fumigants		(%) Combined Impacts		Time, Quality, or Product Loss	Marginal Strategy
HAM ASSOCIATION	Low	EPA	High	Low	High	Low	HIGH	LOW		
NATIONAL COUNTRY HAM ASSOCIATION	26	20	100%	100%	0	0	100%	100%	Phosphine not registered for mites or in NC.	
NAHUNTA PORK CENTER	20	20	100%	100%	0	0	100%	100%		
AMERICAN ASSOCIATION OF MEAT PROCESSORS	20	20	100%	100%	0	0	100%	100%		

Other Considerations	Dichotomous Variables (Y/N)			Other Issues			Economic Analysis			
HAM ASSOCIATION	Currently Use Alternatives?	Research / Transition Plans	Pest-free Market Requirement	Change from Prior CUE Request (+/-)	Verified Historic MeBr Use / State	Frequency of Treatment of Product	Loss per 1000 m^3 (US$/1000m)	Loss per Kg of MeBr (US$/kg)	Loss as a % of Gross Revenue	Loss as a % of Net Operating Revenue
NATIONAL COUNTRY HAM ASSOCIATION	No	No	Yes	0	No	1	No technically feasible alternatives available			
NAHUNTA PORK CENTER	No	No	Yes	0	No	1				
AMERICAN ASSOCIATION OF MEAT PROCESSORS	No	No	Yes	0	No	1				

Notes

Conversion Units: 1 Pound = 0.453592 Kilograms 1,000 cu ft = 0.02831685 1,000 cubic meters

Most Likely Impact Value: High 24% Low 77%

Footnotes for Appendix A:

Values may not sum exactly due to rounding.

1. **Average Volume in the U.S.** – Average Volume in the U.S. is the average of 2001 and 2002 total volume fumigated with methyl bromide in the U.S. in this sector (when available).
2. **% of Average Volume Requested** - Percent (%) of Average Volume Requested is the total volume in the sector's request divided by the Average Volume in the U.S. (when available).
3. **2007 Amount of Request** – The 2007 amount of request is the actual amount requested by applicants given in total pounds active ingredient of methyl bromide, total volume of methyl bromide use, and application rate in pounds active ingredient of methyl bromide per thousand cubic feet. U.S. units of measure were used to describe the initial request and then were converted to metric units to calculate the amount of the U.S. nomination.
4. **2001 & 2002 Average Use** – The 2001 & 2002 Average Use is the average of the 2001 and 2002 historical usage figures provided by the applicants given in kilograms active ingredient of methyl bromide, total volume of methyl bromide use, and application rate in kilograms active ingredient of methyl bromide per thousand cubic meters. Adjustments are made when necessary due in part to unavailable 2002 estimates in which case only the 2001 average use figure is used.
5. **Quarantine and Pre-Shipment** – Quarantine and pre-shipment (QPS) is the percentage (%) of the applicant's requested amount subject to QPS treatments.
6. **Regional Volume, 2001 & 2002 Average Volume** – Regional Volume, 2001 & 2002 Average Volume is the 2001 and 2002 average estimate of volume of methyl bromide used within the defined region (when available).
7. **Regional Volume, Requested Volume %** - Regional Volume, Requested Volume % is the volume in the applicant's request divided by the total volume fumigated with methyl bromide in the sector in the region covered by the request.
8. **2007 Nomination Options** – 2007 Nomination Options are the options of the inclusion of various factors used to adjust the initial applicant request into the nomination figure.
9. **Subtractions from Requested Amounts** – Subtractions from Requested Amounts are the elements that were subtracted from the initial request amount.
    10. **Subtractions from Requested Amounts, 2007 Request** – Subtractions from Requested Amounts, 2007 Request is the starting point for all calculations. This is the amount of the applicant request in kilograms.
    11. **Subtractions from Requested Amounts, Double Counting** - Subtractions from Requested Amounts, Double Counting is the estimate measured in kilograms in situations where an applicant has made a request for a CUE with an individual application while a consortium has also made a request for a CUE on their behalf in the consortium application. In these cases the double counting is removed from the consortium application and the individual application takes precedence.
    12. **Subtractions from Requested Amounts, Growth or 2002 CUE Comparison** - Subtractions from Requested Amounts, Growth or 2002 CUE Comparison is the greatest reduction of the estimate measured in kilograms of either the difference in the amount of methyl bromide requested by the applicant that is greater than that historically used or treated at a higher use rate or the difference in the 2007 request from an applicant's 2002 CUE application compared with the 2007 request from the applicant's 2003 CUE application.
    13. **Subtractions from Requested Amounts, QPS** - Subtractions from Requested Amounts, QPS is the estimate measured in kilograms of the request subject to QPS treatments. This subtraction estimate is calculated as the 2007 Request minus Double Counting, minus Growth or 2002 CUE Comparison then multiplied by the percentage subject to QPS treatments. *Subtraction from Requested Amounts, QPS = (2007 Request – Double Counting – Growth)*(QPS %)*
    14. **Subtraction from Requested Amounts, Use Rate Difference** – Subtractions from requested amounts, use rate difference is the estimate measured in kilograms of the lower of the historic use rate or the requested use rate. The subtraction estimate is calculated as the 2007 Request minus Double Counting, minus Growth or 2002 CUE Comparison, minus the QPS amount, if applicable, minus the difference between the requested use rate and the lowest use rate applied to the remaining hectares.
15. **Adjustments to Requested Amounts** – Adjustments to requested amounts were factors that reduced to total amount of methyl bromide requested by factoring in the specific situations were the applicant could

use alternatives to methyl bromide. These are calculated as proportions of the total request. We have tried to make the adjustment to the requested amounts in the most appropriate category when the adjustment could fall into more than one category.

16. **Use Rate kg/ 1000 m^3 2007** – Use rate in pounds per thousand cubic feet, 2007, is the use rate requested by the applicant as derived from the total volume to be fumigated divided by the total amount (in pounds) of methyl bromide requested.
17. **Use Rate kg/ 1000 m^3 low** – Use rate in pounds per thousand cubic feet, low, is the lowest historic use rate reported by the applicant. The use rate selected for determining the amount to nominate is the lower of this rate or the 2007 use rate (above).
18. **(%) Key Pest Impacts** - Percent (%) of the requested area with moderate to severe pest problems. Key pests are those that are not adequately controlled by MB alternatives. For structures/ food facilities and commodities, key pests are assumed to infest 100% of the volume for the specific uses requested in that 100% of the problem must be eradicated.
19. **Adopt New Fumigants (%)** – Adopt new fumigants (%) is the percent (%) of the requested volume where we expect alternatives could be adopted to replace methyl bromide during the year of the CUE request.
20. **Combined Impacts (%)** - Total combined impacts are the percent (%) of the requested area where alternatives cannot be used due to key pest, regulatory, and new fumigants. In each case the total area impacted is the conjoined area that is impacted by any individual impact. The effects were assumed to be independently distributed unless contrary evidence was available (e.g., affects are known to be mutually exclusive).
21. **Adaptation / Transition** - Estimate of the percentage of the weighted usage that can be transitioned to a marginal strategy. This estimate is for areas of the country where some processors may employ a marginal strategy without major economic dislocation if given a reasonable time frame for the transition.

22. **Qualifying Volume** - Qualifying volume (1000 cubic meters) is calculated by multiplying the adjusted volume by the combined impacts.
23. **CUE Nominated amount** - CUE nominated amount is calculated by multiplying the qualifying volume by the use rate.
24. **Percent Reduction** - Percent reduction from initial request is the percentage of the initial request that did not qualify for the CUE nomination.
25. **Sum of CUE Nominations in Sector** - Self-explanatory.
26. **Total U.S. Sector Nomination** - Total U.S. sector nomination is the most likely estimate of the amount needed in that sector.
27. **Dichotomous Variables** – dichotomous variables are those which take one of two values, for example, 0 or 1, yes or no. These variables were used to categorize the uses during the preparation of the nomination.
    28. **Currently Use Alternatives** – Currently use alternatives is 'yes' if the applicant uses alternatives for some portion of pesticide use on the crop for which an application to use methyl bromide is made.
    29. **Research/ Transition Plans** – Research/ Transition Plans is 'yes' when the applicant has indicated that there is research underway to test alternatives or if applicant has a plan to transition to alternatives.
    30. **Pest-free Market. Required** - This variable is a 'yes' when the product must be pest-free in order to be sold either because of U.S. sanitary requirements or because of consumer acceptance.
31. **Other Issues**.- Other issues is a short reminder of other elements of an application that were checked
    32. **Change from Prior CUE Request**- This variable takes a '+' if the current request is larger than the previous request, a '0' if the current request is equal to the previous request, and a '-' if the current request is smaller that the previous request. If the applicant has not previously applied the word 'new' appears in this column.
    33. **Verified Historic Use/ State**- This item indicates whether the amounts requested by administrative area have been compared to records of historic use in that area.
    34. **Frequency of Treatment** – This indicates how often methyl bromide is applied in the sector. Frequency varies from multiple times per year to once in several decades.
35. **Economic Analysis** – provides summary economic information for the applications.
    36. **Loss per 1000 m^3** – This measures the total loss per 1000 m^3 of fumigation when a specific alternative is used in place of methyl bromide. Loss comprises both the monetized value of yield loss (relative to yields obtained with methyl bromide) and any additional costs incurred through use of the alternative, such as longer time spent in the fumigation chamber. It is measured in current U.S. dollars.

37. **Loss per Kilogram of Methyl Bromide** – This measures the total loss per kilogram of methyl bromide when it is replaced with an alternative. Loss comprises both the monetized value of yield loss (relative to yields obtained with methyl bromide) and any additional costs incurred through use of the alternative. It is measured in current U.S. dollars.
38. **Loss as a % of Gross revenue** – This measures the loss as a proportion of gross (total) revenue. Loss comprises both the monetized value of yield loss (relative to yields obtained with methyl bromide) and any additional costs incurred through use of the alternative. It is measured in current U.S. dollars.
39. **Loss as a % of Net Operating Revenue** -This measures loss as a proportion of total revenue minus operating costs. Loss comprises both the monetized value of yield loss (relative to yields obtained with methyl bromide) and any additional costs incurred through use of the alternative. It is measured in current U.S. dollars. This item is also called net cash returns.

40. **Quality/ Time/ Market Window/Yield Loss (%)** – When this measure is available it measures the sum of losses including quality losses, non-productive time, missed market windows and other yield losses when using the marginal strategy.
41. **Marginal Strategy** -This is the strategy that a particular methyl bromide user would use if not permitted to use methyl bromide.

APPENDIX B. Description of Dry-curing Pork in the US.

Curing is a method of preserving meat that prevents harmful microorganisms from developing. Two curing methods have been developed – wet (or brine) curing and dry curing. In wet curing, the curing ingredients are mixed with boiling water to form "pickling" brine. In dry curing, the ingredients are simply rubbed into the meat several times over the period of the cure. This nomination is for dry cured pork products such as dry cured ham, dry cured country ham, hard salami, pepperoni, and sausage. Other types of preserved pork products are not included in this request.

Dry Curing Pork in the United States

Dry cured country hams are traditional in the southern part of the United States. Historically, this process was calendar based – beginning in the winter months and ending the following autumn. Pigs would be slaughtered and the ham curing process always started during the winter months. The cold winter temperatures would keep the meat cool enough to slow the growth of bacteria that would spoil the ham. Each ham was covered with a salt and sugar cure at least twice and stacked for the winter. In the spring, the ham was washed free of the salt and sugar cure, placed in a woven bag, and left to hang for the summer and into the fall. By late fall, the ham reached peak flavor and was ready for consumption.

Modern commercial production now uses environmentally controlled conditions that mimic the historical process and allows the manufacture of a consistently high quality product year round. Some processors, however, still chose to produce their cured meats in the traditional manner. The time required to cure hams vary from about 20 days to more than 120 days. Key parameters in the curing process are temperature and relative humidity, both of which are controlled by air flow. In addition to curing, smoking may occur.

Curing facilities may be up to 2-3 stories in height and typically have curing rooms that use either wood or stainless steel racks to hang the hams. The curing rooms can hold up to 4000 hams.

Pest Pressure

It is common for producers of dry cured pork products to experience considerable pest pressure from insects such as the ham skipper, the red legged ham beetle, and mites. These insects infest and feed on meat as it cures and ages. Environmental conditions such as rain, temperature, and humidity in and around the curing facility influence the level of pest pressure. In general, higher temperature and humidity levels result in higher pest pressure. In addition, most of the curing facilities are located near slaughter houses and feed lots, which often support residual populations of insects that feed and breed on dry meats.

Steps in the Curing Process

Step 1 (Winter Room) -- Ham is typically salted and sugared using a dry rub method on Day 1 and Day 15. The temperature is approximately 38°F (3.3°C) with low humidity. Sometime between days 42°F – 50°F (4.4°C - 10°C), the salt and sugar are scraped and rubbed off of the ham. In this room, the low temperatures and high salt content is sufficient to keep insect pest pressure to a minimum.

Step 2 (Spring Room) -- After being removed from the winter room, the hams are wrapped in cotton netting and placed in the spring room for only 10 -15 days. The temperature is approximately 50°F – 55°F (10°C -12.8°C) at 50% humidity. The humidity is very important at this stage and it is monitored closely. Most hams are equalized in the spring room. Equalization is a process whereby the salt cure penetrates from the surface of the ham, through the skin, and to the inner portion of the ham.

There are no insect problems here due to the low temperature and the limited amount of time that the hams are in this room.

Step 3 (Summer or Aging Room) – Hams are next moved to the summer (or aging room) for up to 120 days. The temperature is maintained between 80º F - 90ºF (21°C – 32°C) at 55% humidity. These conditions are very important to develop an intense, concentrated flavor and aroma.

As the ham ages, the moisture content of the ham will decrease, the salt content increases, and the chances of bacterial action become limited. If desired, smoking of the hams may occur here, or in a separate “smoke house.”

Since the temperature and humidity are higher in this room, conditions are ideal for insect and mite infestation. It is at this stage that the application of MB is necessary.

APPENDIX C. 2006 Methyl Bromide Reconsideration for Rice Mills

Overview of the US Nomination

The U.S. has requested 135.742 metric tons of methyl bromide for use on uncooked (dry cured or 'country') hams for 2006. MBTOC was unable to make a recommendation for this sector.

Currently there are no viable alternatives to methyl bromide for the dried meat industry: phosphine does not control mites (a major pest affecting this sector) and heat would alter the product. In U.S. pork processing plants that produce dry-cured pork products there are several factors that make the potential alternatives to methyl bromide unsuitable. These include:

- Pest control efficacy of alternatives: the efficacy of alternatives may not be comparable to MB, making these alternatives technically and/or economically infeasible. Phosphine, alone or in combination with carbon dioxide does not control mites, a major pest on cured hams.
- Geographic distribution of the facilities: Facilities included in this nomination are located in the southern U.S. where mild temperatures and high relative humidity result in key pest pressures that are moderate to severe. These ambient conditions require that pests be killed because they will only reinfest the facility after fumigation.
- Age and type of facility: older food processing facilities, especially those constructed of wood, experience more frequent and severe pest infestations that must be controlled by fumigation. In the U.S. it is usual for dry-cured processed pork to be produced in traditional facilities. These facilities are usually constructed of wood and many are decades old, if not older. Many newer facilities are constructed using the older facilities as models.
- Constraints of the alternatives: some types of commodities (e.g., those containing high levels of fats and oils) prevent the use of heat as an alternative because of its effect on the final product (e.g., rancidity). All of the pork products are relatively high fat products so rancidity would be a problem. In addition, using heat will alter the character of the final product, producing, for example, a cooked pork product rather than a dry-cured pork product with the attendant flavor differences.
- Transition to newly available alternatives: Sulfuryl fluoride recently received a Federal registration for certain commodities and structures, such as cereal mills. At present, pork and pork products are not included among the legal uses of sulfuryl fluoride, so this chemical is not an option for these facilities.
- Delay in plant operations: e.g., the use of some alternatives can add a delay to production by requiring additional time to complete the fumigation process. Production delays can result in significant economic impacts to the processors.

It is common for producers of cured pork products to experience pest pressure from insects such as the ham skipper, the red legged ham beetle, dermestid beetles, and mites. These insects infest and feed on meat as it cures and ages. Environmental conditions (temperature and humidity) in and around the facility strongly influence the level of pest pressure. Under favorable ambient conditions, such as those seen in silo curing, pest pressure increases and a regular fumigation schedule is recommended. In the U.S., the Food and Drug Administration (FDA) regulates the

maximum levels of live or dead insects or insect parts that may be present in stored food products. Food commodities that exceed maximum limits allowed are considered adulterated by FDA and thus unfit for human consumption. There are currently no alternatives registered for use on hams in the U.S. that would provide the same level of pest control.

The specific name and physical address of each facility was not requested in the forms filled out by the applicants in the United States. However, general location information for the following facilities is known:

- Kentucky (Cadiz, Greenville)
- Missouri (California)
- North Carolina (Boone, Goldsboro, Smithfield, Wayne County)
- Virginia (Surry)
- Tennessee (Various locations)
- South Carolina (Various locations).

In order to address this concern, USG has requested location information from the post-harvest sector participants. The forms have begun to come in from the applicants and are currently under review. When the analysis is complete it will be forwarded to MBTOC.

It has been difficult to determine the amount of methyl bromide used historically in this sector. Some data have been supplied by applicants[1]:

METHYL BROMIDE CONSUMPTION FOR THE PAST 5 YEARS AND THE AMOUNT REQUIRED IN THE YEAR(S) NOMINATED

	Historical Use						Requested Use	
For each year specify:	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2005**	**2006**
Amount of MB (kg)	1,159	1,309	1,291	972	1,659	1,528	170,350	170,350
Volume Treated 1000 m^3	50	53	52	41	48	43	7,087	7,087
Formulation of MB	Information not provided						Information not provided	
Dosage Rate (kg/1000 m^3)	31	30	32	29	38	35	25	25
Actual (A) or Estimate (E)	Information not provided						Information not provided	

There are currently no alternatives to methyl Bromide in Ham fumigation. Phosphine, alone and in combination with carbon dioxide, does not control mites, a major pest in cured pork products. Additionally, according to the phosphine label, the state of North Carolina has further restricted

[1] Data for only one company. Given the small share of the market for dry-cured pork products represented by the reporting company, these data cannot be taken as representative.

the use of this alternative. According to state regulations, phosphine may only be used to control rats and mice, but not insects.

In the U.S., the Food and Drug Administration (FDA) regulates the maximum levels of live or dead insects or insect parts that may be present in stored food products. Food commodities that exceed maximum limits allowed are considered adulterated by FDA and thus unfit for human consumption and cannot be sold. The law is part of the Federal Food, Drug, and Cosmetic Act and available on the World Wide Web at: http://www.cfsan.fda.gov/~dms/dalbook.html). Another source for the Food, Drug, and Cosmetics Act can be found at: http://www.fda.gov/opacom/laws/fdcact/fdcact4.htm

Meat Inspections are through the Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA). Under authority of the Federal Meat, Poultry and Egg Products Inspection Acts, FSIS inspects and monitors all meat, poultry and egg products sold in interstate and foreign commerce to ensure compliance with mandatory U.S. food safety standards and inspection legislation.
http://www.fsis.usda.gov/regulations_&_policies/federal_inspection_programs/index.asp

Establishments have the option to apply for Federal or State inspection. Under the agreement, a State's program must enforce requirements "at least equal to" those imposed under the Federal Meat and Poultry Products Inspection Acts. However, product produced under State inspection is limited to intrastate commerce. FSIS provides up to 50% of the State's operating funds, as well as training and other assistance.

http://www.fsis.usda.gov/regulations_&_policies/state_inspection_programs/index.asp

Technical and Economic Assessment of MBTOC/TEAP Report.
We have not been provided by MBTOC with information on their technical assessment of the performance of alternatives, ortheir economic assessment on the impact of converting to alternatives. To support the MBTOC's recommended change in the U.S. request citations of the research references and economic assessments that led to the MBTOC conclusions are needed so we can understand the justification. The technical references should describe the species tested, pest numbers, concentrations, times, and commodity volumes. Economic references should describe the costs of converting from methyl bromide to alternatives, the impact of higher yield losses, longer plant back intervals, the economic feasibility if key market windows are missed, and the economic impact of a 20% transition to alternatives including estimates of management costs for more intensive programs and how the impact of less reliable alternatives is calculated. The sources of estimates of the extent of pest pressure should describe the rationale for using other estimates, a description of the questions, species being surveyed and quantitative levels used.

U.S. 2006 nomination
In responding to MBTOC concerns USG has developed some information suggesting that less methyl bromide is needed in this sector than previously thought. Accordingly, USG is submitting an amended request for this sector of 40.854 metric tons of methyl bromide, a reduction to less than 1/3 of the previously requested amount.

Citations

Bell, C.H. 2000. Fumigation in the 21st Century. Crop Protection, 19:563-69.