

**MONTREAL PROTOCOL
ON SUBSTANCES THAT DEplete
THE OZONE LAYER**



UNEP

**REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL**

OCTOBER 2012

**EVALUATION OF 2012 CRITICAL USE NOMINATIONS FOR METHYL
BROMIDE AND RELATED MATTERS**

FINAL REPORT

**UNEP
OCTOBER 2012 REPORT OF THE
TECHNOLOGY AND ECONOMIC
ASSESSMENT PANEL**

**EVALUATION OF 2012 CRITICAL USE NOMINATIONS FOR
METHYL BROMIDE AND RELATED MATTERS**

FINAL REPORT

**Montreal Protocol
On Substances that Deplete the Ozone Layer**

Report of the
UNEP Technology and Economic Assessment Panel

October 2012

**EVALUATIONS OF 2012 CRITICAL USE NOMINATIONS FOR
METHYL BROMIDE AND RELATED MATTERS**

The text of this report is composed in Times New Roman.

Co-ordination: **Methyl Bromide Technical Options Committee**

Composition of the report: MBTOC Soils: Co-chairs Ian Porter, Mohamed Besri
MBTOC SC: Co-chair Michelle Marcotte
MBTOC QPS: Co-chair Marta Pizano

Reproduction: UNON Nairobi

Date: October 2012

Under certain conditions, printed copies of this report are available from:

UNITED NATIONS ENVIRONMENT PROGRAMME
Ozone Secretariat, P.O. Box 30552, Nairobi, Kenya

Normally from SMI Distribution Service Ltd., Stevenage, Hertfordshire, UK, fax: + 44 1438 748844

This document is also available in portable document format from

http://www.unep.org/ozone/teap/Reports/TEAP_Reports/

No copyright involved. This publication may be freely copied, abstracted and cited, with acknowledgement of the source of the material.

ISBN: 978-9966-20-013-6

Disclaimer

The United Nations Environment Programme (UNEP), the Technology and Economic Assessment Panel (TEAP) Co-Chairs and members, and the Methyl Bromide Technical Options Committee (MBTOC) Co-Chairs and members, and the companies and organisations that employ them do not endorse the performance, worker safety, or environmental acceptability of any of the technical options discussed. Every industrial operation requires consideration of worker safety and proper disposal of contaminants and waste products. Moreover, as work continues - including additional toxicity evaluation - more information on health, environmental and safety effects of alternatives and replacements will become available for use in selecting among the options discussed in this document.

UNEP, TEAP Co-Chairs and members, and the MBTOC Co-Chairs and members, in furnishing or distributing this information, do not make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or utility; nor do they assume any liability of any kind whatsoever resulting from the use or reliance upon any information, material, or procedure contained herein, including but not limited to any claims regarding health, safety, environmental effect or fate, efficacy, or performance, made by the source of information.

Mention of any company, association, or product in this document is for information purposes only and does not constitute a recommendation of any such company, association, or product, either express or implied by UNEP, TEAP Co-Chairs and members, and the MBTOC Co-Chairs and members or the companies or organisations that employ them.

Acknowledgement

The Technology and Economic Assessment Panel and its Methyl Bromide Technical Options Committee acknowledge with thanks the outstanding contributions from all of the individuals and organisations who provided support to Panel and Committee Co-Chairs and members. The opinions expressed are those of the Panel and the Committee and do not reflect the reviews of any sponsoring or supporting organisation.

Methyl Bromide Technical Options Committee:

MBTOC Soils (S) Co-Chairs: Ian Porter (Australia). Mohamed Besri (Morocco) **Members of MBTOC S:** Antonio Bello (Spain); Aocheng Cao (China); Peter Caulkins (USA); Raquel Ghini (Brazil); George Lazarovits (Canada); Andrea Minuto (Italy); Marta Pizano (Colombia); Sally Schneider (USA); JL (Stappies) Staphorst (South Africa); Akio Tateya (Japan); Alejandro Valeiro (Argentina); Janny Vos (The Netherlands); Jim Wells (USA); Suat Yilmaz (Turkey)

MBTOC Structures and Commodities (SC) Chair: Michelle Marcotte (Canada) **Members of MBTOC SC** Fred Bergwerff (Netherlands); Chris Bell (UK); Ricardo Deang (Philippines); Alfredo Gonzalez (Philippines); Darka Hamel (Croatia); Christoph Reichmuth (Germany); Jordi Riudavets (Spain); John Sansone (USA); Robert Taylor (UK); Chris Watson (UK)

MBTOC Quarantine and Preshipment Chair: Marta Pizano (Colombia), **Members of MBTOC QPS** Jonathan Banks (Australia); Ken Glassey (New Zealand); Takashi Misumi (Japan); David Okioga (Kenya); Ian Porter (Australia); Ken Vick (USA) and Eduardo Willink (Argentina).

MBTOC Economist: Nick Vink (South Africa)

**OCTOBER 2012 REPORT OF THE
TECHNOLOGY AND ECONOMIC
ASSESSMENT PANEL**

**EVALUATIONS OF 2012 CRITICAL USE NOMINATIONS FOR
METHYL BROMIDE AND RELATED MATTERS**

FINAL REPORT

MBTOC FINALCUN REPORT – OCTOBER 2012

Common Acronyms

1,3-D	1,3-dichloropropene
A5	Article 5 Party
ASD	Anaerobic soil disinfestation
CUE	Critical Use Exemption
CUN	Critical Use Nomination
DOI	Disclosure of Interest
EC	European Community
EMOP	Extraordinary Meeting of the Parties
EPA	Environmental Protection Agency
EPPO	European Plant Protection Organisation
IM	Iodomethane
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPM	International Standard Phytosanitary Measure
LPBF	Low Permeability Barrier Film (including VIF films)
MB	Methyl Bromide
MBTOC	Methyl Bromide Technical Options Committee
MBTOC QPS	Methyl Bromide Technical Options Committee, Quarantine and Pre-shipment Subcommittee

MBTOC SC	Methyl Bromide Technical Options Committee, Structures and Commodities Subcommittee
MBTOC S	Methyl Bromide Technical Options, Soils Subcommittee
MITC	Methyl isothiocyanate
MOP	Meeting of the Parties
MS	Metam sodium
OEWG	Open Ended Working Group
Pic	Chloropicrin
QPS	Quarantine and Pre-shipment
SF	Sulfuryl fluoride
TEAP	Technology and Economics Assessment Panel
TIF	Totally Impermeable Film
VIF	Virtually Impermeable Film
VOC	Volatile Organic Compounds

2012 Evaluations of Critical Use Nominations for Methyl Bromide and Related Matters – Final Report

Table of Contents

1.1	SCOPE OF THE REPORT	1
1.2.	CRITICAL USE NOMINATIONS FOR METHYL BROMIDE	1
1.2.1.	MANDATE	1
1.2.2	FULFILMENT OF DECISION IX/6	1
1.2.3	REPORTING OF MB CONSUMPTION FOR CRITICAL USE	2
1.2.4	TRENDS IN METHYL BROMIDE USE FOR CUES SINCE 2005	2
1.2.5	DISCLOSURE OF INTEREST	3
1.2.6	ARTICLE 5 ISSUES	3
1.2.7	CONSIDERATION OF STOCKS, DECISION EX.1/4 (9F)	4
1.3	EVALUATIONS OF CUNS – 2012 ROUND FOR 2014 EXEMPTIONS	9
1.3.1	CRITICAL USE NOMINATIONS REVIEW	9
1.3.2	ACHIEVING CONSENSUS	10
1.4	MBTOC SOILS: FINAL EVALUATIONS OF 2012 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE FOR 2014	11
1.4.1	CRITICAL USE NOMINATIONS SUBMITTED.....	11
1.4.2	CUN ASSESSMENT FOR PREPLANT SOIL USES	11
1.4.3	ISSUES RELATED TO CUN ASSESSMENT FOR PREPLANT SOIL USE	11
1.4.3.1	<i>Australia</i>	12
1.4.3.2	<i>Canada</i>	12
1.4.3.3	<i>United States</i>	12
1.4.3.4.	<i>General comments on assessment</i>	12
1.4.4	REGISTRATION OF ALTERNATIVES FOR PREPLANT USES - DECISION EX I/4 (9I) AND (9J).....	13
1.4.5	SUSTAINABLE ALTERNATIVES FOR PREPLANT USES.....	13
1.4.6	STANDARD PRESUMPTIONS USED IN ASSESSMENT OF NOMINATED QUANTITIES.....	13
1.4.7	ADJUSTMENTS FOR STANDARD DOSAGE RATES USING MB/PIC FORMULATIONS	16
1.4.8	USE/EMISSION REDUCTION TECHNOLOGIES - LOW PERMEABILITY BARRIER FILMS AND DOSAGE REDUCTION	16
1.5	MBTOC-STRUCTURES AND COMMODITIES – FINAL CUN REPORT	28
1.5.1	PROCESS USED BY MBTOC SC TO CONDUCT CUN RE-REVIEWS	28
1.5.2	RESOURCING ISSUES IN 2012 AND IN COMING YEARS	28
1.5.3	DETAILS OF EVALUATIONS	29
1.6	ACTIVITY REPORT FOR 2012 AND WORK PLAN FOR 2013	52
1.6.1	ACTIVITY REPORT FOR 2012.....	52
1.6.2	WORK PLAN AND INDICATIVE BUDGET FOR 2013	52
1.7	REFERENCES:	54
ANNEX 1: DECISION IX/6	56	
ANNEX II: MINORITY REPORT.....	71	
ANNEX III - PART A: TREND IN MB PREPLANT SOIL NOMINATIONS AND EXEMPTIONS	66	
ANNEX IV - PART B: TRENDS IN MB STRUCTURAL AND COMMODITY NOMINATIONS AND EXEMPTIONS.....	83	

2012 Evaluations of Critical Use Nominations for Methyl Bromide and Related Matters

1.1 Scope of the Report

This 2012 final report provides evaluations by MBTOC of Critical Use Nominations (CUNs) submitted for methyl bromide (MB) for 2014 by three Parties (Australia, Canada, USA). As per provisions set out in Decision IX/6 (Annex I, MOP16), CUNs were submitted to the Ozone Secretariat by the Parties in accordance with the timetable shown in paragraph 1 of Annex I, Decision XVI/4.

This final report 1) provides new updated recommendations for the CUNs for which the Parties provided further information or requested reassessment after the 32nd OEWG, 2) lists the CUNs for which interim assessments have not changed and 3) provides information on the CUNs from Parties on stocks (Decision Ex.1/4 (9f)). It further provides partial information on actual MB consumption for critical uses (in accordance with Decision XVII/9) and apparent adoption rates of alternatives, as evidenced by trend lines on reduction of MB CUNs (in accordance with Decisions XIX/9, XX/5). It is noted that trend lines on adoption may not necessarily indicate true adoption rates for alternatives, as the use of stocks of MB that may have been available to the same sector or areas of production may have increased or fallen within the sector due to a range of circumstances. MBTOC notes that stock volumes have significantly decreased in recent years.

Standard presumptions used in the 2012 round were the same as those used in the 2011 evaluations of the CUNs. These standard presumptions are subject to continual review. However, any changes proposed by MBTOC are required to be approved by the Party's in the MOP preceding the year of assessment based on a draft Decision presented to the MOP in accordance with paragraph 2 in Annex 1 to the report of MOP16.

1.2. Critical Use Nominations for Methyl Bromide

1.2.1. Mandate

Under Article 2H of the Montreal Protocol, Parties not operating under Article 5(1) are required to phase-out all production and consumption (defined as production plus imports minus exports) of MB after 1 January 2005. However, the Parties agreed to a provision enabling exemptions for those uses of MB that qualify as critical. Parties established criteria, under Decision IX/6 (see Annex 1 of this report) of the Protocol, which all critical uses need to meet in order to qualify for an exemption. TEAP and its MBTOC provided guidance to the Parties' decisions on critical use exemptions in accordance with Decisions IX/6, Annex I of Decision XVI/2 and a number of subsequent decisions (XVI/2; XVII/9, XVIII/13, XIX/9, XX/5, XXI/11, XXII/6 and XXIII/4).

1.2.2 Fulfilment of Decision IX/6

Decision XVI/2 and Decision XXI/11 directed MBTOC to indicate whether all CUNs fully met the requirements of Decision IX/6. When the requirements of Decision IX/6 are met, MBTOC can recommend critical uses of MB. Where some of the conditions are not fully met, MBTOC can recommend a decreased amount depending on its technical and economic evaluation, or determine the CUN as "unable to assess" and request further information from the Party. When the information is submitted, MBTOC is required to re-assess the nomination, following the procedures defined in Annex 1 of the Sixteenth Meeting of the Parties

MBTOC recommended less methyl bromide than requested in a CUN when technically and economically feasible alternatives were considered to be available or, in a few cases, when the Party failed to show that there was no technically and economically feasible alternative. In this round of

CUNs, as in previous rounds, MBTOC considered all information provided by the Parties, including answers to questions requested by MBTOC up to the date of the evaluation.

Now that technically and economically feasible alternatives have been identified for virtually all applications, regulations on the use of these alternatives often determine their availability to the end users. In addition, comparative information on the economic feasibility/infeasibility of the use of alternatives compared to MB is critical to the outcomes of present and future CUNs. MBTOC needs annual updates of the economics information evaluating the costs of alternatives. In many cases, MBTOC has proposed that existing commercially and economically feasible alternatives should be used. Where these are not available, MBTOC has suggested research that could lead to commercial alternatives to replace MB. MBTOC has also shown how regulatory issues can hinder or promote the phase out of MB, and has directed Parties attention toward such issues.

1.2.3 Reporting of MB Consumption for Critical Use

A number of decisions (Ex.I/3(5); XVI/2(4); XVII/9(5)), XVIII/13(6), XIX/9(7), XX/5(7), XXI/11(6), XXII/6(5) and XXIII/4(4) set out provisions which request Parties to submit by 1 February each year information on how criteria in IX/6(1) is met when licensing permitting or authorizing CUEs.

Decision XVII/9 of the 17th MOP specifically requests TEAP and its MBTOC to “*report for 2005 and annually thereafter, for each agreed critical use category, the amount of methyl bromide nominated by a Party, the amount of the agreed critical use and either:*

- (a) The amount licensed, permitted or authorised; or*
- (b) The amount used*

Since the start of the CUN reviews in 2003, MBTOC has provided the amounts of MB nominated and agreed for each critical use (Annexes III and IV). MBTOC is now able to report more information on amounts of MB permitted and/or used for CUE uses. Parties are required to report the data to UNEP by March 2012 as part of the accounting framework, form 2.

The Meeting of the Parties authorised use of 4.87 tonnes of MB for rice in 2011 in Australia, but 4.043 tonnes were used for that purpose. In addition, Parties authorised 29.79 tonnes for strawberry runners in that same year, but 29.29 tonnes were used for strawberry runners.

For Canada, the Meeting of the Parties authorised 2.084 tonnes for pasta manufacturing in 2011, however 0.9349 tonnes were used; and 14.106 tonnes for flour-mills, but 11.495 tonnes were used. A further 5.261 tonnes were granted for strawberry runners, and that full amount was fully used.

Japan was authorised a use of 239.746 tonnes for a range of vegetable crops, ginger and chestnuts for 2011 by the MOP, and used 222.239 t. Japan did not apply for CUEs for 2014..

For Israel, the MOP authorised 290.878 tonnes for a range of vegetable and strawberry crops in 2011. The actual amount used is as yet unknown, as Israel has not submitted an Accounting Framework Report for 2012. Israel did not apply for CUEs in 2014.

For the United States, the MOP authorised 1855.2 tonnes for a wide range of crops and commodities in 2011 (Annex III and IV). In their allocation regulation for 2011 critical uses, the Party reported that in 2011, 1,382.206 tonnes had been approved for pre-plant soil uses and 117.794 tonnes for postharvest uses (Federal Register, September 30, 2011).

1.2.4 Trends in Methyl Bromide Use for CUEs since 2005

The nominated amounts and the apparent rate of reduction in MB or adoption of alternatives achieved by Parties are shown in Table 1-5, as well as Figures 1-1 and 1-2. It is noted that for those countries that have pre-2005 stocks of MB that are being drawn down, the reductions in CUEs from year to year cannot be taken directly as evidence of alternative adoption since pre-2005 stocks may have been used

in the same sectors. Tables 1-9 and 1-11 in particular show the amounts nominated by Parties for soil uses, and structures and commodity uses and the final recommendations for ‘Critical Use’ in 2014.

Decision XVII/9 requires TEAP to show trends in the phase out of the critical uses of MB by the Parties (Figs 1-1 to 1.2, Annexes III and IV). Since 2005, there has been a progressive trend in the reduction of methyl bromide for CUNs by all Parties for both soil and post harvest uses, although this has occurred at different rates. Figs 1-1 to 1.2 show reduction trends in amounts approved/nominated by Parties for ‘Critical Use’ from 2005 to 2014 for all the remaining soil uses and some of the remaining structures and commodity uses. The complete trends in phase out of MB by country, as indicated by change in CUE, are shown in Annexes III and IV.

1.2.5 Disclosure of Interest

As in past reports, MBTOC members were requested to update their disclosure of interest forms relating specifically to their level of national, regional or enterprise involvement for the 2012 CUN process. The Disclosure of Interest declarations for 2012, updated in February 2012 can be found on the internet at

http://ozone.unep.org/new_site/en/disclosure_of_interest.php?body_id=6&committee_id=6 and a list of members in Annex I, chapter 11 of this TEAP report. As in previous rounds, some members withdrew from a particular CUN assessment or only provided technical advice on request for those nominations where a potential conflict of interest was declared.

MBTOC co-chairs requested members to complete a Categorisation of Interest Form on the application of declarations of interest to the best extent possible. Most MBTOC members found it difficult to accurately categorise their conflicts accordingly, however they discussed these during the plenary at the start of the MBTOC meeting in Beijing and members were given the opportunity to declare their conflicts of interest. Where known, these were managed appropriately by recusal or self recusal during the relevant CUN assessment.

MBTOC co-chairs seek guidance from TEAP and the Parties on how to improve DOI/COI updating and management procedures and in particular to implement them for the CUN process.

1.2.6 Article 5 issues

Methyl bromide is due to be fully phased out in A5 Parties by January 1, 2015, 10 years after full phaseout by non-A5 Parties. In both cases, uses for feedstock and QPS are exempted from phase out under the control measures described in Article 2H. There is also provision for exemption from phase out for uses deemed ‘critical’ according to Article 2H, as complying with Decision IX/6.

Presently, nearly 80% of the controlled consumption in A5 Parties has been phased out, well ahead of the 2015 deadline. This has been achieved largely as a result of investment projects implemented by the Montreal Protocol agencies, with MLF funding, bilateral cooperation and also national funding. Most of the remaining MB consuming A5 Parties have agreements in place with the MLF and other organisations for full phaseout of methyl bromide by 2015 at the latest, very often earlier. These are usually accompanied with legislation to ban further consumption of MB for controlled uses, and funding to support ongoing implementation of alternatives therefore promoting the sustainability of the phase out.

Article 5 Parties may choose to submit nominations for Critical Use Exemptions (CUEs) for remaining uses they consider appropriate for the year 2015 and possibly subsequently. The first CUNs by non-A5 Parties were made in 2003 for CUEs to be in force in 2005. If a similar advanced submission period is to be followed, some A5 Parties may choose to submit CUNs in 2013 for assessment by MBTOC for potential use as 2015 CUEs.

MBTOC is mindful of the difficult and complex process that occurred during the first round of CUNs in 2003 for non A5 Parties. TEAP urges Parties to consider the requirements for CUNs in due time as set out in the ‘Handbook on Critical Use Nominations’ which has been revised and updated to meet the needs of the non A5 and A5 Critical Use Process in response to Decision XXIII/14.

([http://ozone.unep.org/Assessment_Panels/TEAP/Reports/MBTOC/Handbook%20CUN-version 7](http://ozone.unep.org/Assessment_Panels/TEAP/Reports/MBTOC/Handbook%20CUN-version%207))

1.2.7 Consideration of Stocks, Decision Ex.I/4 (9f)

One criterion for granting a critical use is that MB “*is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide*” (paragraph 1 (b) (ii) of Decision IX/6). Parties nominating critical use exemptions are requested under decision Ex.I/4(9f) to submit an accounting framework with the information on stocks. MBTOC has not reduced its recommended amount of methyl bromide in consideration of stocks held by the Party and has instead relied on Parties to take this into consideration when approving the amounts recommended by TEAP for each nomination. To assist the Parties with their consideration of stocks, and in accordance with Decision XVIII/13(7), a summary of the data on stocks as reported by the Parties in the first year for accounting in 2006, and then reports submitted in 2011 and 2012 are summarized in Tables 1-1 to 1-3 below.

Parties may wish to consider this information in the light of Decision IX/6 1(b)(ii) when authorising methyl bromide for critical uses.

Efficient functioning of commerce requires a certain level of available stocks and additional stocks to respond to emergencies. Additionally, stocks may be held on behalf of other Parties or for exempt uses (feedstock and QPS uses). The correct or optimal level of stocks for virtually every input to production is not zero. In addition, stocks are privately owned and may not be readily available for critical uses, or there may be national regulations preventing the transfer of stocks. Despite these restrictions, Parties may wish to ensure that stocks are used wherever possible in order to minimize the quantity of MB that need to be produced each year for critical uses. Tables 1-1 to 1.3 report the quantities of MB ‘on hand’ at the beginning and end respectively of 2005, 2010 and 2011 as required under Decision XVI/6. The earlier CUN reports list stocks for the other years.

Table 1-1: Quantities of MB (metric tonnes) ‘on hand’ at the beginning and end of 2005, as first reported by Parties in 2006/2007 under Decision XVI/6.

Party	Critical use exemptions authorized by MOP for 2005	Quantity of MB as reported by Parties (metric tonnes)				
		Amount on hand at start of 2005	Quantity acquired for CUEs in 2005 (production +imports)	Amount available for use in 2005	Quantity used for CUEs in 2005	Amount on hand at the end of 2005
Australia	146.6	0	114.912	114.912	114.912	0
Canada	61.792	0	48.858	48.858	45.146	3.712
EU	4 392.812	216.198	2 435.319	2 651.517	2 530.099	121.023
Israel	1 089.306	16.358	1 072.35	1 088.708	1 088.708	0
Japan	748	0	594.995	594.995	546.861	48.134
New Zealand	50	6.9	40.5	47.4	44.58	2.81
USA(a)	9 552.879		7 613	not reported	7 170	443

Additional information on stocks was reported on US EPA website, September 2006: MB inventory held by USA companies: 2004 = 12,994 tonnes; 2005 = 9,974 tonnes.

Table 1-2: Quantities of MB ‘on hand’ at the beginning and end of 2010, as reported by Parties in 2011 under Decision XVI/6.

Party	Critical use exemption authorized by MOP for 2010	Quantity of MB as reported by Parties (metric tonnes)				
		Amount on hand at start of 2010	Quantity acquired for CUEs in 2010 (production +imports)	Amount available for use in 2010	Quantity used for CUEs in 2010	Amount on hand at the end of 2010
Australia	36.44	0	34.167	34.167	34.167	0
Canada	33.277	6.38	23.456	29.836	25.254	1.185
Israel	290.88	12.47	288.94	301.41	290.86	10.55
Japan	267.00	8.82	248.67	257.49	251.159	6.331
USA	1,956	3,063 (a)	1,955	5,018	1,955 613 (c)	1,803(b)

(a) Amount of pre-2005 stocks available at the start of 2010

(b) Amount of pre-2005 stocks available at the end of 2010.

(c) Stocks used for CUE uses in 2010.

Table 1-3: Quantities of MB ‘on hand’ at the beginning and end of 2011, as reported by Parties in 2012 under Decision XVI/6.

Party	Critical use exemption authorized by MOP for 2011	Quantity of MB as reported by Parties (metric tonnes)				
		Amount on hand at start of 2011	Quantity acquired for CUEs in 2011 (production +imports)	Amount available for use in 2011	Quantity used for CUEs in 2011	Amount on hand at the end of 2011
Australia	34.66	0	33.333	33.333	33.333	0
Canada	21.451	1.185	15.889	17.074	17.691	-0.617
Israel	Not reported					
Japan	239.746	6.413	225.552	231.965	222.239	9.726
USA	1,500 [2055 approved by MOP for CUEs]	1,803(a)	1,499	3,302	1,499 555(c)	0 1,249(b)

(a) Amount of pre-2005 stocks available at the start of 2011

(b) Amount of pre-2005 stocks available at the end of 2011

(c) Stocks used for CUE uses in 2011

Figure 1-1: Amounts of MB nominated and exempted for CUE uses in nominated preplant soil sectors from 2005 to 2014. Blue lines indicate the trend in of CUN nominated and the red lines the amount CUE methyl bromide approved by the Parties

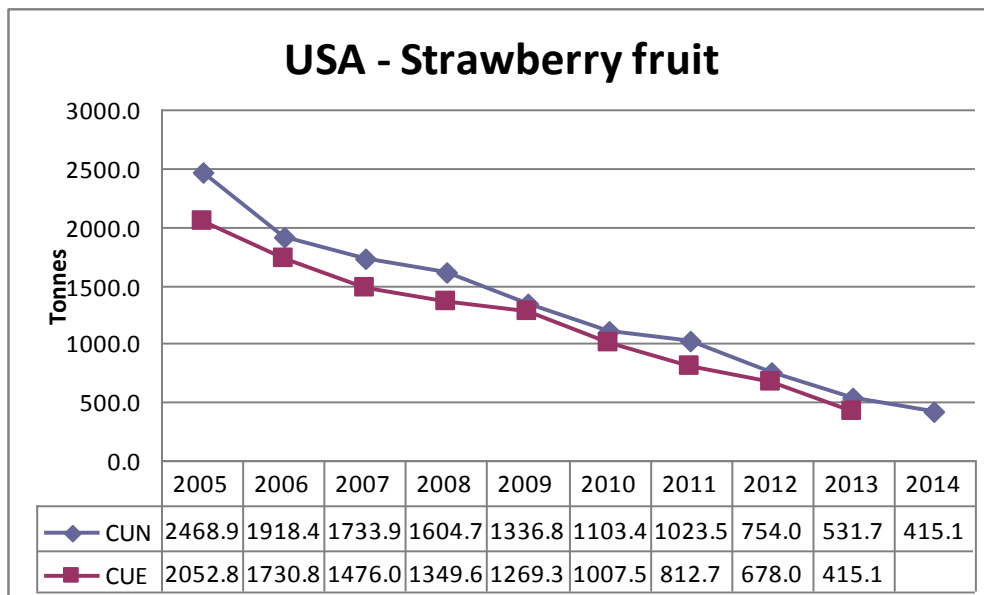
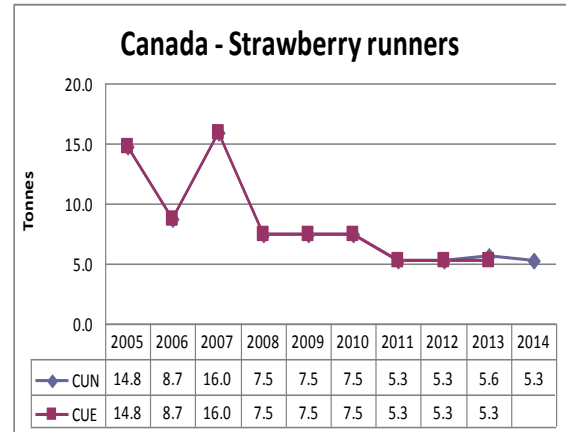
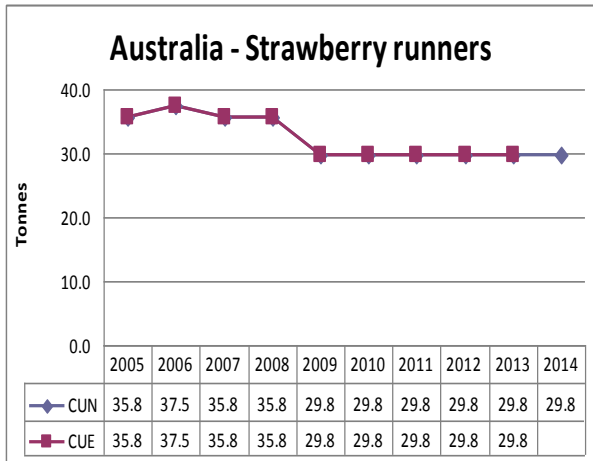


Figure 1-2: Amounts of MB nominated and exempted for CUE uses in mills and food processing facilities and for commodities from 2008 to 2014 in nominated postharvest industries from 2005 to 2014. Blue lines indicate the trend in of CUN nominated and the red lines the amount CUE methyl bromide approved by the Parties

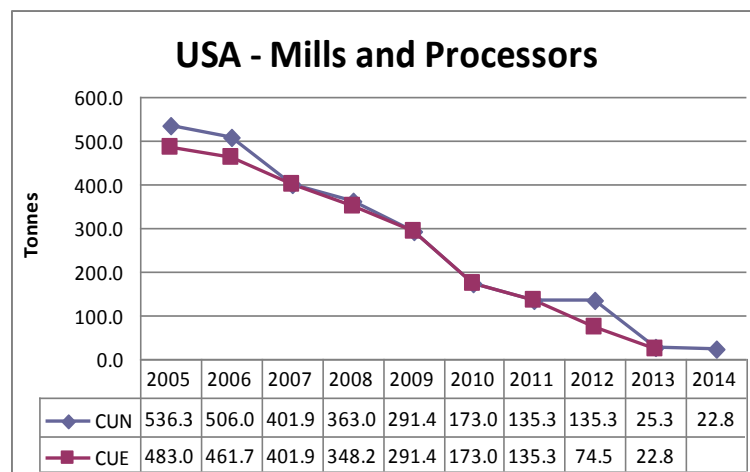
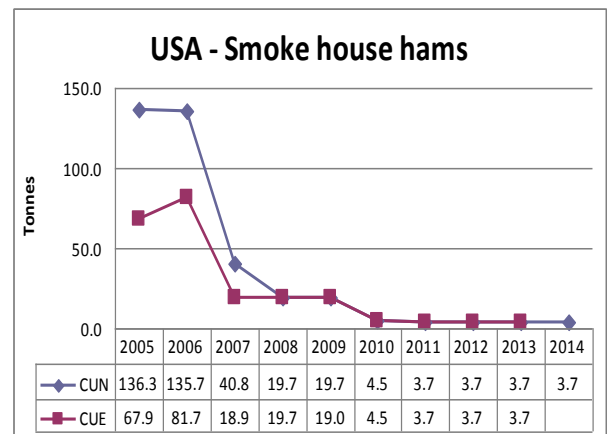
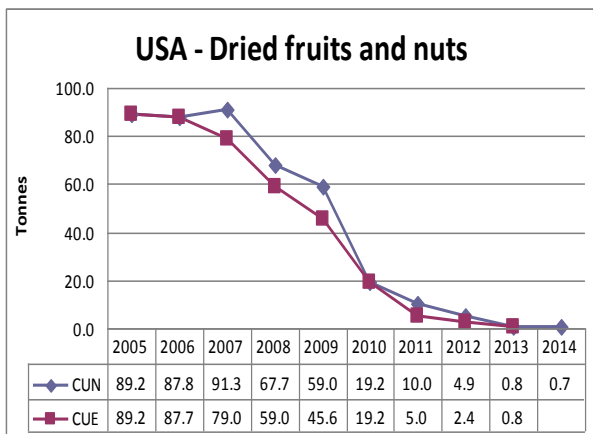
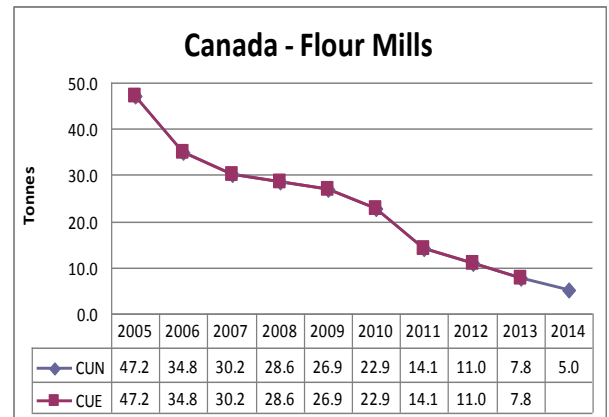
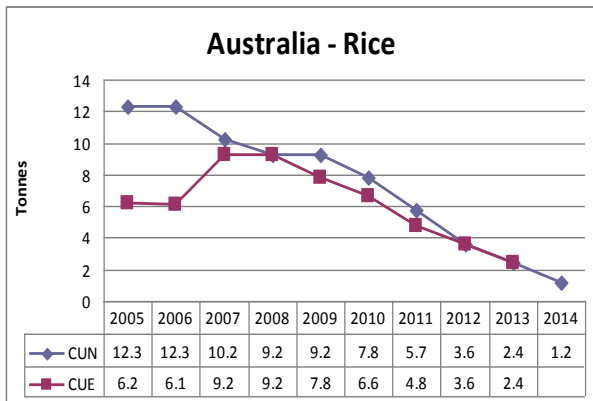


Table 1-4. Summary of Critical Use Nominations and Exemptions of Methyl Bromide (tonnes)

	Quantities Nominated										Quantities Approved										Final Recommendation
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005 (1ExMOP and 16MOP)	2006 (16MOP+ 2ExMOP+ 17MOP)	2007 (17MOP + 18MOP)	2008 (18MOP + 19MOP)	2009 (19MOP)	2010 (20MOP + 21MOP)	2011 (21MOP)	2012 (22MOP)	2013 (23MOP)	2014	
Australia	206.950	81.250	52.145	52.900	38.990	37.610	35.450	34.660	32.164	30.947	146.600	75.100	48.517	48.450	37.610	36.440	28.710	31.708	32.134	[27.971]	
Canada	61.992	53.897	46.745	42.241	39.115	35.080	19.368 +3.529	16.281	13.444	10.305	61.792	53.897	52.874	36.112	39.020	30.340 +3.529	19.368	16.281	13.109	[10.094]	
European Community <u>1</u>	5754.361	4213.47	1239.873	245.00	0	0	0	0	0	0	4392.812	3536.755	689.142	245.146	0	0	0	0	0	0	
Israel	1117.156	1081.506	1236.517	952.845	699.448	383.700	232.247	0	0	0	1089.306	880.295	966.715	860.580	610.854	290.878	0	0	0	0	
Japan	748.000	741.400	651.700	589.600	508.900	288.500	249.420	221.104	3.317	0	748.000	741.400	636.172	443.775	305.380	267.000	239.746	219.609	3.317	0	
New Zealand	53.085	53.085	32.573	0	0	0	0	0	0	0	50.000	42.000	18.234	0	0	0	0	0	0	0	
Switzerland	8.700	7.000	0	0	0	0	0	0	0	0	8.700	7.000	0	0	0	0	0	0	0	0	
USA	10753.997	9386.229	7417.999	6415.153	4958.034	3299.490	2388.128	1181.779+ 6.339	691.608	442.337	9552.879	8081.753	6749.060	5355.976	4261.974	3232.856 +2.018	2055.200	993.706	562.328	[415.646]	
TOTALS	18704.241	15617.837	10677.552	8297.739	6244.487	4044.380	2928.142	1460.163	740.533	483.589	16050.089	13418.200	9160.714	6990.039	5,254.838	3572.183	2343.024	1261.304	610.888	[453.711]	

* Not yet available.

1Members of the European Community which had CUNs/CUEs included:

2005 – Belgium, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain, and the United Kingdom.

2006 – Belgium, France, Germany, Greece, Ireland, Italy, Latvia, Malta, Netherlands, Poland, Portugal, Spain, and the United Kingdom.

2007 – France, Greece, Ireland, Italy, Netherlands, Poland, Spain, and the United Kingdom

2008 – Poland, Spain

1.3 Evaluations of CUNs – 2012 round for 2014 exemptions

Detailed interim assessments of all CUNs were made by MBTOC during its first meetings for Soils and QPS in Beijing, China, from February 27- March 2 and MBTOC Structures and Commodities in Berlin, Germany, from February 28 - March 1.

For the soils CUNs, Australia and Canada submitted similar amounts to the previous rounds highlighting difficulties with phase out of MB for the strawberry runner sector. In the USA the only soil CUN submitted was for strawberry fruit; none of the other previous years' CUNs were submitted.

Australia, Canada and the US submitted five CUNs in total for the postharvest sector. In Structures and Commodities, Parties continued to show progress in reducing the quantity of methyl bromide requested in the CUNs. The reduction was most likely the result of continuing efforts by Parties to resolve the inter-related issues of treatment logistics, costs and effectiveness of alternatives. Japan did not submit a CUN for fresh chestnuts this year.

Also during the first meeting progress reports were prepared and 'Disclosure of Interest' declarations updated. At the 32nd OEWG meeting in Bangkok, MBTOC held bilateral meetings with the Australia, Canada and the United States to discuss the interim recommendations and since then all three Parties have provided further information to support reassessment of five nominations.

MBTOC did not hold a second meeting this year in view the small number of CUNs and funding difficulties faced by many non-A5 members in relation to meeting attendance. Consideration of new information and reassessment of CUNs was thus conducted electronically, as discussed in the pertinent sections ahead. MBTOC has updated the Handbook by email exchange for presentation at the 24th MOP in November 2012.

As discussed in the TEAP Progress Report, three Parties only, (ie Australia, Canada, and the USA) submitted nominations for critical uses of MB for either preplant soil use and/or postharvest use in 2014 round. These Parties have submitted nominations in previous CUN years. Eight nominations were submitted in this round (Tables 1.5 and 1.10). The total nominated amount for all countries for 2014 was 483.589 t and this represented a 35% reduction to that nominated in 2011 for 2013.

After reassessment by MBTOC after the OEWG, the final recommendation for 2014 was 453.711 t, ie. 93% of that nominated (Table 1.4). MBTOC has sometimes recommended quantities of MB for 2014 which are less those nominated. The grounds used for these recommendations are given in detail in the relevant CUNs in Tables 1-9 and 1-11.

In general the CUNs were submitted due to the following issues: regulatory restrictions that did not allow partial or full use of alternatives, difficulties in the scale-up of alternatives, alternatives considered uneconomical and unavailability of alternatives. Additionally, MBTOC-SC notes that some Parties continue to struggle with the ability make an effort to adapt previously identified alternatives to their circumstances. In paragraph 20 of Annex 1 referred to in Decision XVI/4, Parties specifically requested that MBTOC explicitly state the specific basis for the Party's economic statement relating to CUNs. Tables 1-9 and 1-11 provide this information for each CUN. This information was prepared by the MBTOC economist. MBTOC notes there was an improvement in the economic information supplied in this round.

1.3.1 Critical Use Nominations Review

The meetings were held as required in accordance with the time schedule for the consideration of CUNs provided in Annex I referred to in Decision XVI/4. In considering the CUNs submitted in 2012, as in previous rounds, both MBTOC subcommittees applied as much as possible the standards contained in Annex I of the final report of 16 MOP, and, where relevant, the standard presumptions given below. In particular, MBTOC sought to provide consistent treatment of CUNs within and between Parties while at the same time taking local circumstances into consideration. Unless

otherwise indicated, the most recent CUE approved by the Parties for a particular CUN was used as baseline for consideration of continuing nominations. In evaluating the CUNs for soil treatments, MBTOC assumed that the presence of a technically feasible alternative to MB would need to provide sufficient pest and/or weed control for continued production of that crop to existing market standards.

For commodity and structural applications, it was assumed that technically and economically feasible alternatives would provide disinfestation to a level that met the objectives of a MB treatment, e.g. meeting infestation standards in finished product from a mill. Costs for alternatives for soil or postharvest uses should be within 20% (MBTOC 2011) of the cost of using methyl bromide for it to be considered economically feasible in the context of that nomination, to the extent that could be determined.

The outcome of evaluations of CUNs for the soil and structural treatments are presented in Table 1.9 and 1.11 below.

1.3.2 Achieving Consensus

In accordance with decision XX/5(9) and similar subsequent decisions (XXI/11(4), XXII/6(4) and XXIII/4(3)) the Parties have indicated that MBTOC '*should ensure that it develops its recommendations in a consensus process that includes full discussion among all available members of the Committee and should ensure that members with relevant expertise are involved in developing its recommendations*'.

In 2012 as described in the TEAP Progress Report, MBTOC's procedures were designed to improve members' contribution and reaching final decisions on nominations before, during and after the MBTOC meetings. This procedure ensured all members were sent information and able to discuss issues related to all nominations.

For the final reassessment, MBTOC Co-Chairs agreed on the following process to conduct the re-reviews electronically.

All the information from Parties was circulated to all members for an opportunity to make comments about the reassessment. Members were asked to submit comments by the end of August, 2012. Comments from all members of MBTOC on the nominations submitted for reassessment were considered by the relevant sub-committee. The coordinating Co-Chair (s) provided a summary of all the comments received to the sub-committee, who then formed a position which the co-chairs used to draft the proposed text boxes and recommendations. Sub-committee members then further discussed, commented on and made changes to the proposal. The agreed text box and recommendation was again circulated to obtain consensus (or agreement not to disagree) by each member of the sub-committee. The consensus positions of each sub-committee were then sent to full MBTOC for information and approval of the sub-committee findings. The results of the re-reviews were incorporated into this report which focuses mainly on the reassessed CUNs.

During the final assessments, one MBTOC Soils member disagreed with the position of the sub-committee on one CUN; consensus was achieved for the rest of the soils CUNs. The postharvest sub-committee of MBTOC achieved consensus on its nominations. The minority view submitted by the dissenting member can be found in Annex II.

Several members recused from evaluation of nominations as required by MBTOC's working procedures. These included Jonathan Banks (Australian Rice), George Lazarovits (US Strawberry fruit and Canadian Strawberry Nurseries), Jim Wells (US Strawberry Fruit) and Ian Porter (Australian Strawberry nurseries). The recusals took place either as a result of a member's disclosure as per MBTOC's guidelines or members may have chosen to self recuse to avoid any perceived conflict of interest.

1.4 MBTOC Soils: Final evaluations of 2012 Critical Use Nominations for Methyl Bromide for 2014

1.4.1 Critical Use Nominations submitted

At the Open Ended Working Group in Bangkok , in July 2012, MBTOC Soils presented interim recommendations on all three nominations received from Australia, Canada and the United States as shown in Table 1-5. During bilateral discussions at the OEWG, all three Parties who had submitted nominations in the 2012 round indicated issues related to the interim assessments and subsequently sent further information and requests for reassessment.

1.4.2 CUN reassessment for preplant soil uses

In summary, in the final assessment, the Australian and Canadian CUNs were unchanged from the interim recommendation, but the US strawberry fruit nomination was increased by 45.9 t as MBTOC agreed that the withdrawal of methyl iodide from the market would impact the nomination for 2014.

Table 1-5: Summary of the interim recommendations by MBTOC-S (in square brackets) for CUE's for preplant uses of MB (tonnes) submitted in 2012 for 2014

Country and Sector	Nomination by the Party for 2014	Interim Recommendation for 2014	Final Recommendation for 2014
1. Australia Strawberry runners	29.760	[26.784]	[26.784]
2. Canada Strawberry runners	5.261	[5.050]	[5.050]
3. USA Strawberry fruit	415.067	[343.740]	[389.640]
TOTAL	450.088	[375.574]	[421.474]

1.4.4 Issues Related to CUN Assessment for Preplant Soil Use

Key issues which influenced assessment and the need for MB for preplant soil use of MB in the 2012 round were:

- i) Limitation on the uptake of a key alternative, methyl iodide (MI or iodomethane) because of issues related to its registration. In Australia, further studies have been asked for before registration can be granted, in Canada the registrant is not seeking registration at present and in the USA it has been withdrawn from sales.
- ii) Changing regulations on key alternatives, particularly metam sodium and Pic used alone or in mixtures and the township caps and buffer zone regulations on 1,3-D in the US.
- iii) Continued adoption of a new formulation of 1,3-D/Pic ('Pic-Clor 60') in the USA, which increases the area that may be treated with 1,3-D in regions affected by township caps.
- iv) Effect of restrictions on use of high rates of Pic (greater than 200 kg/ha (20 g/m²)) in some counties in California.
- v) Ineffective disease control achieved by some alternative fumigants (1,3-D/Pic, Pic alone) when applied by drip fumigation as not all of the bed is treated.

MBTOC has noted more specific issues related to requests for CUNs below and also in the CUN text boxes (Table 1.9).

1.4.4.1 Australia

In its interim assessment, MBTOC noted that the nomination submitted by Australia for the critical use of MB for the production of strawberry runners stated that a 20% reduction in MB consumption would commence in 2015 and reduce at 20% per year up to and including 2019. MBTOC examined only the amount requested for consumption in 2014. MBTOC strongly recommends that the Party review the 5-year reduction proposed in the nomination with a view to eliminating this small consumption in MB in one year. MBTOC notes that Australia has been undertaking trials for many years with the most likely alternative methyl iodide, which has been pending registration in Australia for several years. Only the state of Victoria requests CUEs at present; other States, such as Queensland, which requested CUEs in the past, have now implemented alternatives.

1.4.4.2 Canada

In its interim assessment, MBTOC noted that the CUN submitted by Canada for the production of strawberry runners did not provide details of research that was being undertaken to identify and implement alternatives. MBTOC notes that the Parties are ‘... required to demonstrate that an appropriate effort is being made to evaluate, commercialize and secure national regulatory approval of alternatives and substitutes. Parties must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes’². MBTOC notes that if the nomination were to be assessed according to the criteria agreed in decisions of the Parties, MB would not be recommended. However, MBTOC acknowledges that for this particular round they have no registered alternatives and is mindful that the lack of MB authorised by the Parties due to inadequate research would result in this company on Prince Edward Island not being able to produce strawberry runners and therefore provided a recommendation. MBTOC strongly recommends that the Party consider a phase out plan to eliminate this small consumption in MB in one year.

1.4.4.3 United States

In its nomination, the US provided several reasons for the requirement for critical uses of methyl bromide for the production of strawberries in California, including limitation on the uptake of a key alternative, methyl iodide (MI or iodomethane) because of issues related to its registration. “After MBTOC’s meeting in Beijing in 2012, the manufacturer of MI suspended product sales for all formulations of methyl iodide in USA³, although at this stage it still maintains federal registration. However, the California Department of Pesticide Registration” cancelled all products containing methyl iodide at the request of the registrant⁴.”

At the OEWG, the Party requested reassessment, largely based on the withdrawal of methyl iodide but also presented new information about regulations affecting two of the key alternatives, 1,3_D/Pic and chloropicrin.

1.4.4.4 General comments on assessment

MBTOC continues to encourage Parties to consider a review of regulations covering the registration, use and adoption of alternatives, particularly a review of barrier films to reduce dosage rates of MB and its alternatives, and associated emissions. In this regard, MBTOC was pleased to receive information from the US on buffer zone credits that are due to take effect from 1 December 2012. Further information is provided in Section 1.4.4.

² Paragraph 1(b)(iii) of Decision IX/6.

³ Arysta. 2012. Arysta LifeScience suspends MIDAS in the USA. <http://www.arystalifescience.com/release/MIDASPress3-20-12FINAL.pdf>

⁴ CDPR. 21 March 2012. Methyl Iodide Registration. http://www.cdpr.ca.gov/docs/registration/methyl_iodide.htm

MBTOC also notes that a large proportion of MB has been nominated for uses where regulations or legislation prevent reductions of MB dosage. For several uses, the mandatory use of MB is specified at a high dosage for either treatment of certified propagation material or because regulations prevent use of barrier films which otherwise could have reduced the MB dosage rate. Also regulations on the use of alternatives are preventing their uptake for a substantial proportion of the remaining CUNs for preplant soil use.

1.4.5 Registration of alternatives for preplant uses - Decision Ex I/4 (9i) and (9j)

Decision Ex. I/4 (9i) requires MBTOC,

“To report annually on the status of re-registration and review of methyl bromide uses for the applications reflected in the critical-use exemptions, including any information on health effects and environmental acceptability”. Further, Decision Ex I/4 (9j) requires MBTOC *“To report annually on the status of registration of alternatives and substitutes for methyl bromide, with particular emphasis on possible regulatory actions that will increase or decrease dependence on methyl bromide”.*

Prior to the OEWG, but after the interim recommendations, the manufacturer of methyl iodide announced “... *the immediate suspension of product sales for all formulations of methyl iodide in the United States ... based on a review [by the manufacturer] of the fumigant’s economic viability in the US*”⁵. Even though the fumigant may remain registered, the company is not willing to sell the fumigant in the US from 20 March 2012. At the request of the registrant (Arysta), the registration of methyl iodide has been cancelled by the California Department of Pesticide Regulation. Arysta has also announced it is no longer seeking registration in Australia and the product was never considered for use in Canada. The company has only maintained registration in limited countries, eg, Japan.

The EU has further reported that registration for 1,3-D and other chemical alternatives including chloropicrin, dazomet and metam sodium are under review. A grace period for the registration of 1,3-D is presently granted in the EU for a specific time period on a yearly basis, but future registration has not been supported by the EU. Similarly, registration of chloropicrin in the EU may not continue.

In any future nominations submitted by Australia, Canada and the US should include information on expected rates of adoption of alternatives following registration, in accordance with paragraphs 34-35 of Annex 1 of the MOP16, as this information would assist MBTOC in its evaluation of these CUNs.

1.4.6 Sustainable alternatives for preplant uses

MBTOC urges Parties to consider the long term sustainability of treatments adopted as alternatives to MB; whilst chemical treatments have been shown to offer an adequate solution, combining them with environmentally sustainable non-chemical alternatives where possible, within an integrated approach will provide best results in the longer term. Decision IX/6 1(a)(ii) refers to alternatives that are ‘*acceptable from the standpoint of environment and health*’. MBTOC has visited various regions where successful non-chemical alternatives e.g. grafting, soil less culture, solarisation, steam, biodisinfestation and anaerobic soil disinfestation, are used as sustainable alternatives to MB. Several Parties consider these techniques as viable alternatives, particularly when an integrated approach that combines different options is adopted.

1.4.7 Standard presumptions used in assessment of nominated quantities.

The tables below (Tables 1-6 and 1-7) provide the standard presumptions applied by MBTOC-S for this round of CUNs for preplant soil uses. These standard presumptions were first proposed in the MBTOC report of October 2005 and were presented to the Parties at 17th MOP. Studies and reports to

⁵ Press release. 20 March 2012. Arysta LifeScience Suspends MIDAS in the United States.

support them have been provided in previous reports and were revised for some sectors after consideration by the Parties at the 19th MOP. The rates and practices adopted by MBTOC as standard presumptions are based on maximum rates considered acceptable by published literature and actual commercial practice.

As in the evaluations in previous years, MBTOC considered reductions to quantities of MB in particular nominations to a standard rate per treated area where technical evidence supported its use. As a special case, MBTOC continues to accept a maximum rate of 200 kg/ ha (20 g/m²) in MB/Pic formulations with high Pic-containing mixtures with or without barrier films for certified nursery production, unless regulations prescribe lower or higher rates. However, MBTOC notes that studies have shown that rates of 200 kg/ha (20g/m²) or less of MB: Pic 50:50 are effective with barrier films for production of ‘certified’ nursery material and urge Parties to consider regulations which permit these lower rates. MBTOC also notes that certified runner production may involve regulations which specify the mandatory use of a fumigant such as MB or an alternative, in order for the runners to be “certified runners”.

The indicative rates used by MBTOC were maximum guideline rates, for the purpose of calculation only. MBTOC recognises that the actual rate appropriate for a specific use may vary with local circumstances, soil conditions and the target pest situation. Some nominations were based on rates lower than these indicative rates.

Table 1-6: Standard presumptions used in assessment of CUNs for preplant soil use of MB from the 2009 -2012 assessments

	Comment	CUN adjustment	Exceptions
1. Dosage rates	Maximum guideline rates for MB:Pic 98:2 are 25 to 35 g/m ² with barrier films (VIF or equivalent); for mixtures of MB/Pic are 12.5 to 17.5 g MB/m ² for pathogens and nutsedge respectively, under barrier films depending on the sector. All rates are on a 'per treated hectare' basis.	Amount adjusted to maximum guideline rates. Maximum rates set dependent on formulation and soil type and film availability.	Higher rates accepted if specified under national legislation or where the Party had justified otherwise.
2. Barrier films	All treatments to be carried out under low permeability barrier film (e.g. VIF, TIF)	Nomination reduced proportionately to conform to barrier film use.	Where barrier film prohibited or restricted by legislative or regulatory reasons
3. MB/Pic Formulation: Pathogens control	Unless otherwise specified, MB/Pic 50:50 (or similar) was considered to be the standard effective formulation for pathogen control, as a transitional strategy to replace MB/Pic 98:2.	Nominated amount adjusted for use with MB/Pic 50:50 (or similar).	Where MB/Pic 50:50 is not registered, or Pic (Pic) is not registered
4. MB/Pic Formulation: Weeds/nutsedge control	Unless otherwise specified, MB/Pic 67:33 (or similar) was used as the standard effective formulation for control of resistant (tolerant) weeds, as a transitional strategy to replace MB/Pic 98:2.	Nominated amount adjusted for use with MB/Pic 67:33 (or similar).	Where Pic or Pic-containing mixtures are not registered
5. Strip vs. Broadacre	Fumigation with MB and mixtures to be carried out under strip	Where rates were shown in broad acre hectares, the CUN was adjusted to the MB rate relative to strip treatment (i.e. treated area). If not specified, the area under strip treatment was considered to represent 67% of the total area.	Where strip treatment was not feasible e.g. some protected cultivation, emission regulations on MB, or open field production of high health propagative material

Table 1-7: Maximum dosage rates for preplant soil use of MB by sector used in the 2009 and later assessments (standard presumptions).

Film Type	Maximum MB Dosage Rate (g/m²) in MB/Pic mixtures (67:33, 50:50) considered effective for:			
	Strawberries and Vegetables	Plant Nurseries*	Orchard Replant	Ornamentals
Barrier films - Pathogens	12.5	15	15	15
Barrier films - Nutsedge	15.0	17.5	17.5	17.5
No Barrier films - Pathogens	20	20	20	20
No Barrier films - Nut sedge	26	26	26	26

* Maximum rate unless certification specifies otherwise

1.4.8 Adjustments for standard dosage rates using MB/Pic formulations

One key transitional strategy to reduce MB dosage has been the adoption of MB/Pic formulations with lower concentrations of MB (e.g. MB/Pic 50:50, 33:67 or less). These formulations are considered to be equally as effective in controlling soilborne pathogens as formulations containing higher quantities of MB (e.g. 98:2, 67:33) (Porter 2006; Santos *et al.*, 2007; Hamill *et al.*, 2004; Hanson *et al.*, 2006). Parties are urged to consider even lower dosage rates of MB for the remaining CUNs. This includes rates as low as 75 kg/ha (7.5 g/m²) with mixtures of 30:70 or 33:67 mixtures (at 250 kg/ha or 25 g/m²) or 100 kg/ha (10 g/m²) of MB in 250 kg/ha (25 g/m²) of 50:50 MB/Pic mixtures in conjunction with barrier films (Table 1-8).

Table 1-8: Actual dosage rates applied during preplant fumigation when different rates and formulations of MB/Pic mixtures are applied with and without barrier films. Rates of application reflect standard commercial applications rates.

Commercial application rates (kg/ha) of MB/Pic formulation	MB/Pic formulation (dose of MB in g/m ²)			
	98:2	67:33	50:50	30:70
A. With Standard Polyethylene Films				
400	39.2	26.8	20.0	12.0
350	34.3	23.5	17.5	10.5
300	29.4	20.1	15.0	9.0
B. With Low Permeability Barrier Films (LPBF)				
250	24.5	16.8	12.5	7.5
200	19.6	13.4	10.0*	6.0
175	17.2	11.8	8.8	5.3

* Note: Trials from 1996 to 2008 (previous CUN reports) show that a dosage of 10g/m² (e.g. MB/Pic 50:50 at 200kg/ha with low permeability barrier Films) is technically feasible for many situations and equivalent to the standard dosage of >20g/m² using standard PE films

1.4.9 Use/Emission reduction technologies - Low permeability barrier films and dosage reduction

Decision XXI/11 (para 9) requested further reporting on Decision IX/6 to ensure Parties adopted emissions controls where possible. For preplant soil use, this includes the use of barrier films and lowest effective dose of MB with mixtures of chloropicrin. Other methods include deep shanking and use of ammonium thiosulphate and different irrigation technologies (Yates *et al.*, 2009). These latter technologies have not been reported or adopted widely by Parties and need to be evaluated more widely.

In southeast USA the reported use of barrier films in vegetable crops, which expanded rapidly to over 20,000 hectares in 2009 has continued to increase. An exception to the adoption of barrier films is in the State of California in the USA where a regulation currently prevents use of barrier films with MB (California Code of Regulations Title 3 Section 6450(e). MBTOC notes that barrier films particularly more recently developed totally impermeable (TIF) films can be used with alternatives and this is consistently improving the performance of alternatives at lower dosage rates (Driver *et al.* 2011; Fennimore and Ajwa, 2011). Effectiveness at lower dosages can allow for greater areas to be treated

with 1,3-D under township cap regulations or increase the likelihood of chloropicrin being applied at dosage rates below the 125 or 200 lb/acre restrictions presently imposed in California.

In the USA as a result of mitigation developed for the fumigants undergoing reregistration, buffer zones around treated fields will go into effect on fumigant labels as of 1 December 2012. By choosing to use certain low permeability tarps, the applicator can qualify for buffer zone reduction credits. These credits are specific for each fumigant and tarp. The most impermeable tarps to chemical fumigants results in a maximum buffer zone credit of 60%, which may allow for a larger quantity of the alternative chemical to be used. Applicators of fumigants can obtain more information on the appropriate buffer reduction credit at http://www.epa.gov/pesticides/reregistration/soil_fumigants/factsheets/sfm-buffer-zones-2012.pdf. Buffer zone credits apply to soil fumigant products such as MB/Pic (but not in California), Pic, 1,3-D/Pic, and Pic, and metam sodium or metam potassium.

MBTOC notes that the impact of these changes will be difficult to determine and therefore will require thorough clarification from the Party on the impact on use of alternatives in any future nominations. MBTOC is aware that the only fumigant labels that currently specify buffer zones in the US are on 1,3-D products, which will not be affected by the new EPA labels and buffer zone credits as they are not part of re-registration. Buffer zones for methyl bromide are included in Californian regulations. Buffer zones for metam sodium and chloropicrin are in Californian county's permit conditions. Regulations and permit conditions supersede labels if they are more stringent than the labels. In essence, the requirement for buffer zones on the MB, metam and chloropicrin labels will go into effect at the end of 2012 or in early 2013 for the first time along with the buffer zone credits so it is difficult to know the impact on use of the alternatives.

Table 1-9: Final evaluation of CUNs for preplant soil use submitted in 2012 for 2014

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
Australia	Strawberry runners	35.750	37.500	35.750	35.750	29.790	29.790	29.790	29.760	29.760	29.760	[26.784]
<p>MBTOC Recommendation for 2014:</p> <p>MBTOC has not changed the interim recommendation and recommends a reduced CUE of 26.784 tonnes for use in 2014 which is a 10% reduction from the amount nominated by the Party. According to the transition timeframe in the nomination, the anticipated quantity was proposed to be reduced by 10% in 2015. However, MBTOC considers the timeframe for reduction could be advanced by one year and encourages the Party to consider a faster transition than stated in the nomination. MBTOC considers that soilless culture is a technique used widely throughout the world for production of strawberry runners and is technically and economically suitable for some of the nursery production system as well as stock plants resulting in healthy nursery material. MBTOCs original recommendation was not based on methyl iodide registration, but on the adoption of soilless culture.</p> <p>Reassessment by MBTOC after the OEWG:</p> <p>After the OEWG, the Party requested reassessment based on the time needed to transition to soilless and potential lack of suitability of the technology for runner production. The party reported that the cost of change to soilless culture is significant. The party indicated that the final phase out of methyl bromide, which was to commence in 2015, was based on methyl iodide as the alternative to achieve 100% transition. The research effort focused primarily on commercial scale-up of methyl iodide ahead of its anticipated registration. The registration of this fumigant has however been withdrawn. This withdrawal means that the transition away from methyl bromide will not commence in 2015 as no research of other alternatives has been done. According to the Party, soilless culture is not technically and economically feasible because of substrate availability, used substrate disposal and high costs. MBTOC considers that transition to foundation stock into substrates has been successful to date and that further adoption of soilless culture is feasible for other stages of the multiplication process.</p> <p>Strawberry runner growers in Queensland successfully used Telone C-35. Telone C-35 has not been successful in Victoria due to phytotoxicity and lower production (by up to 40%) caused by heavier soils and lower temperatures. Although this occurred even after 3-4 months, MBTOC considers Pic alone as a key component in the production of healthy runners and suggest that lower rates in combination with other registered products may be worth consideration.</p> <p>Given the recent loss of methyl iodide as the most promising full replacement, the Australian Government and the strawberry runner industry is reviewing their research and development programs to phase out methyl bromide. A revised strategy will be developed in the next few months</p> <p>Original Nomination by the Party:</p> <p>The quantity requested for this CUN is 29.760 tonnes and has remained unchanged since 2009.</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>Circumstances of the Nomination:</p> <p>The Party states that the key pests affecting strawberry runner production are fungi (<i>Phytophthora</i>, <i>Pythium</i>, <i>Rhizoctonia</i> and <i>Verticillium</i> spp.) and weeds (<i>Sinapsis arvensis</i>, <i>Agrostis tenuis</i>, <i>Raphanus</i> spp., <i>Poa annua</i>, <i>Cyperus</i> spp). The Party also states that MB:Pic 50:50 at a MB dose of 25 g/m² is required to meet certification standards. Although this quantity exceeds MBTOC's standard presumption of 20 g/m², the lower rate is unregistered. MBTOC acknowledges the notification by the Party of the QPS issues. The Party has informed MBTOC of its intention to phase out MB for critical uses over 5 years beginning in 2015, assuming that an alternative is registered by this time.</p> <p>Original MBTOC Review and Interim Assessment:</p> <p>MBTOC considers, and the Party demonstrated, that soil-less substrate production is technically feasible for the foundation generation and plans to commission soil-less production in the 2011/2012 season. MBTOC considers soilless substrates are also technically feasible for successive early generations of nursery runners and can be implemented for a portion of the production in the next 2 years. Therefore MBTOC recommends a 10% transition to soil-less substrates for early generation runners in 2014. Victorian Strawberry Industry certification Authority has established a commercial facility in 2011 with a capacity for producing 60,000 foundation stock plants. Methyl iodide test results have been very positive, and more data has been submitted to support the registration. However, this fumigant has not yet been registered. If methyl iodide or any other alternative is registered before the MOP 2012, MBTOC will need to reassess the nomination. A key alternative, 1,3-D/Pic, is considered ineffective due to phytotoxicity and doubling of plant back times in the heavy and wet soil conditions in the high elevation regions.</p> <p>MBTOC Comments on Economics 2012:</p> <p>Economic information on the infeasibility of plug plants was insufficient to validate Australia's assertion that soilless production of runners would not be economic. Soilless production has been found economic in many countries.</p> <p>Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> • Dec. IX/6 b(i) Emission control: No, but standard films are claimed by the Party to perform the same as VIF in the cold temperatures and heavy wet soils typical for strawberry runner production. • Dec. IX/6 b(iii) Research program: On going research is being conducted in (a) supporting reduced application rates of MB/Pic, (b) supporting the registration of MI and EDN, (c) use of MB recaptured from QPS applications in combinations with chloropicrin, (d) soilless production systems. • Dec. IX/6 b(iii) Appropriate effort: Research effort is adequate, but commercialization of chemical alternatives is confronted with regulatory obstacles. 										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
Canada	Strawberry runners (PEI)	6.840	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	5.261	[5.050]
<p>MBTOC Final Recommendation for 2014:</p> <p>MBTOC has not changed the interim recommendation and recommends a reduced amount of 5.05 tonnes for use in 2014, which is a 4% reduction from the quantity nominated by the Party. MBTOC considers that soilless culture is widely used around the world for strawberry runner production and is technically and economically feasible to replace 50% of the foundation stock within the 14 month time period until this CUE takes effect. MBTOC notes that whilst the 4% reduction addresses transition of only 50% of the foundation stock, it is a suitable and sustainable method to replace the entire use of MB for this purpose. MBTOC accepts that its cost effectiveness for other generations may need further evaluation and suggests that a pilot study be conducted on this aspect. MBTOC further encourages the Party in developing a suitable action plan to support the adoption of alternatives and to overcome regulatory restrictions that currently impact the successful adoption of alternatives in PEI.</p> <p>Reassessment by MBTOC after the OEWG:</p> <p>After the OEWG the Party requested reassessment based on the need for more time to transition to soilless culture and on the potential unsuitability of this technology for strawberry runner production. In addition, the Party questioned whether soilless culture provided a solution for all stages of runner production and whether it would still be the alternative of choice if chloropicrin became available. They identified that the cost of converting to soilless culture techniques is significant: the approximate cost for a greenhouse alone is on average \$62 per square meter (\$620,000/hectare) and costs will rise to approximately \$129 per square meter (\$1.29M/hectare) when machinery and equipment costs are included (Chaudhary and Nabj, 2011). A complete analysis of the potential capital costs for the grower in PEI to transition to soilless culture in greenhouses for its transition stock would thus be needed. Despite the fact that foundation stock yields are reported to increase significantly through greenhouse production, Canada has concerns that the logistics of soilless culture are quite complex and that time will be required to implement a transition. Canada has also reconfirmed continuing efforts to implement an action plan to assist the grower to phase with MB phase-out, but the actual characteristics of this plan have not been submitted. The Party asks for reinstatement of the full nominated amount.</p> <p>After consideration of production methods adopted by strawberry runner producers around the world and transition made to soilless production systems, MBTOC considers it is still feasible to transition to soilless culture for stock plants, in particular because the soilless production facility in question is quite small. MBTOC further considers soilless production to be a reliable method for production of high health stock plants that would not be redundant if a suitable alternative, such as chloropicrin was registered. MBTOC notes that dazomet, metam sodium and metam potassium are registered and considers that in the absence of any other suitable chemical alternative that more effort be made to evaluate these products at PEI. MBTOC notes that whilst the reduction is only for 50% of the stock plants that the Party may wish to consider implementation of this technology for all the stock plants at the one time. MBTOC notes the increased efforts being made by the Party and strongly suggest development of an action plan to phase out the remaining use of methyl bromide.</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>Original Nomination from the Party:</p> <p>The Party has nominated 5.261 t of MB for use on (24.3 ha) of field grown runners and (2 ha) of stock plants. The nomination is based on a reduced rate of MB of 20 g/m² under high barrier films for the entire 26.3 ha to be fumigated.</p> <p>Circumstances of the Nomination:</p> <p>The Party has considered replacing MB with 1,3-D, but 1,3-D was banned for use in Prince Edward Island (PEI) in January 2003 due to potential ground water contamination. In addition, Telone C-35 was withdrawn from Canada in 2011. Chloropicrin (PIC 100) has been registered by the Pest Management Regulatory Agency (PMRA) and is used by other runner growing companies in Canada. The PEI Department of Environment is not prepared to allow the application of Pic until PMRA indicates that groundwater contamination is unlikely in PEI soil conditions. A study was conducted and submitted to PEI authorities and to PMRA for use in their re-evaluation of chloropicrin but the outcome has not yet been determined. The registration of methyl iodide has not been applied for use in Canada. The company has been testing organic production from 2006 - 2009 with different varieties and has found that they obtained significant reductions in yield ranging from 40% to 70%. Only one variety using the organic production system compared favourably to conventional production with methyl bromide. The Party states that the producer cannot meet disease-free requirements of their buyers with organically produced runners. The Party stated that 100% of the crop is exported and therefore all plants are subject to inspection to meet phytosanitary requirements.</p> <p>Original MBTOC Review and Interim Assessment:</p> <p>MBTOC acknowledges the Party's reduction of the rate of methyl bromide being used by the grower in PEI in the absence of formal registration for this dosage rate. MBTOC also notes that 100% of the crop is exported and MB is used as an aid to meet phytosanitary certification standards for export. MBTOC considers that soilless culture is suitable at least for foundation stock. MBTOC notes that other Parties have adopted a number of chemical alternatives (ie. methyl iodide/chloropicrin, chloropicrin combined with herbicides and 1,3-D/Pic) for strawberry runner production, however these chemical alternatives are prevented from use because of regional regulations in PEI. MBTOC notes that dazomet, metam sodium and metam potassium are registered for use in Prince Edward Island (PEI), however under Health Canada's legislation, combinations of these products are not permitted (i.e. application at the same time). Dazomet used alone or sequential applications may warrant evaluation. It is expected that the PMRA will make a final decision on chloropicrin reevaluation in the spring of 2012 and that PEI will consider the outcomes of the PMRA decision. If the decision is to permit the use of Pic 100 following their review of the groundwater study before the MOP 2012, or any other chemical alternative is registered, MBTOC will need to reassess the nomination.</p> <p>MBTOC strongly recommends that the Party submit 1) a phase out plan for MB use in PEI. (2) expand its research efforts to better comply with Decision IX/6 by examining the feasibility of expanding soilless culture beyond foundation stock and the suitability of other chemical and non chemical alternatives.</p> <p>MBTOC Comments on Economics 2012:</p> <p>The nomination was not based on economic arguments.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
	<p>Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> • Dec. IX/6 b(i) Emission reduction: Yes, uses barrier films with reduced application rate of MB conforming to MBTOC's presumptions • Dec. IX/6 b(ii) Research Effort: Although some research/adoption has been done in the past (ie high barrier films, biofumigation, organic varieties), MBTOC expects significant progress in accordance with Decision IX/6 with adoption of their proposed research program. • Dec. IX/6 b(iii) Appropriate effort: Registrants for Midas, EDN and DMDS have not submitted any registration application materials at this time. A groundwater study for chloropicrin has been submitted by the registrant to PEI and federal authorities. 											

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
United States	Strawberry (field)	2052.846	1730.828	1476.019	1349.575	1269.32	1007.477	812.709	678.004	461.186	415.067	[389.640]
<p>MBTOC final recommendation for 2014:</p> <p>MBTOC recommends a reduced amount of 389.640 tonnes for use in strawberry fruit in California for 2014. This is based on 170 kg/ha and a 2,292 ha. One member held a different view and has submitted a minority report (see below and Annex II).</p> <p>Reassessment by MBTOC after the OEWG:</p> <p>After the OEWG, the Party requested the original amount be reinstated based on the fact that alternatives can-not be used for areas of high pest pressure or where of regulatory constraints are in place. The Party also stated that methyl iodide has been taken off the market by the manufacturer (Arysta) and thus is no longer available in California. Further, the Party suggests that organic production is not a replacement for areas of high pest pressure and that steam is extremely costly.</p> <p>In view of MI withdrawal from the market, the majority of MBTOC (all but one member) agreed with consensus to recommended reinstating the 45.9 t of MB that had been deducted for adoption of methyl iodide. MBTOC acknowledges the Party's statement that "The amount of methyl bromide nominated was calculated based on using 100% of the 1,3-D township cap using Pic-Clor 60 for strawberry fruit in 2014." MBTOC however does not agree that totally impermeable (TIF) films are not effective to increase the proportion of fumigants that can be used for replacing MB as studies have shown that these films allow for a significant reduction in dosage rates in strawberries and other sectors (Fennimore and Ajwa 2011, Driver <i>et al</i>, 2011). This enables an increase in the area that can be treated with key alternatives, especially Pic-Clor 60. As an example, Fennimore and Ajwa, (2011) showed in separate trials over two years that using TIF at 224 kg/ha of Pic-Clor 60 (a 33% reduction from the standard rate) led to fruit yields and weed control similar to dosages of 336 kg/ha of Pic-Clor 60 with standard film and to MB /Pic at 396 kg/ha with standard film. They also found that TIF films at rates of 224kg/ha or 336 kg/ha had higher fumigant concentrations, better weed control 'and possibly pathogen control' under the film for at least 100 to 160 hours under the film than standard films although no data on pathogen control was reported. MBTOC considers that whilst high barrier films may not reduce the Application Factor (AF), the reduced dosage rate does allow more hectares to be treated under the same township cap.</p> <p>Additionally, a review of commercial usage data (PUR) by MBTOC suggests that past dosage rates used commercially are lower than regulations which prevent use of chloropicrin in some counties. Also barrier films again offer opportunities to reduce dosage rates with chloropicrin applied alone. In a number of trials where pathogens were severe, Ajwa et al. (2005) found that the rates of drip-applied chloropicrin required to produce strawberry yields similar to shank applied methyl bromide plus chloropicrin were 330 and 222 kg/ha under standard and VIF films, respectively, a 48% reduction in chloropicrin under barrier films. From information provided by the Party it appears that the lower rate falls within the restrictions of most counties and would allow chloropicrin to be used.</p> <p>The Party contends that organic production may not be a suitable replacement for areas of high disease pressure, however MBTOC still considers that a small proportion of the existing production can transition to organics and maintains its initial recommendation for transitioning 10 ha of area previously treated with MB to organic production.</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>Although no reduction was made for the uptake of steam, MBTOC considers that on a small scale (ie buffer zones) and used within an IPM approach, steam should be considered as a suitable replacement in future nominations. This has been confirmed for example by Fennimore et al (2011). New and lower cost boilers with improved treatment speed are available in several countries and in use in horticulture and tree nurseries, mushroom growing, viniculture and weed control (see for example www.moeschle.de).</p> <p>The minority view of one member was that a further annual transition can be expected with existing alternatives and under the current regulatory restrictions, recommending to reduce the 2014 critical area to no more than 2243 ha, and the 2014 critical use at 170 kg/ha to no more than 381.310 tonnes (See Annex II).</p> <p>Original Nomination by the Party:</p> <p>The Party nominated 415.067 tonnes of methyl bromide for critical uses for strawberry fruit for 2014. This was approximately a 10% reduction of the amount approved at the MOP in 2013. The nomination is based on 2,442 ha at a dosage rate of 17.0 g/m² which conforms to the MBTOC standard presumptions for use with high barrier films, although high barrier films can not be used in California with MB (http://www.cdpr.ca.gov/docs/emon/methbrom/tarps.pdf). The Party stated that this reduction was based on a composite figure encompassing all the used and available alternatives and was unable to present a specific basis for this proposed reduction.</p> <p>Circumstances of the Nomination:</p> <p>The Party states that Californian growers have a critical need for methyl bromide to treat fields where the primary alternative, 1,3-D/chloropicrin, cannot be used due to township caps restricting the total amount of 1,3-D that can be used (Fennimore and Ajwa, 2011) or where diseases caused by <i>Macrophomina</i> and <i>Fusarium</i> cannot be managed effectively (Ajwa, personal communication). Methyl iodide (iodomethane, Midas®) was registered in California in December 2010. To date, it has only been used on a few acres throughout California and only 5 acres have been for strawberry production. This is likely due to cost concerns and to fear by growers that the public will perceive that the methyl iodide fumigation is unsafe and that strawberries are unsafe if they have been produced on methyl iodide-treated land.</p> <p>The Party reduction of 10% is based on uptake of a range of alternatives including 1,3-D/Pic in line and shank applied, Pic alone.</p> <p>The Party states that mixtures of 1,3D and Chloropicrin have regulatory constraints. The Party assumed township caps were fully used up, consistent with 2013 CUE approved by the parties. This mixture, when applied by drip, does not effectively control <i>Macrophomina</i> (Ajwa, personal communication). Additional research is underway to improve efficacy of shank application of 1,3-D /Pic. Use of shank application increases the Township Cap factor and reduces the total acreage that can be treated with 1,3-D over the acreage that can be treated if drip application is used. With successful research over the next 2 years, shank 1,3-D /Pic will be part of the 10% reduction. The CUN states that research has indicated that with the use of totally impermeable films, drip-applied 1,3-D/chloropicrin formulations (Telone C-35 with 63% 1,3-D) at 200 lb per acre (225 kg/ha) is as effective in terms of yield and weed control as a standard methyl bromide treatment (Fennimore and Ajwa, 2011). The CUN states that research has shown that this can lower the amount of 1,3-D by 33% below the rate typically used with standard films and, therefore, may result in reducing the burden of caps that restrict the overall amount of 1,3-D used in a township. Pic-Clor 60 is formulated with lower rates of 1,3-D (39% 1,3-D) and has been effective in field trials, but chloropicrin restrictions are also in place in some counties and reduce its use. These research trials did not address issues associated with <i>Macrophomina</i> or <i>Fusarium</i>.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>Carbonation of 1,3-D/chloropicrin formulations may help to reduce the overall use of 1,3-D by increasing its dispersal in the soil while providing yields comparable to methyl bromide (Thomas et al., 2011b). In Florida trials (Noling and Cody, 2011), most alternative fumigants evaluated produced yields which were statistically equivalent to that of methyl bromide chloropicrin 50/50 (320 lb/[treated] acre). Co-formulated fumigants such as Telone C-35, generally performed better than that of Pic-Clor 60 for maintaining strawberry crop productivity and nematode control”.</p> <p>The nomination and subsequent responses received by MBTOC state that chloropicrin is a widely used alternative and is considered part of the reduction in 2014. Regulatory restrictions at the county level limit the maximum rate and potentially the efficacy against key pathogens. Areas with high pest pressure would likely require rates above 200 lbs/acre (224 kg/ha), requiring a permit from the County Agricultural Commissioner – which has to date seldom been granted and is given on a case-by-case basis.</p> <p>The CUE outcome approved by Parties in 2011 was based on methyl iodide uptake of 21% over 3 yrs, i.e. 721 ha by 2013. In 2011 only 2 ha used MI/Pic, even though a reduction of 7% (240 ha) was made for transition to methyl iodide in 2011.</p> <p>Anaerobic soil disinfestation (ASD) has given promising results on demonstration plots. No test data has been obtained on <i>Macrophominia</i> or <i>Fusarium</i>; only <i>Verticillium</i> in test plots. Type of organic matter, amounts, method of incorporation, keeping moisture on plots, and source of organic matter are technical issues to be determined. Further research on efficacy is required (and planned).</p> <p>The Party states that steam technologies are under development and look promising. While there is some commercial application of steam in flowers, there is no commercial application of steam in strawberry production other than demonstration trials (two acres in 2011). The current price of steam application is 50% higher than treatment with MB. More research is needed to increase efficiency and decrease cost.</p> <p>A substantial increase in organic acres would not allow a continued price premium for organic strawberries, a necessity for this industry. Moreover, any increase in organic acres will likely be insignificant relative to the net number of strawberry acres, thus having a negligible impact on the CUN.</p> <p>Breeders are working on development of cultivars that are tolerant or resistant to key diseases, especially <i>Macrophomina</i> and <i>Fusarium</i>. Dimethyl disulfide (DMDS) is registered for the use in strawberries at the federal level, however, it is not registered in California. Substrate use has not shown economical feasibility, but research continues to reduce costs.</p> <p>Original MBTOC Review and Interim Assessment:</p> <p>Review of the Californian databases by MBTOC, has shown that for the three major strawberry MB use regions in California (Oxnard, Watsonville/Salinas and Santa Maria, the fruit production areas are almost 4713 ha, 6228 ha and 3947 ha respectively (California Strawberry Commission (CSC) survey). The most recent PUR data (2003-2010) show that alternatives, namely 1,3-D, Pic and metam have been widely adopted in these production districts. State-wide in California, the CSC survey expects 15,535 ha strawberry fruit in 2012. The Californian Department of Pesticide Regulation – Pesticide Use Reporting (PUR) database shows that in California the area of 1,3-D use has more than tripled from 2001 ha (2003) to 6422 ha (2010), and the Pic straight area of use more than doubled from 1021 ha (2003) to 2405 ha (2010). In addition, CSC survey data show that the organic production acreage will grow from 245 ha (2003) to an expected 790 ha (2012).</p> <p>MBTOC notes that regulations in California prohibit the use of low permeability (high barrier) films with MB application, and therefore discourage reduction of MB</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>dose rates as well as emission control through use of these films (eg VIF, SIF and TIF).</p> <p>MBTOC acknowledges that the alternatives have been significantly adopted in all counties in the past 4 years, which indicates their technical and economic feasibility. MBTOC understands that regulatory restrictions, township caps on 1,3D and maximum rate restrictions for Pic imposed by county Ag commissioners affect their use. MBTOC notes encouraging trends for increased uptake for Pic alone, Pic-Clor60 and 1,3D + Pic reported through 2010.</p> <p>MBTOC acknowledges that the Party has made a 10% reduction for uptake of a range of alternatives, but has calculated that further adoption of alternatives is possible and has reduced the nomination by an additional 15% to enable transition to these alternatives in 2014. MBTOC understands that this situation may be affected by impacts of new label restrictions on fumigants that come into effect in December 2012, and legal issues regarding the availability of MI. If methyl iodide becomes unavailable, MBTOC would need to reassess this nomination.</p> <p>The total reduction includes a 10% reduction of the 2013 CUE made by the Party and the further reduction (15.47%) made by MBTOC. The total reduction as calculated by MBTOC is based on;</p> <ol style="list-style-type: none"> 1) 261 ha (or 15%) of the expected area in 2013 affected by township caps on 1,3-D mixtures being able to transition to strategies using these fumigant mixtures. These include those which use less 1,3-D dose per unit area, including uptake of Pic-Clor 60, use of barrier films to reduce dosage rates with all 1,3-D formulations and rotation with broad acre fumigant strategies to improve the effectiveness of disease control. MBTOC notes that official databases report approximately 6,500 ha of strawberry fruit production using different formulations of 1,3-D in 2010. 2) 150 ha of the total nomination being able to uptake Pic straight formulations which are not restricted by permit conditions 3) 270 ha of the total nomination being able to uptake methyl iodide 4) 10 ha of the total nomination being able to uptake new technologies of either steam, anaerobic soil disinfestation or organic production strategies. <p>In regards to concerns about an increase of diseases caused by adoption of alternatives, reports stress that there is not enough evidence to directly support the relationship between the appearance of <i>Macrophomina</i> and <i>Fusarium</i> diseases and MB replacement (López-Aranda et al., 2009). The diseases are present in numerous crops and regions of the world independently from MB use. MBTOC, however, does accept that reports (Koike et al., 2010) show that there is an association of these diseases in areas where drip applied fumigants are being used and that broad acre shank treatments with fumigants (e.g. 1,3-D/Pic mixtures, Pic and metam sodium) may be required to clean up infested fields.</p> <p>MBTOC notes that the available literature shows promising non MB management strategies for these diseases. Disease susceptibility varies between cultivars and some of the currently used strawberry varieties show good levels of resistance although not for both pathogens (Koike et al., 2010; Daugovish et al., 2011). Fumigants applied in Californian conditions provide protection from these pathogens early and mid-season although not in late season during May-June, (Koike, 2011; Daugovish et al., 2011); in Israel research shows that metam sodium (730 l/ha) caused 90 and 95% pathogen mortality in field experiments, at the same levels of MB, indicating that fumigation may be an effective method of managing this pathogen in infested soils (Zveibil et al., 2012). Attention should also be given to efficiency in fumigant delivery and distribution to all bed areas to delay plant collapse at the most susceptible zones such as bed sides (Koike et al., 2010; Daugovish et al., 2011). An integrated management strategy for these diseases should include: a) site selection avoiding infested fields; b) crop rotation</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec for 2014
		<p>with plant non-hosts; c) Pre-plant fumigation; d) Sanitation measures to avoid moving infested soil or contaminated equipment; e) the use of tolerant cultivars, and f) reducing plant stress mainly by maintaining optimum soil moistures and proper irrigation (Koike et al., 2010; Daugovish et al., 2011).</p> <p>MBTOC notes that low permeability (high barrier) films can be used on MB alternatives and that lower dose rates of 1,3-D with barrier films are effective.</p> <p>MBTOC notes that databases show MB use for strawberry fruit in California has been higher than the exempted amount for four years since 2006. In 2010, almost 100 tonnes more MB was used than was exempted for this particular use. MBTOC also notes that in 2010, the overall average dosage used across strawberry fruit producing counties was 208 kg/ha, with a predominant formulation of 57% MB. Formulations of 67% and 98% are still used in a significant number of applications (Source: Cal DPR-PUR). MBTOC continues to encourage wider use of 50:50 formulations, which still allow for complying with regulatory restrictions on Pic use.</p> <p>MBTOC notes and commends the withdrawal of MB for this use in Florida and Eastern USA, where full transition to alternatives has been completed.</p> <p>MBTOC continues to urge the Party to develop an action plan for California, particularly addressing the restrictions on the use of alternatives adopted elsewhere in the USA, and showing stepwise reductions to effectively progress the transition to MB alternatives.</p> <p>MBTOC comments on Economics in 2012:</p> <p>An economic analysis indicates that the gross margin (termed net revenue in the CUN) for strawberries using methyl bromide was \$33,744 per hectare while that of broadcast alternatives ranged from +10% (with Pic-Clor 60 (1,3-D plus chloropicrin)) to -9% (with methyl iodide, 33:67), based primarily on the cost of the individual fumigant. These changes are not large and fall within the range of expected annual variation experienced in agriculture, with the implication that these alternatives are economically feasible. Drip alternatives also result in higher gross margins, while steam results in a small decline of 1% in the gross margin, again implying that these alternatives are economically feasible. However, in the case of steam, the costs that are presented are based on small plots (10 acres or less), so it may not yet be economically feasible on a commercial scale.</p> <p>MBTOC notes the outcomes from a key economic study conducted in California (Mayfield and Norman, 2012) which indicates that the years of declining MB use have been years of rising yields, increased cropping areas, exports and revenues. In future nominations, it is anticipated that a thorough review of the information used as the basis for this study is considered by the Party.</p> <p>Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> Dec. IX/6 b(i) Emission reduction: In California low permeability (high barrier) films are not allowed for use with MB, but are allowed and available for use with alternatives; Dec. IX/6 b(ii) Research program: Yes, there is an on going research program, but specific data justifying CUN requests need to be provided. Dec. IX/6 b(iii) Appropriate efforts: In California there is varying effort in the different production districts. 										

¹1ExMOP and 16MOP; ²16MOP+2ExMOP+17MOP; ³MOP17+MOP18; ⁴MOP18+MOP19; ⁵MOP19+MOP20; ⁶MOP20+MOP21; ⁷MOP21+MOP22; ⁸MOP22, ⁹MOP23

1.5 MBTOC-Structures and Commodities – Final CUN Report

At the Open Ended Working Group in Montreal, in July 2012, MBTOC (SC) held a bilateral meeting with the United States. The purpose was to discuss Parties' views concerning MBTOC SC's interim CUN recommendations, receive and provide additional information and discuss outstanding technical and economic questions. In the May TEAP report, MBTOC SC had been unable to assess one CUN for cured pork pending the receipt of data pertaining to MB use in those facilities.

MBTOC SC indicated that it would conduct re-reviews of CUN decisions if Parties requested and provided additional information; the United States requested re-reviews of the cured pork CUN for 2014 and the dried fruit sector of the commodities CUN for 2014. The additional information was sent in August 2012.

1.5.1. Process used by MBTOC SC to conduct CUN re-reviews

Parties have required MBTOC to ensure both robust discussion by all members and that CUN recommendations are formed by members with appropriate expertise.

In its October 2010, May 2011 and May 2012 TEAP reports, MBTOC SC indicated that lack of funding of members to travel to meetings would result in the ability to hold only one MBTOC SC meeting in 2011 and one meeting in 2012. As most MBTOC SC members continue to be inadequately funded for MBTOC travel, and knowing that a second meeting had not been planned in 2012, MBTOC SC agreed to conduct the re-reviews by email.

Accordingly, MBTOC Co-Chairs agreed on the following process to conduct the re-reviews electronically.

All the information from Parties was circulated to all members for an opportunity to make comments about the reassessment. Additionally the information was posted on MBTOC's private website. Members were asked to submit comments by the end of August.

Comments from members of other sub-committees were-considered by each member of the relevant sub-committee, who then submitted their own assessment comments, and then discussed the various views. Originally, each member of the relevant sub-committee was asked to send their review/position to the relevant Co-chair(s) during the second week of September, 2012. In the case of MBTOC SC, this process was very robust and continued until the third week of September.

The coordinating Co-Chair provided a summary of this information to the sub-committee, and began forming a consensus position by the drafting of proposed text boxes and recommendations. Sub-committee members then further discussed, commented on and made changes to the proposal until a consensus was reached. The agreed text box and recommendation was again circulated to obtain consensus (or agreement not to disagree) by each member of the sub-committee. The consensus positions of each sub-committee were sent to full MBTOC for information and approval of the sub-committee findings.

The results of the re-reviews were incorporated into this report which focused mainly on the reassessed CUNs.

1.5.2. Resourcing issues in 2012 and in coming years

Under Decision XV I/4 Annex 1, MBTOC was instructed to meet twice a year when making CUN recommendations to ensure it has full information and to allow Parties seeking CUEs to provide information after MBTOC's first review. At the time of that Decision, twice annual meetings were considered necessary to allow MBTOC to conduct re-reviews or to complete reviews of CUNs. Parties can request a re-review if they disagree with MBTOC's first-review recommendations, and by providing additional information supporting their CUN.

However, when MBTOC has not been preparing an Assessment report and when Parties re-reviews have been few, MBTOC has occasionally met only once per year. Aside from those factors, the ability of MBTOC to meet is limited by the on-going lack of availability of funds for members' travel and subsistence. MBTOC SC met only once in 2011, and once in 2012, and instead conducted its re-review by email. This was necessitated because of lack of funding by members, but also because just a few CUNs required re-review.

In October 2011, MBTOC draws the attention of the Parties to that the requirement that MBTOC meet twice a year in Decision XVI/4 Annex 16, may require further clarification in light of the reductions of CUNs, lack of funding of members, and that now, seven years after MOP 16, meetings can take place electronically. Some Parties commented on this aspect during MOP 23, indicating understanding of this situation and reserved agreement as long as robust discussion of CUNs was incorporated.

In recent years, the number of CUNs has been reducing steadily, but it is unclear if this trend will continue if A-5 Parties begin to submit CUNs in 2013. Another unknown factor that will affect resourcing is that initial CUN submissions take more time to review; Parties in their initial submissions, have difficulty understanding the information requirements for critical use nominations and necessary information may not be available. MBTOC may be unfamiliar with the specific circumstances of the CUN.

If, in coming years, several new CUNs are submitted, and if there are difficulties understanding requirements and sourcing information, MBTOC will require two meetings a year. Furthermore, it would be preferable if more MBTOC members could receive funding to attend the OEWG meeting for discussions with Parties that seek any clarification on the interim recommendation by MBTOC.

1.5.3. Details of evaluations

In 2012, Parties submitted five CUNs for the use of MB in structures and commodities in 2014.

In its May 2012 TEAP report, MBTOC indicated it was unable to assess the CUN for cured pork because we were awaiting further information on the volume of the aging rooms to be treated, as explained in the text box. The Party was asked to supply the needed information. Accordingly in August 2012, the Party submitted considerable new information to MBTOC based on a survey of cured pork facilities. Additionally, the Party submitted new information about the adaptability of certain alternatives for dried fruit when fast turnaround is required. MBTOC then considered this information in its re-review.

The total MB volume nominated in 2012 for non-QPS post-harvest uses was 33.501 tonnes. Of the nominations in 2012 for 2014, and following the re-reviews, MBTOC recommended 32.237 tonnes, (Table 1.10 and 1.11). Table 1-8 provides the MBTOC-SC final recommendations for the CUNs submitted.

Table 1-10. Summary of the final recommendations by MBTOC-SC (in square brackets) for CUE's for postharvest uses of MB (tonnes) for 2014 submitted in the 2012 round.

Country and Sector	Nominated in 2012	Recommendation for 2014
Australia. Packaged rice	1.187	[1.187]
Canada. Mills	5.044	[5.044]
USA		
1. Commodities	0.740	[0.740]
2. Mills and Food Processing Structures	22.800	[22.800]
3. Cured Pork	3.730	[2.466]
USA Sub total	27.270	[26.006]
Total	33.501	[32.237]

Table 1-11. Final evaluations of CUNs for structures and commodities submitted in 2012 for 2014

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
Australia	Rice	6.150	6.150	.205	9.200	7.820	6.650	4.87	3.653	2.374	1.187	[1.187]
<p>MBTOC Recommendation for 2014:</p> <p>MBTOC recommends 1.187 tonnes of MB, the amount nominated by the Party, for use on packaged rice in 2014.</p> <p>Nomination by the Party:</p> <p>The Party nominated 1.187 tonnes, a 50% decrease of the amount of MB granted by the Parties for this use in 2013.</p> <p>Circumstances of the Nomination:</p> <p>The nomination is for packaged rice. The Party confirmed its phase out plan nominating in 2012 for 2014 as a final transition year with the aim that in 2015, there would be no further MB CUN nomination. The Party indicated that regardless of the volumes of rice harvested, this phase out plan would be carried out. Fifty percent of all non QPS MB use is being recaptured.</p> <p>The Party indicates that the applicant is pursuing the adoption of phosphine for treatment of rice in silo bins and in fumigation chambers. They are planning to fumigate milled rice in silo and conduct chamber fumigations on packaged rice. As explained to MBTOC on previous occasions and in the current CUN, the applicant does not yet have the required facilities to deal with the lengthy exposure times required for phosphine. They are currently working through this project and the first stage of construction is going into the 2012 capital budget. It is expected that construction of the first stage will be in 2012 and the second stage in 2013 through early 2014, in line with their phase out plan.</p> <p>MBTOC Review and Assessment:</p> <p>MBTOC notes that these applications with phosphine will only succeed in controlling the developmental stages of <i>Sitophilus</i> spp. if the appropriate temperature (> 25°C) occurs during the treatments and if the treatments will last for 72-144 hours.</p> <p>The Party submitted the results of a research study on the efficacy of sulfuryl fluoride (SF) to control the pests of rice. MBTOC notes, however, that the treatment of packaged rice with (SF) is not registered in Australia. In the research the temperature of the reported trials was far below the levels that are necessary for achieving complete control of all stages including the eggs of pest insects like <i>Sitophilus</i> spp., <i>Tribolium</i> spp. and <i>Plodia</i> spp. MBTOC recommends further experiments with SF at temperatures of 26°C or above. The Party in its response to MBTOC noted that the temperature of rice after milling is 30°C, and so a reasonable temperature for SF effectiveness should not be difficult to achieve. MBTOC encourages the Party to continue its</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>research effort to generate data in support of SF registration for this purpose in Australia because of the need for an alternative should resistance to phosphine occur.</p> <p>To ensure the success of the adopted alternative, the Party should thoroughly conduct 1) disinfestations of raw rice prior to packaging to control especially the internally feeding <i>Sitophilus</i> spp. and 2) disinfestation of processed rice in packages.</p> <p>1) After milling of the rice, which is a control method in itself for externally feeding stored product pest insects, the fairly high temperature of 30°C should immediately be used to carry out any disinfestations measure. Internally developing <i>Sitophilus</i> stages do survive some milling.</p> <p>2) If any holes are pinned into the packages to avoid package ballooning it must be ensured that their size remains always below a diameter of 0.1 mm to prevent young larvae of externally feeding species from invading these packages and resulting post-process re-infestation.</p> <p>Independently of what kind of fumigant is used for disinfestation of packages, the permeation or diffusion of the gas through the plastic laminate is a crucial factor for control. SF is even a less penetrating gas than MB and phosphine. So, the fumigation of packages will only be successful if there are enough openings. Improvements in pest control will improve rice quality and a recent report indicates that consumers may be inclined to pay more for rice when improved pest control techniques have been used (Su et al, 2012, in press)</p> <p><i>Tribolium</i> and <i>Plodia</i> complaints indicate post-process reinfestation. Insect-tight packaging should be used to protect the processed rice products to prevent pest infestation while the product is in the food chain. Perforated packages will possibly allow postpackaging infestation. As part of the reason supporting its request for MB for packaged rice, the Party cites product returns costing \$AU 3,440 in 2009 related to pest infestation of product. The Party notes that reducing these claims has been a focus of the rice company for the past several years and that use of MB has been part of their pest control system that has since 2002 resulted in significant reduction in claims against the company for insect contamination. The Party was unable to inform MBTOC about the species of insects involved in the claims; this information would indicate whether the insects were those that might have survived milling (<i>Sitophilolus oryzae</i>, for example) or those that likely entered the packaging after milling (<i>Plodia interpunctella</i> for example). The Australian rice company, as many other companies, punches holes in their packaging to facilitate stacking, but as the recent reviews by Athanassiou et al. (2011) and Bell (2011) detailed, these holes can easily allow larvae and even small adults of certain pest species access to infest the product after packaging. This can occur during transport or in the marketing channel. Use of MB does not prevent this type of infestation.</p> <p>MBTOC Comments on Economics 2012:</p> <p>The Party reports the applicant is making the necessary investments in silos and chambers to allow it to complete transition to phosphine.</p> <p>Comments Requested in Dec. XX1/11 (para 9):</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>Dec. IX/6 b(i) Emission control: Fifty percent of all non QPS MB use is being recaptured.</p> <p>Dec. IX/6 b(iii) Research program: Research on efficacy of SF for packaged rice has not been successful, perhaps due to inappropriate temperature, but SF is not registered for packaged rice in Australia. The applicant is completing its transition to phosphine</p> <p>Dec. IX/6 b(iii) Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. Phosphine, the selected alternative, is already registered for this use.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
Canada	Mills	47 (included mills and pasta)	34.774	30.167	28.650	26.913	22.878	14.107	11.020	7.848	5.044	[5.044]
<p>MBTOC Recommendation for 2014:</p> <p>MBTOC recommends 5.044 tonnes, the amount nominated by the Party, for use in mills in 2014.</p> <p>Nomination by the Party:</p> <p>The Party nominated 5.044 tonnes, an approximate 35% decrease of the amount granted by the Parties for this use in 2013.</p> <p>Circumstances of the Nomination:</p> <p>The Party advises that mills that are producers of durum semolina or have integrated/contiguous bakery mix plants and those that are particularly large structures are the remaining methyl bromide users. The CUN states that the amount requested is only sufficient for a single treatment of up to 5 of the 11 mills in the application, 6 fewer than last year's application due to transfer to alternative treatments such as heat and upgraded IPM programs. As per Canadian regulation, mills which are listed in the CUN may, if necessary, share some of the total CUN amount granted so that is why more mills are listed than will actually be fumigated. The listed mills are processing semolina or are very large mills with internal grain storages. Mills with internal grain storages present problems with the use of sulfuryl fluoride in the Canadian context because there is no food contact tolerance and it is not possible to completely empty internal grain storages before a fumigation.</p> <p>The Party notes that mills producing semolina from durum wheat cannot use entoleters as an end process to ensure complete insect control on finished product because the process would reduce semolina size making it unsuitable for pasta production.</p> <p>Barring any unexpected event, The Party notes this is the last year the Canadian National Millers Association (CNMA) intends to present an aggregated request from all flour millers. The Party notes that future nominations will be done by an individual mill on an as-needed basis.</p> <p>MBTOC Review and Assessment:</p> <p>Pertaining to the Party's concerns on insects in semolina as a reason for using MB, Bhuvanewari <i>et al.</i>, 2011, indicates that specks, commonly agreed to be an indicator of low quality in finished pasta and couscous, originated in part from insect fragments. However, MBTOC considers that processes and techniques to eliminate insects in wheat and during early milling processes would have a more important impact to remove insects than mill fumigation in this instance. Insects remaining in semolina will be killed by the heat processes used to make couscous or pasta. In this and past CUNs, however, MBTOC notes and accepts that the presence of pests in mills, alive or dead, is unacceptable from viewpoints of regulatory inspection, commercial standards,</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
												<p>consumer expectation and human health.</p> <p>MBTOC notes that there has been substantial investment in upgrades in construction aspects which have significantly improved gastightness in some mills. Evaluation of alternatives to methyl bromide in progress include: heat treatments; ECO₂Fume (carbon dioxide and phosphine mixed in gas cylinders), sulfuryl fluoride (SF) (but only if there is no food contact); plus integrated pest management programs alone or in combination with heat treatments and/or fumigations with one of the fumigants mentioned above. Large mills have difficulty with heat treatment because of heat sinks and slow heat transfer in wood. Complete evaluation of the heating requirements for any single milling facility is a process of trial and error, unique to each site and one that takes time to complete.</p> <p>The use of phosphine is a cause of concern because of the potential for corrosion of electronic components and for the likelihood of developing pest resistance when there are repeated applications of short exposures at warm temperatures which result in pest survival. The results of current trials with SF have indicated poorer than expected efficacy, it would seem because adequate temperatures of 26°C (80°F) or above are not being maintained and the vulnerability of concentration level maintenance in windy conditions, resulting in the survival of eggs of red flour beetle. This is significant because red flour beetle is the pest of most concern in Canadian mills. This was most recently confirmed by Hawkin <i>et al</i>, 2011.</p> <p>For all alternatives, the intensifying regulatory pressure in North America to improve food safety by eliminating all human pathogens, contaminants and stored product pests from food ingredients and processed foods, with forthcoming new food safety legislation in the US, is increasing the pressure to raise the already high efficacy levels of treatments to eliminate pests. Mills in Canada have to operate according to a “Required efficacy” standard which means no live insects, including eggs, in milled grain product fractions leaving the mill for customer destinations across the continent.</p> <p>There is registration of SF for empty facilities but the widening of this registration originally expected in the summer of 2009 has stalled, perhaps due to concerns raised about its use because of the potential to increase fluoride to unacceptable levels where there are high natural fluoride levels in certain regions of the US. Until such problems can be resolved commercial adoption of SF will be delayed. MBTOC notes that in the EU the use of SF has been more widely accepted if mills discard the first 10 or so tonnes of flour after a SF fumigation. If a similar technical decision could be implemented in Canada it could improve prospects for wider use of SF in Canadian mills.</p> <p>MBTOC Comments on Economics 2012:</p> <p>In past years, the Party has submitted economic analysis with its technical reports; the sector is proceeding with transition to alternatives in spite of higher costs. The CUN is not based on economics. Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> Dec. IX/6 b(i) Emission control: Over the years the Party has reported considerable investment in mill improvements to improve sealing and decrease MB use. MB dosage rate is within standard presumptions. Mills are sealed before fumigation to ensure gastightness and ensure the standards for dosage rate are met.

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<ul style="list-style-type: none"> • Dec. IX/6 b(iii) Research program: Excellent research multi-mill, multi-stakeholder research program in past with several full reports submitted to MBTOC (SF, heat and DE, SF and elevated temperature, phosphine + CO2, etc.). New mill research has been conducted this year. • Dec. IX/6 b(iii) Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. SF is not approved for food contact in Canada. A technical decision giving an interpretation clarifying product discard after an SF treatment might encourage wider use. 										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
United States	Commodities	89.166	87.719	78.983	58.921	45.623	19.242	5.000	2.419	0.822	0.740	[0.740]
<p>MBTOC Recommendation for 2014:</p> <p>MBTOC recommends 0.740 tonnes for use in dried fruit and walnuts in 2014, a 10 % decrease of the amount granted by the Parties for this use in 2013. If it were to be provided, an updated phase out plan for dates and walnuts would inform MBTOC and Parties of the continued timing of its transition to alternatives.</p> <p>Nomination by the Party:</p> <p>The Party had requested 0.740 tonnes for use in dried fruit and walnuts, a 10% decrease of the amount granted by the Parties for this use in 2013.</p> <p>Circumstances of the Nomination:</p> <p>In its interim report of May 2012, MBTOC had recommended 0.487 tonnes for this use and disaggregated into the following amounts: California walnuts 0.161 tonnes; dates 0.325 tonnes and dried plum board 0.001 tonne. However, the Party then requested the recommendation of their original nomination of 0.740 tonnes.</p> <p>Phosphine and sulfuryl fluoride are the primary fumigants for dried fruit and walnuts in storage. The Party said that the industry has already transitioned as much as it can to SF and phosphine</p> <p>Fumigation with phosphine takes approximately three days, a time which is said to disrupt market flow and shuts down the processing area. There are concerns that the use of phosphine would eventually result in some corrosion of electrical and electronic equipment in the processing areas, but MBTOC believes this concern should be manageable. .</p> <p>Companies are delaying the purchase of new chambers which could expand the use of phosphine as they await research results of combination treatments which may offer improved efficacy against the eggs of pests and then, a regulatory review may be required.</p> <p>The combination process mentioned above is sulfuryl fluoride (SF) and propylene oxide (PPO). Currently, propylene oxide (PPO) label limits the size of chambers to 10,000 cubic feet, a size impractical for the tons of dried fruit involved. In addition, there is a 200 foot buffer requirement for use of PPO in 10,000 cubic foot chambers, which the Party says would negatively impact ongoing plant operations. Furthermore, the label requirement for 8% PPO includes a minimum heat treatment of 100 °F (37.8 °C), which would be costly—but which MBTOC believes should be achievable.</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>PPO is more effective on the egg stage of many insect pests of dried fruit than SF. As noted above, a combination treatment of PPO and sulfuryl fluoride is being researched by the USDA Agricultural Research Service that could minimize disruption to the current dried fruit processing flow and retain current processing equipment without major modification. This effort is being undertaken to establish an effective treatment using SF and PPO against eggs at 20 °C and under, i.e., during the cooler season. Changes in use patterns, such as a fumigation with a combination of SF plus PPO or the use of PPO in larger chambers, could require regulatory review by the EPA to allow for label revisions.</p> <p>As a result, when market demands fast turnaround immediately before shipping, methyl bromide vacuum treatment, a 4-6 hr treatment, is still occasionally required.</p> <p>SF is efficacious for walnuts and dried fruit, but the Party has documented temperatures at or below 50°F in San Joaquin and Sacramento Valleys of California, their main date production areas and this would be incompatible with SF fumigation.</p> <p>The Party noted that, currently, methyl bromide is the only treatment available to rapidly disinfest California dates at harvest time, when up to a million pounds per day are harvested within a relatively tight timeframe during the fall. These dates are harvested by hand, and growers need to get them to the marketplace in three days before fermentation begins. Although several insects may infest dates, the carob moth, <i>Ectomyelois ceratoniae</i>, is the most damaging species. The Party reports that the California Date Commission is currently testing the efficacy of sulfuryl fluoride on dates in collaboration with USDA; unfortunately, preliminary results show less than adequate egg kill, even when the amount used is twice that needed for comparable methyl bromide fumigation (Walse, 2011). Phosphine takes longer, 5 to 7 days, to fumigate dates, and during this time the dates ferment, resulting in an off-flavor and an unmarketable product.</p> <p>Dr. Walse's current (and future) research on dates focuses on disinfestations of insects required within hours of harvesting. The ovicidal deficiencies of SF toward several insect species endemic to California has questioned its technical merit, economic feasibility, and regulatory compliance when used in this capacity under local conditions. This critical drawback to SF can be circumvented if it is paired with a potent ovicide over the course of the fumigation process if extra heat cannot be provided. Accordingly, Dr. Walse conducts research that evaluates ovicides to use in concert with SF fumigations.</p> <p>MBTOC Review and Assessment:</p> <p>Upon review of the information submitted by the Party pertaining to research results, logistics and economics of the alternatives, including difficulties obtaining efficacy in killing the eggs of pests in dried fruit, and including the need to fumigate quickly before shipments in cool autumn months, MBTOC was able to recommend the full nomination.</p> <p>However, it must also be said that MBTOC is concerned about the length of time the sector is taking to make the logistical changes to enable the use of phosphine or other alternatives. MBTOC believes a complete transition to alternatives should be possible by 2015 for walnuts and the dried fruit included in the dried plum board segments of this nomination.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
												<p>MBTOC believes supplemental heaters could be used to improve the efficacy of treatments with walnuts and dried fruit in the absence of data to the contrary. However, time might be required to gain experience with their use and resolve logistical issues. For this reason MBTOC was able to agree with the recommendation for walnuts for this year to allow for the continued transition to alternatives. However, we would expect that this transition would be completed next year since little information has been received on progress in transition.</p> <p>In its 2013 text box on the US dried fruit and walnut CUN, MBTOC noted that there were alternatives available dried plums saying, “We would expect that any further commodities CUN would not include dried plums since they should be protected from post-process re-infestation with treatments other than MB”. (MBTOC Oct 2011). In May 2010 MBTOC said, “The USG reported that until viable options with the registered alternatives are further developed, the dried fruit industry has reached the maximum adoption of alternatives. But MBTOC believes there are several lines of action available with registered alternatives to almost entirely avoid the use of MB for dried fruit and nuts. For example, phosphine, cold storage after heat drying to prevent re-infestation and propylene oxide (when used to reduce bacteria and mold, insect pests will also be killed) are alternatives that could be used for the commodities in this CUN. SF is also registered for some of these commodities. In Germany carbon dioxide under pressure is used to disinfest some dried fruits.</p> <p>The industry acknowledges that dried plums are free of insects when they come out of the dryer and that re-infestation occurs fairly soon thereafter; the re-infestation is the reason for these stored commodity treatments. MBTOC’s view is that the industry should work to prevent re-infestation and recommends this logistical problem be resolved on a priority basis.</p> <p>The USG said in correspondence that the industry has already transitioned to phosphine where possible, but that MB is needed if treatments need to occur around electronic and electrical equipment. MBTOC, in its May 2012 interim recommendation did not find this a valid reason. Commodity requiring phosphine fumigation could be moved to an appropriate location for fumigation, and new fumigation chambers could be purchased.</p> <p>However, companies are delaying the purchase of new chambers, which could expand the use of phosphine, as they await research results of combination treatments (sulfuryl fluoride and propylene oxide) which may offer improved efficacy against the eggs of pests and then, a regulatory review may be required. MBTOC will expect that this process will be completed before any further nomination for dried fruit as there will then have been adequate time to purchase phosphine chambers and resolve the logistics problem.</p> <p>The Party states that the California dried fruit and nut industries continue to financially support research on methyl bromide alternatives for postharvest applications, but full reports of these tests have not been submitted to MBTOC.” (MBTOC May 2010.)</p> <p>Additionally, new research conducted at USDA laboratories reported, “...biweekly or monthly applications of methoprene plus 1% pyrethrins or esfenvalerate eliminated <i>P.interpunctella</i> populations on raisins, as did biweekly methoprene aerosol treatments. The dried fruit and nut industries use fumigants for control of Indianmeal moths... and our simulations show that it may be possible to also use aerosol applications in sites where products are processed, bagged, and stored.” (Fontenot, 2012 in press)</p>

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>In its May 2012 interim recommendation, MBTOC noted that there are sufficient alternatives and sufficient time has passed to transition, and therefore recommended only a minimal 1 kg to allow for access to MB stocks under the US regulatory system. However, in its final recommendation, MBTOC has agreed to the use of MB as nominated for 2014, and assumes it is the final year for walnuts and the dried fruit included in the California Plum Board section of this CUN.</p> <p>MBTOC currently agrees with the information provided on dates, the lack of effective alternatives which would result in a marketable product, the assessment of the research results, and the research plan.</p> <p>MBTOC Comments on Economics 2012:</p> <p>Walnuts: The CUN provides a detailed financial analysis in the form of a partial budget of the cost of fumigating walnuts with methyl bromide, with sulfuryl fluoride, and with phosphine. SF results in an increase in gross margin because the price per unit is lower, even though the dosages applied are higher. Phosphine requires capital investment in fumigation chambers in the first year because of the longer fumigation time and the danger of missing a market window, but thereafter is cheaper to use as the unit cost is lower than that of methyl bromide. The full cost of the fumigation chambers is charged in the first year.</p> <p>Dried fruit: The CUN shows that treatment with SF results in a higher gross margin, and that treatment with phosphine, while resulting in a lower gross margin in the first year because of the need to provide fumigation chambers, will in later years also lead to a higher gross margin.</p> <p>Dates: SF is the only technically feasible alternative in dates, and the CUN shows that its use results in an increase in gross margin.</p> <p>The CUN is largely, but not entirely, based on technical, rather than economic arguments. However, in its request for re-review of this nomination the Party discussed higher costs of the alternatives as a reason for their lack of adoption.</p> <p>For example, the party provided the following discussion concerning the costs of cold storage. “Total new cold storage construction costs for prunes, raisins and figs would be substantial, even assuming the producer would not have to incur costs in acquiring land for that purpose. Cold storage also involves reoccurring costs related to consumption of electricity for cooling and maintenance in addition to those fixed construction costs.”</p> <p>Concerning the use of propylene oxide, the Party said, “Furthermore, the label requirement⁶ for 8% PPO includes a minimum heat treatment of 100 °F (37.8 °C), which would be costly.”</p>										

⁶http://www.epa.gov/pesticides/chem_search/ppls/047870-00003-20100519.pdf

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>Concerning the use of supplemental heat which would be expected to improve the efficacy of sulfuryl fluoride treatment against pest eggs, the Party said, “The costs of raising the temperature in the storage warehouses to allow for more effective treatment of dried fruit with SF under the current conditions would be expensive and additional time would be required to gain experience with their use and to resolve logistical issues. “</p> <p>Concerning the use of carbon dioxide under pressure, the Party said, “The dried fruit industry has previously evaluated the use of controlled atmosphere (CA) storage. While an efficacious treatment, the additional costs render it not economically viable. According to Dr. James Thompson, Agricultural Engineering, UC Davis, construction costs for CA are 10% more than conventional Normal Atmospheric Pressure (NAP) storage. Newer storage chambers could be retrofitted at the additional costs but most of the industry’s chambers are too old to be retrofitted.”</p> <p>MBTOC appreciates this information but requests that any further nomination be accompanied by partial budget analysis of these alternatives.</p> <p>Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> • Dec. IX/6 b(i) Emission control: Fumigations are conducted in chambers of sufficient gas tightness. • Dec. IX/6 b(iii) Research program: Research on dates has been focussed and ongoing, although the trials were not successful within the regulated requirements. A new research plan has been submitted which hold promise. A combination treatment of SF, carbon dioxide and propylene oxide continues to be researched as preliminary results were positive for dried fruits. • Dec. IX/6 b(iii) Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. However, there are several alternatives registered for dried fruit and walnuts. Although SF is registered for dates, pest control efficacy cannot be achieved within regulatory limits. 										
United States	Mills and processors	483.000	461.758	401.889	348.237	291.418	291.418	173.023	74.510	25.334	22.800	[22.8]
		<p>MBTOC Recommendation for 2014:</p> <p>MBTOC recommends 22.8 tonnes for use in mills in 2014. The recommendation is disaggregated into the following amounts: rice milling, 2.220 t; for pet food facilities 4.199 t; for mills 16.38t. If it were to be provided, an updated phase out plan would inform MBTOC and Parties of the continued timing of its transition to alternatives</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>Nomination by the Party:</p> <p>The Party nominated 22.8 tonnes, a 10% decrease of the amount granted by the Parties for this use in 2013</p> <p>Circumstances of the Nomination:</p> <p>USG is requesting methyl bromide for this sector to allow time for the industry to purchase equipment, modify structures, and/or practice using alternatives.</p> <p>Pertaining to heat treatment, two companies with several mills and food processing plants have converted nearly all of their facilities, but are having difficulty with some facilities. For example, the Party reports that despite successful use of heat in other facilities, in one “problem” mill it was not possible to maintain sufficiently high temperature for an appropriate exposure period to kill all stored product pests present. The company concerned is trying to determine how to address the problem of a heat sink in that mill. Another company has encountered difficulties attributed to the failure of heat to penetrate wall voids in order to kill the pests harboring there. Treatment of some facilities has resulted in the formation of “hot spots” which damaged epoxy flooring, electronics, wood and plastic computer components in the facilities. Another mill has a corrugated sheet metal wall that is unable to maintain high enough temperatures for the length of time needed to kill the insects in the area.</p> <p>Although there have been good advancements in the availability of appropriate heat treating equipment available to this sector, there are still localized problems in hot regions which do not normally need external heat equipment. So, while steam, electric or forced air gas heaters are available to this sector in most regions, two companies in California and Louisiana reported difficulty obtaining heat equipment at this time.</p> <p>The Party reported that, should a facility need fumigation during cold months, SF may not be a cost-effective solution because of the requirement to use supplemental heat and additional dosage.</p> <p>Pertaining to the use of sulfuryl fluoride in the sectors included in this CUN, there has been no regulatory change; SF is allowed for use in mills and rice processing but not allowed for contact of pet food and for the mixes and multiple ingredients present in many bakery products often found in some mills which produce such foods. If such foods are present, they cannot merely be tarped off during a fumigation and the Party says its applicants indicate that completely removing all products would present significant logistical challenges.</p> <p>Barakat et al. (2011) described the necessary amount of SF for control of <i>Plodia interpunctella</i> eggs of different age at 27°C within one to four days stating that the ct product for these times is not constant but decreasing with longer exposures than two days. This indicates the possibility of controlling this pest at fairly low SF concentrations of 2 g/m³ by expanding the exposure to 96 hours. The Party could also refer to the MBTOC Progress Report of 2011 for the Special Report on SF Efficacy for a more thorough discussion of how to achieve efficacy in mills when using SF,</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>Many pet food manufacturing and storage facilities have converted to alternatives; the Pet Food Institute (PFI) estimates that less than 10 percent of pet food manufacturing facilities, generally older facilities, still use methyl bromide.</p> <p>MBTOC Review and Assessment:</p> <p>Most of the facilities in all three of the sectors included in this nomination use alternatives, most of the time. This nomination is for those times when alternatives fail to control a pest problem and facilities must still rely on fumigation to kill insects in the processing equipment, bins, storage spaces, and even the walls of the structure.</p> <p>There are two primary chemical fumigants available to this industry that may accomplish these tasks: methyl bromide and sulfuryl fluoride. Heat is the other main alternative. Sulfuryl fluoride is more sensitive to temperature and is less efficacious on insect eggs than methyl bromide. Heat, a non-chemical option, is also used in this industry to disinfest facilities, but cannot be used in all situations (e.g., where there are problems with heat sinks). This nomination is for facilities, or portions of facilities, that are unsuitable for the alternatives, or where the alternatives are not economically feasible.</p> <p>Pertaining to the Party's reporting of problems with heat sinks, hot spots and penetration problems at a few specific mills, while MBTOC finds that heat is a widely applicable alternative in use at many mills, we also acknowledge that the problems reported are also consistent with its experience and published research. Some of these problems are surmountable, some are not. We cite noted Kansas State Professor Dr. Subramanyam who said, heat treatment is an art (but he did not say it is impossible!) (Beckett <i>et al</i>, 2007; Subramanyam <i>et al</i>, 2011)</p> <p>The lethal effects of sulfuryl fluoride (SF) are highly dependent upon temperature and MBTOC recommends that SF treatments occur at above 26°C (80°F) to ensure the treatment kills pest eggs.</p> <p>MBTOC noted that some companies own mills in both Canada and the United States, and that Canadian mills have adopted heat treatment to a much greater extent than American mills. MBTOC asked the Party to explain the technical or structural differences between the mills or sectors, which would affect pest control matters. The Party provided technical reasons for differences between the two milling regions with which MBTOC could agree. The geographical locations, structural components, and building configurations make each facility unique and there is no single method of pest control that works in all instances. For example, representatives of some of these types of companies reported that in the southern United States there is pest pressure year round at much higher levels than they experience in their facility in Canada. A company that has a facility in the Midwest of the United States has a problem with prevailing winds preventing them from maintaining heat for effective kill in that area; however, they have converted all their other mills to the alternatives. Phosphine, is used in combination with heat and CO₂ in some Canadian mills, but the use of phosphine can be a cause of concern because of the potential of corrosion of electronic components and the likelihood of development of pest resistance when there are repeated applications of short exposures at raised temperatures which result in survival.</p> <p>Research in mills has focussed lately in IPM aspects to decrease pest presence, to monitor pests so they can be controlled when localized before spreading, to control pests in warehouses and where food mixtures are present (where SF cannot be used because of lack of regulatory approval). In</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>overview, these approaches work to prevent the need for full site fumigations, allow improved efficacy of spot treatments and allow IPM treatments to function without full site fumigations. As examples, Fontenot et al, 2012 examining the effectiveness of aerosols and insect growth regulators noted that that single applications of a contact insecticide or aerosol may not be sufficient to manage <i>P. interpunctella</i> populations over a 6-month period but some of the biweekly and monthly insecticide treatments were predicted to be effective for management of <i>P. interpunctella</i> (Fontenot et al, 2012 in press). Investigating whether the use of methoprene aerosols could synergistically act with heat or cold treatments to control pests, Wijayarathne and Fields (2010) found that adult <i>T. castaneum</i> exposed to methoprene were less heat tolerant, although there was no such effect on larvae nor when exposed to cold treatment. Wijayarathne et al, 2011, also found that methoprene, an aerosol whose pest control action is thought to diminish fairly quickly after application will still reduce reduce populations of <i>T. castaneum</i> by reducing their progeny production, even if adults emerge.</p> <p>Pet food sector has a particular problem in that SF cannot be used to disinfest pet foods because it is not labelled for that purpose. The processing of pet foods is itself a disinfestation process, but the rich nutrient content of pet foods is highly attractive to pests. A recent examination of the locations and movements of pests in a pet mill indicates that IPM improvements especially rigorous hand sweeping of the production area, rejection of poor quality incoming products, closing doors between production and warehousing areas, cleaning and monitoring resulted in decreased pest infestation (Belda et al 2011). Holcomb and McLean (2010) reported on an IPM approach in pet food processing plants and warehouses. The authors have had success in controlling pests in these facilities for over 5 years. They ensure outside sanitation around plants and warehouses. They also try to reduce introducing pests by inspecting incoming ingredients and goods to ensure they are “clean;” maintaining screens at windows and doors; and placing lights so that insects are not attracted to openings. Microsanitation and pest control access are stressed in Holcomb and McLean’s (2010) IPM approach. Holcomb mentioned during his MBO presentation that companies need to hire a sanitation team to ensure that the facility and all equipment could be thoroughly cleaned every 30 days to break the life cycle of stored product pests (which is typically about 45 days). (Holcomb and McLean, 2010).</p> <p>Additionally, it is known that heat treatment either full site or spot heat treatment of rooms or equipment has been efficient in most pet food establishments. With the new, clear details provided on the IPM approaches that are effective in pet food establishments indicated in the research reported above, and the use of heat, MBTOC signals that unless significant new, specific and detailed data is provided showing that IPM and heat is not effective for the remaining pet food establishments, it would not support a recommendation for pet food for 2015.</p> <p>MBTOC Comments on Economics 2012:</p> <p>Improved financial information was provided, verified from third party sources. In both alternatives examined costs of treatment increase. However, this increase is only a miniscule fraction of gross margins. In the case of postharvest CUNs one would also want to look at the proportionate change in costs. In both these cases this is however also small. In summary, the nomination is not based on economic grounds, and it would be difficult to recommend an exemption on economic grounds.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
	<p>Comments Requested in Dec. XX1/11 (para 9):</p> <ul style="list-style-type: none"> • Dec. IX/6 b(i) Emission control: Mills are sealed before fumigation to ensure gastightness and ensure the standards for dosage rate are met. • Dec. IX/6 b(iii) Research program: Extensive research program. USDA research for mills is focussed on IPM aspects such as monitoring pests, use of volatiles and pest modelling. A USDA-NIFA Methyl Bromide Transition Grant is supporting an investigation of the major pests in the rice mills, and the spatial and temporal distribution of those pests within the rice mill. • Dec. IX/6 b(iii) Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. 											

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
United States	Cured pork	67.907	40.854	18.998	19.669	18.998	4.465	3.73	3.730	3.730	3.730	2.466
<p>MBTOC Recommendation for 2014:</p> <p>MBTOC recommends 2.466 tonnes for use in US dry cured pork in 2014 (sometimes referred to as Southern or Country Ham). This represents a 34% reduction over the nominated amount.</p> <p>Nomination by the Party:</p> <p>The Party nominated 3.73 tonnes, the same amount as was granted by the Parties for this use in 2013. Following MBTOC interim recommendation in May 2012, and when assessing the survey of MB users in this sector which reported that 3.664 tonnes of MB was used, the Party maintained their originally nominated amount with the following statement. "The amount of methyl bromide nominated by the United States government is 3,730 kg. This amount is slightly larger than that reported as being used by the 26 producers that responded to the questionnaire given yearly variations in production, economics, pest pressure, and environmental conditions (e.g. weather)."</p> <p>Circumstances of the Nomination:</p> <p>Currently there are no viable alternatives to methyl bromide for Southern dry cure pork, a regional traditional product; heat would alter the product, and phosphine has failed to control mites, a major pest. Sulfuryl fluoride received federal registration and has been tested for efficacy against the mites and other pests of cured meat products. Although mortality of the red-legged ham beetle (<i>Necrobia rufipes</i>) occurred at levels below maximum rates of sulfuryl fluoride, control of the ham mites took three times the legal limits of sulfuryl fluoride (Phillips, et al., 2008). The US cured pork research program has identified the incidence of pests in cured pork facilities; 50-60% of plants have reported infestations of the red-legged beetle. The incidence of mites is approximately 60-70 %. (Shilling, in USG response to MBTOC Mar 30, 2010)</p> <p>At the time of this nomination, there are no known registered alternatives for use on hams in the U.S. that provide the same level of mite control as methyl bromide. Research is still ongoing with phosphine; recent attempts to scale-up a phosphine treatment previously tested at lab level did not show adequate efficacy. More research and commercial applications need to be conducted before any treatment can be considered an alternative to methyl bromide for treatment of ham (mold) mites.</p> <p>There is an ongoing multi-university, multi-state research program which is focused on improving meat processing sanitation, IPM and pest control. So, for example, the Party reports, processors are now trying to steam clean, bleach, or both to sanitize and their aging facilities when the hams are gone and before new hams are introduced. In addition, some changes to a few facilities have taken place, such as cement floors that they can power wash with steam and bleach. While this has not eliminated the pests, it does take longer before hams are infested with mites, ham beetles and/or ham skippers.</p>												

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>These and other IPM steps should allow for a reduction in frequency of fumigation of the ham storage facilities.</p> <p>In addition, prior to the phase-out of methyl bromide this industry tended to fumigate on a monthly basis. Plus processors brought in new hams into aging houses that had contaminated old hams. This is no longer the case. Processors keep new hams away from the older hams, many have subdivided their aging house space. Processors are only fumigating when the pests, or signs of the pests, are present.</p> <p>MBTOC Review and Assessment:</p> <p>MBTOC has closely followed the research in this difficult pest control problem and agrees that no pest control has proven effective at this time. However, MBTOC finds that significant improvements are needed in facility gas tightness and efforts to reduce frequency of fumigation are required to fully satisfy Decision IX/6. The amount of methyl bromide recommended by MBTOC in this report should both ensure pest control of this commodity, and ensure the requirement of Decision IX/6 is met. MBTOC's calculations based on new MB use data submitted by the Party in August 2012 will be found below.</p> <p>At the time of its interim recommendation in May 2012, MBTOC was unable to recommend a volume. In May, MBTOC asked the Party to supply the following information: a total true volume of the aging rooms which are fumigated in each facility, irrespective of the number of fumigations. In other words, if one of the applicants' aging rooms is fumigated 3x/yr we did not want them to multiply the volume of their aging room 3x and then report that as the volume. We then noted that we needed to know the average of how often each aging room is fumigated annually by each applicant.</p> <p>Following the May TEAP report, Dr. Wes Schilling (Mississippi State University) conducted a survey of Southern dry-cure pork facilities, receiving 26 responses. The information collected provides the size of the aging rooms, the maximum yearly amounts of methyl bromide used, and the maximum number of fumigations per year, by facility. This information was provided to MBTOC and will be found in some aspects of the table below.</p> <p>MBTOC re-reviewed the CUN and the new information supplied by the Party in August and September 2012. When all facilities were included, MBTOC determined the dosage rate used was 25.45 g/m³. If we exclude the three facilities only fumigating twice a year and with which we have no problems, then the average dosage increases to 25.84 g/m³. The MBTOC standard presumption is a dosage rate of 20g/m³. MBTOC acknowledges that occasionally during a fumigation, extenuating weather circumstances require the use of additional fumigant, but in a sufficiently gastight facility the use of a higher dosage rate should not be the norm. The Party, in its August 2012 response to MBTOC noted that, "The amount of methyl bromide listed includes additional gas added to adjust for any loss to ensure the required CT (Concentration Time) is maintained during treatment." This indicates to MBTOC that the requirement for additional gas may be more frequent than should be required in a sufficiently gastight facility as is required for good practise.</p> <p>Additionally, although three facilities fumigated a maximum of twice a year, many other facilities were reported to fumigate a maximum of four and five times a year. Our review of the Southern cured pork process, the likely dwell time in the various storage rooms, product turn over and total length of process does not seem to justify a frequency of fumigation of up to 5 times a year – if IPM procedures are being followed.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>These factors led MBTOC to recommend a reduced nomination as explained by the following: one fewer fumigation per year at each facility (except for those already only fumigating twice a year) with a dosage of 20 g/m³, plus a 10% allowance for occasional unforeseen requirement for additional MB due to inclement weather or the sudden need for an extra treatment at a particular facility or possibly for one or two facilities not included in, or responding in time to, the survey, summed up as 10% for contingency measures.</p> <p>Given that the application was expressed as the maximum number of treatments, MBTOC believes the sector can achieve this reduction by improving facility gastightness and through IPM improvements. With improved gastightness, air circulation and temperature can be increased during the fumigation which will improve the effectiveness of the MB at the dosage of 20g/m³.</p> <p>In its interim report May 2012, MBTOC noted that for any future nomination for this sector, MBTOC would like actual MB use data; we believe there are only a few MB applicators working in this sector. We would like an explanation for any increase of the standard 20 g/m³ dosage rate being used by the applicants and what actions are being taken to decrease the dosage rates through facility improvements and improvements in gastightness. We have read with interest the advances being made in sanitation and IPM but we wonder why this has not resulted in a decrease in MB use over time; the CUN in this sector has requested the same amount for several years.</p> <p>Although some of this information has been supplied to MBTOC, we are indicating that a fuller and repeated submission of this information will be essential for any future nomination for this sector.</p> <p>MBTOC members, knowing that the Party and its research scientists are grappling with a difficult challenge, would like to report that it can propose some other alternatives which work with similar cured meat products in Europe. (Although we acknowledge that each country's cured meat products have variations which may affect infestation issues.). Different types of Ham products are produced in Spain (in the south - Jabugo, in the Pyrenees – Serrano), France (Bayonne) and Italy (Parma). There are similar mites problems but no MB is used in these areas. In the EU the use of any pesticide is not approved on hams. Procedures to avoid mite problems rely on sanitation, modernization of structures, fumigation of empty structures with PH₃ and other authorized pesticides, dipping the hams in olive oil and lard at 90°C (control of superficial mites), strict control of the RH during the process (initial 75 % to allow salt penetration and afterwards gradually decrease to 65%), control of moulds in the ham surface. Updating the old ham houses to modernize them into modern meat processing facilities would assist in avoiding pest infestations.</p> <p>In the next phase of the research planned in the US, we could recommend increasing the fumigation temperature to at least 30°C in order to achieve control of eggs effectively. Also they could try double PH₃ fumigation with the timing done to catch the growth cycle. This has been demonstrated with other species. Physical exclusion by means of fine mesh or air blowing out of the curing chamber could help avoid mite infestation. Lehms <i>et al.</i> (2012) showed that nets of 30 µm were sufficient to keep out all stages of the mite <i>Tyrophagus putrescentiae</i>. This needs to be confirmed in commercial process. Also, the mesh could be used to form a shroud over the hanging shelves of hams to keep mites infesting the aging room from attacking the clean hams.</p>										

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
<p>US Dry Cure Pork Text Box Table</p> <p>Note: units in kilograms</p> <p>1. Columns 1-4 were supplied to MBTOC By the Party as “U.S. Country Ham Facility Questionnaire Conducted by Dr. Schilling, May 2012:”</p> <p>2. Column 5 is MBTOC’s recommendation based on the following: one fewer fumigation per year at each facility (except for those already only fumigating twice a year) with a dosage of 20 g/m3, plus a 10% allowance for occasional unforeseen requirement for additional MB</p>												
	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹	US ¹
	Facility #	Maximum MeBr used per year (kg)	Aging Room Size (1,000 cubic meters)	Maximum number of fumigations per year	MBTOC Recommendation ²							
	1	55	0.64	4	38.4							
	2	272	2.61	5	208.8							
	3	91	0.85	4	51.0							
	4	681	6.37	4	382.2							
	5	55	0.57	4	34.2							
	6	50	0.57	4	34.2							
	7	45	0.57	4	34.2							
	8	64	0.57	4	34.2							
	9	272	2.83	4	169.8							
	10	1,135	7.70	5	616.0							

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
	11		27		0.28			4			16.8	
	12		27		0.28			4			16.8	
	13		68		0.57			4			34.2	
	14		272		2.83			4			169.8	
	15		18		0.17			4			10.2	
	16		14		0.14			4			8.4	
	17		45		0.43			4			25.8	
	18		45		0.45			4			27.0	
	19		23		0.28			4			16.8	
	20		64		0.71			4			42.6	
	21		114		1.27			4			76.2	
	22		36		0.34			4			20.4	
	23		82		0.79			4			47.4	
	24		27		0.85			2			34.0	
	25		27		0.85			2			34.0	
	26		54		1.46			2			58.4	
	Total		3,664 kg MeBr								2241.8	
											(+ 10% = 2,466 kg)	
	Footnotes: ¹ The volumes of MB supplied in the US originated columns were rounded by Excel spreadsheet after conversion from the original U.S. units.											
	² Apart from facilities 24-26, this amount provides for one less fumigation at each facility per year.											

Country	Industry	CUE for 2005 ¹	CUE for 2006 ²	CUE for 2007 ³	CUE for 2008 ⁴	CUE for 2009 ⁵	CUE for 2010 ⁶	CUE for 2011 ⁷	CUE for 2012 ⁸	CUE for 2013 ⁹	CUN for 2014	MBTOC rec. for 2014
		<p>MBTOC Comments on Economics 2012:</p> <p>The CUN is not based on economics.</p> <p>Comments Requested in Dec. XX1/11 (para 9)</p> <ul style="list-style-type: none"> • Dec. IX/6 b(i) Emission control: Over the years the applicants have made facility improvements to improve gas tightness, but this is a traditional meat curing process and some of the facilities are older and unusual. The research program continues to work with the applicants to improve gastightness, IPM and other process improvements which reduce the need for fumigation and result in decreased use of MB. This work needs to continue. Producers have modified their buildings both to make them more gas-tight and to exclude pests. • Dec. IX/6 b(iii) Research program: . Excellent research effort to date and still ongoing. Now researching phosphine effectiveness on commercial scale. A multi-state, multi-university research program is ongoing and full reports of research have been made available to MBTOC. <p>Dec. IX/6 b(iii) Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. Phosphine is registered for use on processed meats such as cured pork</p>										

¹ExMOP and 16MOP; ²16MOP+2ExMOP+17MOP; ³MOP17+MOP18; ⁴MOP18+MOP19; ⁵MOP19+MOP20; ⁶MOP20+MOP21; ⁷MOP21+MOP22; ⁸MOP22, ⁹MOP23

Activity Report 2012 and Workplan for 2013

1.6.1. Activity report for 2012

- Initial summarisation of the CUNs (initial sorting and recording carried out by the Secretariat).
- Preparation of questions for Parties. Assessment of responses received from Parties.
- First meeting of MBTOC sub committees in last week of February 2012 on the assessment of the CUNs: MBTOC- S and QPS met in Beijing, China (February 27 – March 2) and MBTOC- SC met in Berlin, Germany (February 28 – March 1). Meetings were held simultaneously and a consultation session was held via Skype between the subcommittees to share interim recommendations made on corresponding CUNs. Bilateral meetings were held by MBTOC-S with the USA. MBTOC-SC held a teleconference with the USA to discuss details of their nominations.
- Interim recommendations and preparation of the CUN Interim, QPS and Progress reports for consideration by the 32nd OEWG
- Site visits: MBTOC-S conducted a field trip to observe alternatives adopted by vegetable and tomato growers in the vicinity of Beijing. MBTOC-QPS visited the Tianjing Quarantine Station in Tangu.
- 32nd OEWG (Bangkok, 23- 27 July, 2012). Bilateral meetings with USA, the California Strawberry Commission (USA), Australia and Canada.
- No second meetings were held in the year, and MBTOC (S and SC) conducted its re-reviews by an agreed email process.
- MBTOC-S and MBTOC-SC prepared the final report on the CUNs for consideration by the Parties at their 23rd Meeting.
- The Handbook on Submitting Critical Use Nominations was updated and posted at the Ozone Secretariat Website.
- Three MBTOC members resigned; MBTOC thanked Tom Batchelor, Patrick Ducom and Jim Schaub for their work.

The following “Actions” and “Indicative Completion Dates” are the “Working procedures of MBTOC relating to the evaluation of nominations for critical uses of methyl bromide”, as described in Annex 1 of the 16th Meeting of the Parties. The annual work plan is required to be drawn up by MBTOC (supported by the Ozone Secretariat) in consultation with TEAP, which shall submit it to the Meeting of the Parties each year.

1.6.2. Work plan and indicative budget for 2013

Table 1-12. MBTOC work plan and indicative budget: 2011

Tasks and actions	Indicative budget needs where applicable	Indicative completion date	Dates of meetings
1. Parties submit their nominations for critical-use exemptions to the Secretariat*	-	24 January 2013	
2. The nominations are forwarded to MBTOC co-chairs for distribution to the subgroups of appointed members	-	7 February 2013	
3. Nominations in full are assessed by the subgroups of appointed members. The initial findings of the subgroups, and any requests for additional information are forwarded to the MBTOC co-chairs for clearance	-	28 February 2013	
4. MBTOC co-chairs forward the cleared advice on initial findings and may request additional information on to the nominating Party concerned and consult with the Party on the possible presumption therein	-	21 February 2013	

5. Nominating Party develops and submits its response to the MBTOC co-chairs	-	7 March 2013	
6. MBTOC Meeting No 1 <ul style="list-style-type: none"> Meets as usual to assess nominations, including any additional information provided by the nominating Party prior to the MBTOC meeting under action 5 and any additional information provided by nominating Party through pre-arranged teleconference, or through meetings with national experts, in accordance with paragraph 3.4 of the terms of reference of TEAP (see Annex I of MOP16, Dec XVI/4) Bilateral meetings To discuss and finalise the CUN evaluation process proposed by the co-chairs and commented by the MBTOC members To discussed any new or standard presumptions that MBTOC seeks to apply in its future assessment of critical-use nominations, for approval by the Meeting of the Parties Any administrative changes to improve the operations of the Committee, within the scope of Decisions that have been agreed by the Parties Draft the 2012 Progress Report 	Funds for travel of 1 non-A5 members: US\$3,000** Meeting Costs \$3,000	March 2013	TBD
8. MBTOC provides its draft recommendations on the CUNs to TEAP		April, 2013	
9- TEAP Meeting: To assess the MBTOC report on critical-use nominations and submits the finalised interim report on recommendations and findings to the Secretariat.		April 2013	TBD
10. The Secretariat posts the finalised report on its web site and circulates it to the Parties	-	May 2013	
11. OEWG Bilateral Discussions: Nominating Party has the opportunity to consult with MBTOC on a bilateral basis in conjunction with the Open-ended Working Group meetings		June - August 2013 (TBD)	TBD
12. The nominating Party submits further clarification for the critical-use nomination requested by MBTOC or if requested to do so by the Open-ended Working Group, and provides additional information should it wish to appeal against a critical-use nomination recommendation by MBTOC/TEAP	-	Late June 2013 depending on OEWG date	
13. MBTOC Meeting No 2 or agreed email process (according to feasibility and justification of a second meeting): <ul style="list-style-type: none"> Meets to reassess only those critical-use nominations in the “unable to assess” category, those where additional information has been submitted by the nominating Party and any critical-use nominations for which additional information has been requested by the Open-ended Working Group (see Annex I of MOP16, Dec XVI/4) finalise the report, including notice of any proposed new standard presumptions to be applied by MBTOC conduct any bilateral consultations requested by Parties draft work plan and budget for MBTOC for 2013 	Funds for travel of 1 non-A5 members**: US\$3,000 Meeting costs: \$US 3,000	September-October 2013	TBD
14. MBTOC draft final report considered by TEAP, finalised and made available to Parties through the Secretariat	-	Middle October 2013	
15. 24th Meeting of the Parties			November 2013
Total budget:	US \$: 12,000* US\$ 6,000 (Travel of Non Article 5 member) Meeting Costs \$6,000		

* CUNs from A5 Parties could be submitted

** Travel funds for non A5 members have been requested in the past but not granted

1.7 References:

- Ajwa, H., Fennimore, S., Browne, G., Martin, F., Trout, T., Duniway, J. Shem-Tov, S. and Daugovish, O. (2005). Strawberry yield with various rates of chloropicrin and inline applied under VIF. In: Proc Ann Int Res Conf on MeBr Alternatives and Emission Reductions. San Diego, CA, Oct. 31–Nov. 3, 2005. Abstr. 53.
- Athanassiou, C.G., Riudavets, J., and Kavallieratos N.G., (2011) Preventing stored-product insect infestations in packaged-food products. *Stewart Postharvest Review*. 3:8 pp1-5
- Beckett S.J., Fields P.G and Subramanyam Bh. (2007). Disinfestation of stored products and associated structures using heat.. In, CAB International 2007, Heat treatment for postharvest pest control: theory and practice. pp. 182-237
- Belda, C., Ribes-Dasi M, and Riudavets, J. Improving pest management in pet food mills using accurate monitoring and spatial analysis. (2011). *Journal of Stored Product Research*. 47. Pp 385-392.
- Bell, C.H. (2011). Insect and mite penetration and contamination of packaged foods. In: Kilcast, D., Subramaniam, P. (Eds.), *Food and Beverage Stability and Shelf Life*. Woodhead Publishing Ltd, Cambridge, ISBN 978-1-84569-701-3, pp. 106-131.
- Bhuvaneshwari, K., Fields, P.G., White, N.D.G., Sarkar, A.K., Singh, C.B., and Jayas, D.S. (2011). "Image analysis for detecting insect fragments in semolina. *Journal of Stored Products Research*, 47(1), pp. 20-24. doi: 10.1016/j.jspr.2010.08.003
- Bowley, C. R. and Bell, C. H. (1981) The toxicity of twelve fumigants to three species of mites infesting grain. *J. stored Prod. Res.* 17, 83-87.
- Californian Department of Pesticide Regulation. <http://www.cdpr.ca.gov/>
- Daugovish, O., Koike, S., Gordon, T., Ajwa, H., and Legard, D. (2011). Fumigant and strawberry variety evaluations in *Macrophomina phaseolina* and *Fusarium oxysporum* infested fields. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/10DaugovishOFumigantandvarietyevaluations.pdf>
- Driver, J., Welker, R. and Louws, F. (2011). Totally impermeable films for fumigant rate reduction in North Carolina. In: Proc Ann Int Res Conf on MeBr Alternatives and Emission Reductions. San Diego, CA, Oct. 31–Nov. 2, 2011. Abstr. 16
- Federal Register. Protection of stratospheric ozone: The 2011 Critical Use Exemption from the phase out of methyl bromide. 40 CFR Part 82. EPA. September 30, 2011, Vol 76, No. 190. Pp 60736 – 60748.
- Fennimore, S. A. and Ajwa, H. A. (2011). Totally impermeable film retains fumigants, allowing lower application rates in strawberry. *California Agriculture*, October-December, 2011. Vol. 65:211-215. <http://ucce.ucdavis.edu/files/repositoryfiles/ca.E.6504p211-91055.pdf>
- Fennimore, S., Samtani, J. and Subbarao, K (2011). Soil disinfestation in strawberry with steam. . Annual International Research Conference on Methyl Bromide Alternatives and Emission Reduction, Orlando, FL, November 2011
- Fields, P.G. (2007). Evaluation of Alternatives to Methyl Bromide for Use in Structural Fumigation of Canadian Pasta Manufacturing Facilities 2007/2008. Agriculture and Agri-Food Canada and the Canadian National Millers Association.
- Fontenot, E.A., Arthur, F., Nechols, J.R., and Throne, J.E. 2012 Using a population growth model to simulate response of *Plodia interpunctella* Hübner populations to timing and frequency of insecticide treatments. *Journal of Pest Science*. (In press).
- Hamill, J. E., Dickson, D. W., T-Ou, L., Allen, L. H., Burelle, N. K. and Mendes, M. L. (2004). Reduced rates of MBR and C35 under LDPE and VIF for control of soil pests and pathogens. In: Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions 31 October - 3 November, 2004, Orlando, Florida, USA, pp. 2-1.
- Hanson, B., J. Gerik and S. Schneider (2006). Evaluation of reduced Methyl Bromide rates and alternative fumigants in field grown perennial crop nurseries. In: Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions, Orlando, Florida, USA, 2006.
- Hawkin, K.J., Stanbridge, D.M., and Fields, P.G. (2011) Sampling *Tribolium confusum* and *Tribolium castaneum* in mill and laboratory settings: Differences between strains and species. *Canadian Entomologist*. 143: 504_517
- Holcomb, M. and M. McLean. (2010). An IPM approach to methyl bromide replacement: in pet food processing plants and warehouses. Presentation at MBAO, Nov. 2-5, 2010, Orlando, FL. Available at: <http://mbao.org/2010/65Holcomb.pdf>.
- Koike, S., Daugovish, O., Gordon, T., Ajwa, H., Bolda, M. and Legard, D. (2010). Biology and Management of *Macrophomina* Disease of Strawberry. Californian Strawberry Commission Annual Production Research Report 2009-2010. http://www.calstrawberry.com/fileData/docs/Koike_2010_11_mac.pdf
- Lopez-Aranda, J., et al López-Aranda J M, Miranda L, Soria C, Domínguez P, Pérez-Jiménez R M, Zea T, Talavera, M Romero F, De Los Santos B, Medina-Mínguez J J, (2009). Strawberry Production in Spain: Chemical Alternatives to MB, 2009 results. 2009 Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions. November 10-13, San Diego, California
- Lehms, M.; Baier, B.; Wurst, S.; Schöller, M.; Reichmuth, C., 2012: Zum Eiablageverhalten der vorrattsschädlichen Milben *Acarus siro* und *Tyrophagus putrescentiae* auf verschiedenen Substraten und durch feinmaschige

- Gaze [Egg laying behaviour of the stored roduct pest mites *Acarus siro* and *Tyrophagus putrescentiae* of different substrates and through fine mesh Nylon gaze]. In: Julius Kühn-Institut (Ed.), Julius-Kühn-Archiv, No 438, Proceedings of the 58. Deutsche Pflanzenschutztagung, 10. - 14. September 2012 in Braunschweig, Germany, ISBN978-3-930037, <http://pub.jki.bund.de/index.php/JKA/article/view/670/2244>, 500 pp., 75.
- MBTOC (2011). Methyl Bromide Technical Options Committee., 2010 Assessment Report. UNEP, Nairobi, Kenya
- Noling, J. W. and Cody, M. 2011. USDA-ARS Areawide Project: Large scale field demonstration trialing of methyl bromide alternatives in Florida strawberry 2010-11. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/26NolingJAREAWIDE.pdf>
- Phillips, T.W. Hasan, M.M., Aikens, M.J., Schilling, M.W. (2008). Efficacy of sulfuryl fluoride to control ham mites and red-legged ham beetles. Annual International Research Conference on Methyl Bromide Alternatives and Emission Reduction, Orlando, FL, November 11th-14th
- Porter, I.J., L. Trinder and D. Partington. (2006). Special Report Validating the Yield Performance of Alternatives to Methyl Bromide for Preplant fumigation. TEAP/MBTOC Special Report, UNEP Nairobi, May 2006 97pp.
- Santos, B.M., J.P. Gilreath, J.M. López-Aranda, L. Miranda, C. Soria, and J.J. Medina. (2007). Comparing Methyl Bromide alternatives for strawberry in Florida and Spain. *Journal of Agronomy* 6(1): 225 – 227.
- Su, L., Adam, B., Lusk, J., and Arthur F. (2012 in press). A comparison of auction and choice experiment: An application to consumer willingness to pay for rice with improved storage management. Department of Agricultural Economics, Oklahoma State University,
- Subramanyam Bh., Mahroof R., and Brijwani M. (2011). Heat treatment of grain-processing facilities for insect management: a historical overview and recent advances. *Stewart Postharvest Review*. Dec. 3:1
- Thomas, J. E., Van Sickle, J. J., Allen, L. H., Noling, J. W., and Dickson, D. W. (2011). Increasing efficacy and decreasing application rate of Telone C35 with carbonation and low permeable films. <http://mbao.org/2011/Proceedings/76ThomasJ.pdf>
- Wijayaratne, L.K.W., Fields. P.G. Arthur, F.H. (2011) Effect of methoprene on the progeny production of *Tribolium castaneum* (Coleoptera: Tenebrionidae). *Pest Management Science*.
- Wijayaratne, L.K.W., and Fields, P.G. (2010) Effect of methoprene on the heat tolerance and cold tolerance of *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae). *Journal of Stored Products Research*. pp 1-8.
- Yates, S, Papierknik S., Chellemi D, Wang D, Gao S, Hanson B, Ajwa H, Browne G, Kluepfel D. (2009). Update of film permeability measurements for USDA-ARS area-wide research project. In ‘Annual International Research Conference on MB Alternatives and Emissions Reductions’ Nov 10-13, San Diego, 2009.
- Zveibil, A., Mor, N., Gnayem N. (2012) Survival, Host–Pathogen Interaction, and Management of *Macrophomina phaseolina* on Strawberry in Israel. *Plant Disease* 96: 265 - 272

ANNEX 1: Decision IX/6

1. *To apply the following criteria and procedure in assessing a critical methyl bromide use for the purposes of control measures in Article 2 of the Protocol:*

- (a) *That a use of methyl bromide should qualify as “critical” only if the nominating Party determines that:*
 - (i) *The specific use is critical because the lack of availability of methyl bromide for that use would result in a significant market disruption; and*
 - (ii) *There are no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination;*
- (b) *That production and consumption, if any, of methyl bromide for critical uses should be permitted only if:*
 - (i) *All technically and economically feasible steps have been taken to minimise the critical use and any associated emission of methyl bromide;*
 - (ii) *Methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide, also bearing in mind the developing countries’ need for methyl bromide;*
 - (iii) *It is demonstrated that an appropriate effort is being made to evaluate, commercialise and secure national regulatory approval of alternatives and substitutes, taking into consideration the circumstances of the particular nomination and the special needs of Article 5 Parties, including lack of financial and expert resources, institutional capacity, and information. Non-Article 5 Parties must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes. Article 5 Parties must demonstrate that feasible alternatives shall be adopted as soon as they are confirmed as suitable to the Party’s specific conditions and/or that they have applied to the Multilateral Fund or other sources for assistance in identifying, evaluating, adapting and demonstrating such options;*

2. *To request the Technology and Economic Assessment Panel to review nominations and make recommendations based on the criteria established in paragraphs 1 (a) (ii) and 1 (b) of the present decision;*

3. *That the present decision will apply to Parties operating under Article 5 and Parties not so operating only after the phase-out date applicable to those Parties.*

Para. 2 of Decision IX/6 does not assign TEAP the responsibility for determining the existence of “significant market disruption” specified in paragraph 1(a)(i).

TEAP assigned its Methyl Bromide Technical Options Committee (MBTOC) to determine whether there are *no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination*, and to address the criteria listed in Decision IX/6 1(b).

ANNEX II: Minority report on the critical use of methyl bromide, US strawberry fruit, 2014

Author: Janny Vos

Introduction

This minority report is produced to present a more precise and transparent approach to the assessment of the critical use of MB for US strawberry fruit, 2014, than is currently used by the MBTOC majority.

Nomination by the Party

US nominated 415.067 tonnes of methyl bromide for critical uses for strawberry fruit for 2014 and requested re-instatement of this amount following the MBTOC interim recommendation of 343.740 tonnes (170 kg/ha on 2022 ha).

Economic considerations

The nomination was not based on economic arguments. It is noted however, that a recent economic study conducted in California (Mayfield and Norman, 2012⁷) shows that, contrary to ex-ante industry claims, the years of exempted MB use have been years of rising yields, increased cropping areas, exports and revenues for Californian strawberry fruit growers, even when faced with a global recession and increased imports from Mexican growers.

Assessment

Details of the assessment are provided in the tables below, in particular in No. 11. It is concluded that a further annual transition of at least 470 ha can be expected with existing alternatives and under the current regulatory restrictions.

Recommendation

Based on the assessment, a transition of at least 470 ha is recommended. Given the 2013 CUE area of 2713 ha, the 2014 critical area should therefore be reduced to no more than 2243 ha, and at 170 kg/ha the 2014 critical use should be reduced to 381.310 tonnes at most.

Tables showing review and assessment

Annex I (A) of [MOP16 \(32\)](#): Exemptions must fully comply with Dec IX/6 and other relevant decisions, and are intended to be limited to the levels needed for critical-use exemptions, temporary derogations from the phase-out of methyl bromide in that they are to apply only until there are technically and economically feasible alternatives that otherwise meet the criteria in decision IX/6. MBTOC should take a precise and transparent approach to the application of the criteria.

[Dec XXI/11\(9\)](#): MBTOC is requested to summarise in the table on its recommendations for each nomination information on adherence with each criterion set out in decision IX/6(1)(a)(ii) and (b)(i) and (b)(iii) and other relevant decisions of the Parties. Decision IX/6 requests the TEAP to review nominations and make recommendations based on the criteria established in paragraphs 1 (a) (ii) and 1 (b) of Decision IX/6, which includes the three parts of 1 (b), namely 1(b)(i),(ii) and (iii).

⁷ Mayfield, E.N. and Norman, C.S. (2012) Moving away from methyl bromide: Political economy of pesticide transition for California strawberries since 2004. *Journal of Environmental Management* 106: 93-101. Doi: 10.1016/j.jenvman.2012.04.009

REVIEW AND ASSESSMENT: US Strawberry fruit CUN2014

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
1	IX/6(1)(a)(ii); and XXI/11(9)	... there are no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination	Number of alternatives listed in the Party's " MB Alternatives Database " (see No 9 below); reductions in number of facilities, farmers or land using MB; alternatives present in other regions or countries for the same purpose	<p>The US Methyl Bromide Alternatives Database of 2005 reported that at that time 4 chemical alternatives (1,3-D, Pic, MS, Terbacil) to methyl bromide were registered for use on strawberry fruit in US as well as 3 combinations (1,3-D + Pic, 1,3-D + Pic + MS, Pic + MS), and that a further 2 chemical alternatives (dazomet and iodomethane) were under consideration. Alternatives are listed by the US on http://www.epa.gov/ozone/mbr/alts.html (EPA 20 Feb 2012). CUN2013 reported registration of MI in California in 2010, but in 2012 MI was withdrawn from the market.</p> <p>Currently, technically and economically feasible alternatives include (CUN2014 and CalDPR-PUR):</p> <ul style="list-style-type: none"> • 9 alternatives to MB and their combinations, available and registered in California and that can be used as alternatives to MB (see http://www.epa.gov/ozone/mbr/alts.html) : <ul style="list-style-type: none"> ○ 1,3-D ○ PIC ○ 1,3-D + PIC ○ Dazomet ○ MI ○ Metam sodium (MS) ○ 1,3-D + PIC + MS ○ Terbacil (?) ○ MS + PIC • Alternatives to MB that do not require registration but are available (CUN2014): <ul style="list-style-type: none"> ○ Organic strawberry fruit production ○ Steaming on plots smaller than 10 acres ○ Resistant cultivars, with resistance to <i>Macrophomina</i> or <i>Fusarium</i> available, but not against all soil pests simultaneously • Combinations of alternatives <ul style="list-style-type: none"> ○ Cultivar Camarosa with drip applied 1,3-D/pic provides comparable yields to MB (CUN2014);

⁸ **Annex I (A) of MOP16 (10):** MBTOC should categorize the nomination as “unable to assess” if there is insufficient information to make an assessment, and clearly explain what information was missing. **Annex I (A) of MOP16 (28):** The onus remains on the nominating Party to provide sufficient information in order for MBTOC to be able to assess whether critical-use nominations comply fully with Dec IX/6.

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
				<p>○ Non-chemical alternative used in buffer zones.</p> <p>CUN2014 says: “<i>Expansion of alternative methods to areas currently considered critical for methyl bromide will occur and effective alternatives are available. Factors that may affect farmer transition to alternatives include regulatory restrictions, perception of the consequences of methyl iodide use, results of the effectiveness of non-fumigant technologies, and remedies to biological issues, such as the emergence of <i>Macrophominia phaseolina</i> and <i>Fusarium oxysporum</i> as major pests in some areas.</i>”</p> <p>Conclusion: The applicant has not demonstrated that technically and economically feasible alternatives or substitutes are NOT available to the user that are acceptable from the standpoint of environment and health and are suitable for strawberry fruit production in California.</p>
2	IX/6(1)(b)(i); and XXI/11(9)	... all technically and economically feasible steps have been taken to minimize the MB critical use	Dosage minimized, VIF used and others.	<p>The nomination is for a dose rate of 170 kg/ha, as it was in the nominations for 2012 and 2013 (sources: CUN2012, CUN2013, CUN2014). With barrier films the MBTOC standard presumption for strawberry is 12.5 gm-2 for pathogens with film and 20 gm-2 without film.</p> <p>In 2010, the overall average dosage used across strawberry fruit producing counties was 208 kg/ha, with a predominant formulation of 57% MB (77% of applications), although lower formulations of 33% and 50% are used as well (6% of applications). It is noted though that formulations of 67% and 98% are still used in a significant number of applications (17% of applications) (Source: CalDPR-PUR).</p> <p>California regulation prohibits use of VIF use in MB application (see 3).</p> <p>Conclusion: Applicant has partly demonstrated that all steps have been taken to minimize the MB critical use.</p>
3	IX/6(1)(b)(i); and XXI/11(9)	...all technically and economically feasible steps have been taken to minimize MB emissions	Gas tightness recorded and improved, recapture in place, VIF, tarpaulins ...	<p>CUN2014 does not mention any steps taken to minimize MB emissions.</p> <p>California regulation prohibits use of VIF with MB, but allows use of high barrier with MB (http://www.cdpr.ca.gov/docs/emon/methbrom/tarps.pdf), and these can reduce buffer zones. It is however not clear in how far barrier films are used.</p> <p>Conclusion: Applicant has not demonstrated that it has taken all steps to minimize any associated emissions of MB.</p>
4	IX/6(1)(b)(ii);	... existing stocks of MB are not sufficient in quantity and quality	Stocks reported in the Accounting Framework Report;	CUN14 requests 415,067 kg which is well within the range of 1,800,000 kg of stocks. Decision IX/6(1)(b)(ii) requires the applicant to demonstrate that existing stocks of MB

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
		and therefore new production should be permitted by the Party	Applicant report on stocks	are not sufficient in quantity and quality and therefore new production should be permitted by the Party. The applicant has not done this. Conclusion: Stocks are presumed to be available and new MB is not necessary to meet this need.
5	IX/6(1)(b)(iii) ; and XXI/11(9)	... an appropriate effort is being made to evaluate, commercialise and secure national regulatory approval of alternatives and substitutes	Research programme in place to commercialize and gain regulatory approval for each alternative	Results of US studies highlight the promising potential for alternatives to methyl bromide, including non-chemical alternatives. Technologies such as steam (Fennimore <i>et al.</i> , 2011 ⁹), soilless production with substrates and landscape fabrics (Thomas <i>et al.</i> , 2011 ¹⁰ ; Cabrera <i>et al.</i> , 2011 ¹¹), cultivar selection (Daugovish <i>et al.</i> , 2011 ¹²), buffer zone management (Daugovish <i>et al.</i> , 2011 ¹³), anaerobic soil disinfestations (Daugovish <i>et al.</i> , 2011 ¹⁴ ; Shennan <i>et al.</i> , 2011 ¹⁵ ; Roskopf <i>et al.</i> , 2011 ¹⁶), biofumigation (Mazzola,

⁹ Fennimore, S., Samtani, J., and Subbarao, K. 2011. Soil disinfestations in strawberry with steam. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/46FennimoreS.pdf>

¹⁰ Thomas, H., Legard, D., Sjulín, T., Rowe, D., Reddy, S., Fennimore, S., Serohijos, R., and Low, C. 2011. Production of strawberry in substrate. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/43ThomasH.pdf>

¹¹ Cabrera, J. A., Wang, D., Gerik, J., and Gan, J. 2011. Effects of landscape fabrics on pest control in a raised-bed trough system for strawberry production without fumigation. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/05CabreraASTrawberryfabrics.pdf>

¹² Daugovish, O., Koike, S., Gordon, T., Ajwa, H., and Legard, D. 2011. Fumigant and strawberry variety evaluations in *Macrophomina phaseolina* and *Fusarium oxysporum* infested fields. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/10DaugovishOFumigantandvarietyevaluations.pdf>

¹³ Daugovish, O., Fennimore, S., Gordon, T., Koike, S., and Subbarao, K. 2011. Non-fumigant combinations for management of San Andreas strawberry in a buffer zone infested with *Fusarium oxysporum* and *Macrophomina phaseolina*. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/03DaugovishONONFUMIGANTCOMBINATIONS1.pdf>

¹⁴ Daugovish, O., Muramoto, J., Shannon, C., Bolda, M., and Koike, S. 2011. Anaerobic soil disinfestation for Southern California strawberries. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/02DaugovishOASDSOCAL.pdf>

¹⁵ Shennan, C., Muramoto, J., Bolda, Koike, S., M., Daugovish, O., Mochizuki, M., Klonsky, K., Roskopf, E., Burelle, N., Butler, D., Fennimore, S., and Samtani, J. 2011. Anaerobic soil disinfestation: California. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/44ShennanC.pdf>

¹⁶ Roskopf, E., Kokalis-Burelle, N., Butler, D., Muramoto, J., Shennan, C., Noling, J., He, Z., Booker, B., Sances, F., and Campbell, T. 2011. Field Evaluation of non-fumigant pest control for Florida strawberry production. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011).

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
				2011 ¹⁷), and innovative applications pesticides (Sances <i>et al.</i> , 2011 ¹⁸ ; Daugovish and Fennimore, 2011 ¹⁹ ; Thomas <i>et al.</i> , 2011 ²⁰). Transition from methyl bromide is expected to continue with the refinement of these new technologies being funded by USDA nationwide. However, applicant feedback shows little or no expectation of take-up of non-chemical alternatives by 2014, or evidence of scaled-out extension on IPM messages or of chemical alternatives. Conclusion: Applicant has demonstrated that an appropriate effort is being made to evaluate alternatives and substitutes, however there is no evidence that the applicant makes appropriate effort to commercialise alternatives and substitutes.
6	IX/6(1)(b)(iii) ; and XXI/11(9)	... a research programme is in place to develop alternatives and substitutes	Research programme in place, results of programme, performance of programme	See (5) above Conclusion: Applicant has demonstrated that a research programme is in place to develop alternatives and substitutes.
7	IX/6(1)(b)(iii) ; and XXI/11(9)	... a research programme is in place to deploy alternatives and substitutes	Method to ensure alternatives are installed by the end users	See (5) above Conclusion: Applicant has not demonstrated that a research programme is in place to deploy alternatives and substitutes.
8	Annex I (A) of MOPI6 (21)	Parties are invited to include in their nominations, information on their determination that the specific	Check box at the beginning of the application Form shows 'Significant Market Disruption'	Yes, box checked by applicant. However, a new and key economic study conducted in California (Mayfield and Norman, 2012 ¹) indicates that the years of exempted MB use have been years of rising yields, increased cropping areas, exports and revenues for

<http://mbao.org/2011/Proceedings/45RosskopfEStrawberry2011MBAO.pdf>

¹⁷ Mazzola, M. 2011. Potential of biofumigation for soilborne pest control in strawberry. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/47MazzolaMBAOstrawberrysymposium.pdf>

¹⁸ Sances, F. V., Dujardin, R., and Norton, J. A. 2011. Efficacy and proof of concept of herbicide coated plastic mulch for use in alternative strawberry and tomato production systems. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/15SancesF.pdf>

¹⁹ Daugovish, O. and Fennimore, S. 2011. S-Metolachlor (Dual magnum) safety for strawberry in southern California. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). <http://mbao.org/2011/Proceedings/78DaugovishODualMagnum.pdf>

²⁰ Thomas, J. E., Dickson, D. W., Van Sickle, J. J., Noling, J. W., Allen, L. H., Vu, J. C., Gao, S., Ajwa, H., Gerik, J. S., Wang, D., Hanson, B. 2011. Multi-state evaluation of carbonated fumigants and low permeable tarps to reduce application rate, increase efficacy, and minimize emissions. CRIS/University of Florida research project progress report. <http://www.reeis.usda.gov/web/crisprojectpages/222549.html>

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
		use is critical because the lack of availability of methyl bromide for that use would result in a significant market disruption	is checked/ticked by the applicant; information provided if checked?	<p>Californian growers of strawberry fruit.</p> <p>Conclusion: There is no evidence of significant market disruption.</p>
9	Dec ExI/3 , paragraph 9(h)	TEAP is requested to assess , annually where appropriate, any critical-use nomination made after the end of 2006 in the light of the Methyl Bromide Alternatives Database		<p>See (1) above</p> <p>Conclusion: 9 alternatives to MB and their combinations are available and registered in California and can be used as alternatives to MB that are technically and economically feasible. It is recommended that the Alternatives Database submitted to the Parties should be updated with the most recent available information.</p>
10	Dec ExI/3 , paragraph 9(h)	TEAP is required to compare annually the quantity of MB requested and recommended in the nomination, for each pre-harvest and post-harvest use, with the [National] Management Strategy submitted by the Party	What is stated in the Party's NMS? What is the date of the NMS? What is stated in the nomination? Comments that compare MS and nomination statements	<p>The first US National Management Strategy stated that "additional acreage or production volume of a commodity must be accomplished using a MB alternative". In the update on this US National Management Strategy for MB in 2009, the US explicitly reports in the section on strawberry fruit: "Strawberry growers have been replacing methyl bromide or reducing its use rates in all production areas" and "California growers have a critical need for methyl bromide to treat fields where alternatives are not available due to regulations or to complete a fumigation program that includes a once per three year treatment with methyl bromide to manage two new diseases (<i>Macrophomina</i> and <i>Fusarium oxysporum</i>)".</p> <p>It is noted that no stepwise MB phase-out plan is presented in the US NMS. It is also noted that CUN2014 still refers to the need for MB because of regulatory constraints and to manage the same two new diseases, although several years have passed since the first report of these new disease problems in strawberry fruit production. There is a lack of information in CUN2014 to substantiate the incidence and severity of these new diseases as well as evidence that available MB alternatives do not sufficiently control them.</p> <p>Conclusion: the NMS needs an update and inclusion of a stepwise MB phase-out plan.</p>
11	Annex I (A) of MOP16 (35)	In situations where MBTOC recommends a nomination on grounds that it is necessary to have a period for adoption of alternatives, the basis for calculating the time period must be explained fully in the TEAP report and take fully into account the information provided by the nominating Party , the supplier, the	MBTOC to provide calculations on the basis of information obtained from the nominating Party, the supplier, the distributor or the manufacturer.	<p>Information was not provided of enterprises that need to transition in order to adopt alternatives. MI/Pic is no longer for sale in the USA hence this is no longer an alternative. Information was not provided on expected uptake of each of the other alternatives from 2011 to 2014. However, calculations can be made for some of these alternatives on the basis of information from the applicant and public databases such as the California Strawberry Commission Survey and the California DPR – Pesticide Use Report:</p> <ol style="list-style-type: none"> Further uptake of 1,3-D through adoption of new formulations and barrier films: <ul style="list-style-type: none"> Use of high barrier films can reduce the dose rate and will allow more hectares treated under the township caps. However, suitable data have not yet been found;

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
		<p>distributor or the manufacturer.</p> <p>Relevant factors for such a calculation include the number of enterprises that need to transition, e.g., the number of fumigation and pest control companies, estimated training time assuming full effort, opportunities for importing alternative equipment and expertise if not available locally, and costs involved.</p>		<ul style="list-style-type: none"> • Data are available on 1,3-D use area, numbers of applications, amounts chemical applied, etc, until 2010. In 2010, 6,422 ha of strawberry fruit were treated with 1,3-D in California (DPR-PUR). In that year, some growers used Inline (228 applications at an average dose rate of 182 kg/ha) and other growers used PicClor60 (333 applications at an average dose rate of 112 kg/ha). The overall application of 1,3-D on strawberry fruit was 874,217 kg. • USG provided information to MBTOC during its 2012 spring meeting: <ul style="list-style-type: none"> ○ The accumulated total kg 1,3-D that 35 townships can get is $(35 * 40,974 =) 1,434,090$ kg. It could be assumed that non-strawberry crops consume a significant amount of this township cap. ○ 1,3-D bed-top drip applications can be calculated at 75 kg/ha and an AF of 1.16, which means that per township $40,974 / (75*1.16) = 471$ ha could be treated ○ 1,3-D shank applications can be calculated at 125 kg/ha with an AF of 1.9, which means that per township $40,974 / (125*1.9) = 173$ ha could be treated • Assuming that the 2010 strawberry 1,3-D use amount of 874,217 kg is the overall township cap for strawberry fruit (we don't know whether there is further room for more use), then an overall maximum area of $874,217 / (75*1.16) = \mathbf{10,048}$ ha could be drip-treated with PicClor60. As MBTOC has agreed, some growers may need broadcast application, so a complete shift to PicClor60 drip should not be expected. Nevertheless, given these figures it is not unrealistic to expect further expansion of the 1,3-D treated area of strawberry fruit. • Average additional uptake of 1,3-D/Pic since 2003 has been 632 ha / year. A transition of a third to half of this historical uptake would lead to a total area under 1,3-D in 2014 of below 7500 ha, well below the margin described above. Therefore, an additional annual transition to 1,3-D on an extra 211 ha or more can be expected. 2. Further uptake of Pic-straight with dose rates below the regulatory restrictions: <ul style="list-style-type: none"> • In 2010, 2,405 ha strawberry fruit used Pic Straight, almost exclusively in Orange/San Diego and Oxnard districts (DPR-PUR). Applicant implies that permits are needed when Pic Straight is applied at rates above 200 lbs/acre. In 2010, the applied dose rates are on average 181 kg/ha which is well below 200 lbs/acre = 224 kg/ha. • Given the trend in adoption of Pic Straight over previous years (average additional uptake of 198 ha/year since 2003) under existing regulatory barriers, further adoption of Pic straight on strawberry fruit should be expected. An additional annual transition to Pic-Straight can be expected of on an average extra 198

No	Decision agreed by the Parties	The applicant demonstrates that ...	Indicators of performance	Review and assessment, including the extent to which information was provided to MBTOC ⁸
				<p>ha.</p> <p>3. Further uptake of non-chemical alternatives</p> <ul style="list-style-type: none"> • Organic production is expected in new areas of production, as we know that strawberry fields are often rotated in the area. The organic strawberry area increased from 245 ha in 2003 to 790 ha in 2012, and so increased on average 61 ha per year over the past 9 years. It is not unrealistic to expect that this trend will continue over the next years • Research has produced successful results of steam and ASD. Some organic growers will adopt these methods, which are expected to be attractive too for treatment of buffer zones where chemical treatments are restricted. • Steam: new boilers of much lower costs and much improved speed are now operational in Germany and elsewhere, in use in horticulture and tree nurseries, mushroom growing, viniculture and weed control in city cleaning. • An additional annual transition to non-chemical alternatives can be expected of at least 61 ha. <p>4. Further uptake of other alternatives, such as IPM which could include use of metam sodium in combination with crop rotation and/or use of resistant varieties.</p> <ul style="list-style-type: none"> • Data are unavailable to calculate potential further uptake of other alternatives. <p>Conclusion: A feasible additional annual adoption of 211 ha 1,3-D, 198 ha Pic-Straight and at least 61 ha non-chemical can be expected, which adds up to an annual transition of at least 470 ha. For lack of data, this calculation excludes any further transitions to other (combinations of) alternatives.</p>
12	Ex.I/4(3)(b)	Requires the use of expedited procedures , where possible, to develop, register and deploy technically and economically feasible alternatives.	Is there evidence of expedited procedures? What are the procedures for registering new alternatives? Are they faster than normal registration methods? Are the procedures in place locally and not just at the national level?	No evidence of expedited procedures

SUMMARY: US Strawberry fruit CUN2014

Source	Criteria	CUN assessment outcome	Source	Criteria	CUN assessment outcome	Source	Criteria	CUN assessment outcome
IX/6(1)(a)(ii); and XXI/11(9)	Technically and economically feasible alternatives	Alternatives are available	IX/6(1)(b)(iii); and XXI/11(9)	Evaluate, commercialise and secure national regulatory approval of alternatives	Partly done	Annex I (A) of MOP16 (21)	Significant market disruption	No evidence, contrary is argued in literature
IX/6(1)(b)(i); and XXI/11(9)	Minimize the methyl bromide critical use	Partly done	IX/6(1)(b)(iii); and XXI/11(9)	... a research programme is in place to develop alternatives	In place	Dec ExI/3, paragraph 9(h)	Methyl Bromide Alternatives Database	No update
IX/6(1)(b)(i); and XXI/11(9)	Minimise emissions	No effort made	IX/6(1)(b)(iii); and XXI/11(9)	... a research programme is in place to deploy alternatives	Not in place	Dec ExI/3, paragraph 9(h)	National Management Strategy	No update
IX/6(1)(b)(ii)	Stocks	Stocks are available				Annex I (A) of MOP16 (35)	Period of adoption calculations	No information provided, in 2014 an additional adoption on 470 ha is expected
						Ex.I/4(3)(b)	Expedited procedures	No information provided

ANNEX III - Part A: Trend in MB Preplant Soil Nominations and Exemptions

List of nominated (2005 – 2014) and exempted (2005 – 2013) amounts of MB granted by Parties under the CUE process for each crop.

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Australia	Cut Flowers – field	40.000	22.350									18.375	22.350								
Australia	Cut flowers – protected	20.000										10.425									
Australia	Cut flowers, bulbs – protected Vic	7.000	7.000	6.170	6.150							7.000	7.000	3.598	3.500						
Australia	Strawberry Fruit	90.000										67.000									
Australia	Strawberry runners	35.750	37.500	35.750	35.750	29.790	29.790	29.790	29.790	29.760	29.760	35.750	37.500	35.750	35.750	29.790	29.790	23.840+ 5.95	29.760	29.760	
Belgium	Asparagus	0.630	0.225									0.630	0.225								
Belgium	Chicory	0.600	0.180									0.180	0.180								
Belgium	Chrysanthemums	1.800	0.720									1.120									
Belgium	Cucumber	0.610	0.545									0.610	0.545								
Belgium	Cut flowers – other	6.110	1.956									4.000	1.956								
Belgium	Cut flowers – roses	1.640																			
Belgium	Endive (sep from lettuce)		1.650										1.650								
Belgium	Leek & onion	1.220	0.155									0.660									

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
	seeds																				
Belgium	Lettuce(& endive)	42.250	22.425									25.190									
Belgium	Nursery	Not Predictable	0.384									0.900	0.384								
Belgium	Orchard pome & berry	1.350	0.621									1.350	0.621								
Belgium	Ornamental plants	5.660										0.000									
Belgium	Pepper & egg plant	5.270	1.350									3.000	1.350								
Belgium	Strawberry runners	3.400	0.900									3.400	0.900								
Belgium	Tomato (protected)	17.170	4.500									5.700	4.500								
Belgium	Tree nursery	0.230	0.155									0.230	0.155								
Canada	Strawberry runners (PEI)	14.792	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.596	5.261	(a)14.792	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	
Canada	Strawberry runners (Quebec)		1.826	1.826								(a)	1.826	1.826							
Canada	Strawberry runners (Ontario)			6.129										6.129							
France	Carrots	10.000	8.000	5.000								8.000	8.000	1.400							
France	Cucumber	85 revised to 60	60.000	15.000								60.000	60.000	12.500							
France	Cut-flowers	75.000	60.250	12.000								60.000	52.000	9.600							

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
France	Forest tree nursery	10.000	10.000	1.500								10.000	10.000	1.500							
France	Melon	10.000	10.000									7.500	6.000								
France	Nursery: orchard, raspberry	5.000	5.000	2.000								5.000	5.000	2.000							
France	Orchard replant	25.000	25.000	7.500								25.000	25.000	7.000							
France	Pepper	Incl in.tomato cun	27.500	6.000									27.500	6.000							
France	Strawberry fruit	90.000	86.000	34.000								90.000	86.000								
France	Strawberry runners	40.000	4.000	35.000								40.000	40.000	28.000							
France	Tomato (and eggplant for 2005 only)	150(all solanaceo us)	60.500	33.250								125.000	48.400								
France	Eggplant		27.500	33.250									48.400								
Greece	Cucurbits	30.000	19.200									30.000	19.200								
Greece	Cut flowers	14.000	6.000									14.000	6.000								
Greece	Tomatoes	180.000	73.600									156.000	73.600								
Israel	Broomrape			250.000	250.000	125.000	12.500	12.500						250.000	250.000	125.000	12.500				
Israel	Cucumber - protected new 2007			25.000	18.750		18.750	12.500						25.000	18.750	-	15.937				
Israel	Cut flowers – open field	77.000	67.000	80.755	53.345	42.777	42.554	23.292				77.000	67.000	74.540	44.750	34.698	28.554				

Party	Industry	Total CUN MB Quantities										Total CUE Quantities								
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013
Israel	Cut flowers – protected	303.000	303.000	321.330	163.400	113.821	72.266	52.955				303.000	240.000	220.185	114.450	85.431	63.464			
Israel	Fruit tree nurseries	50.000	45.000	10.000								50.000	45.000	7.500						
Israel	Melon – protected & field	148.000	142.000	140.000	87.500	87.500	87.500	35.000				125.650	99.400	105.000	87.500	87.500	70.000			
Israel	Potato	239.000	231.000	137.500	93.750	75.000						239.000	165.000	137.500	93.750	75.000				
Israel	Seed production	56.000	50.000			22.400						56.000	28.000			NR				
Israel	Strawberries – fruit (Sharon)	196.000	196.000	176.200	64.125	52.250	47.500	28.500				196.000	196.000	93.000	105.960	42.750				
Israel	Strawberries – fruit (Sharon & Ghaza)																57.063			
Israel	Strawberry runners (Sharon)	35.000	35.000		20.000	15.800	13.570	13.500				35.000	35.000	28.000	31.900	15.825				
Israel	Strawberry runners and fruit Ghaza				87.875	67.500	67.500	34.000								47.250				
Israel	Strawberry runners (Sharon & Ghaza)																22.320			
Israel	Tomatoes			90.000										22.750						
Israel	Sweet potato					95.000	20.000	20.000							111.500	95.000	20.000			

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Italy	Cut flowers (protected)	250.000	250.000	30.000								250.000	187.000	30.000							
Italy	Eggplant (protected)	280.000	200.000	15.000								194.000	156.000								
Italy	Melon (protected)	180.000	135.000	10.000								131.000	131.000	10.000							
Italy	Pepper (protected)	220.000	160.000	67.000								160.000	130.000	67.000							
Italy	Strawberry Fruit (Protected)	510.000	400.000	35.000								407.000	320.000								
Italy	Strawberry Runners	100.000	120.000	35.000								120.000	120.000	35.000							
Italy	Tomato (protected)	1300.000	1030.00	418.000								871.000	697.000	80.000							
Japan	Cucumber	88.300	88.800	72.400	68.600	61.400	34.100	29.120	26.162			88.300	88.800	72.400	51.450	34.300	30.690	27.621			
Japan	Ginger – field	119.400	119.400	112.200	112.100	102.200	53.400	47.450	42.235			119.400	119.400	109.701	84.075	63.056	53.400	47.450			
Japan	Ginger – protected	22.900	22.900	14.800	14.800	12.900	8.300	7.770	6.558			22.900	22.900	14.471	11.100	8.325	8.300	7.036			
Japan	Melon	194.100	203.900	182.200	182.200	168.000	90.800	77.600	67.936			194.100	203.900	182.200	136.650	91.100	81.720	73.548			
Japan	Peppers (green and hot)	189.900	200.700	169.400	162.300	134.400	81.100	68.260	61.101			187.200	200.700	156.700	121.725	81.149	72.990	65.691			
Japan	Watermelon	126.300	96.200	94.200	43.300	23.700	15.400	13.870	12.075			129.000	98.900	94.200	32.475	21.650	14.500	13.050			
Malta	Cucumber		0.096										0.127								
Malta	Eggplant		0.128										0.170								

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Malta	Strawberry		0.160										0.212								
Malta	Tomatoes		0.475										0.594								
New Zealand	Nursery material	1.085	1.085										0								
New Zealand	Strawberry fruit	42.000	42.000	24.78								42.000	34.000	12.000							
New Zealand	Strawberry runners	10.000	10.000	5.720								8.000	8.000	6.234							
Poland	Strawberry Runners	40.000	40.000	25.000	12.000							40.000	40.000	24.500							
Portugal	Cut flowers	130.000	8.750									50.000	8.750								
Spain	Cut Flowers – Cadiz	53.000	53.000	35.000								53.000	42.000								
Spain	Cut Flowers – Catalonia	20.000	18.600	12.840	17						20.000	15.000	43.490								
					(+Andalucia)								(+Andalucia)								
Spain	Pepper	200.000	155.000	45.000								200.000	155.000	45.000							
Spain	Strawberry Fruit	556.000	499.290	80.000								556.000	499.290	0.0796							
Spain	Strawberry Runners	230.000	230.000	230.000	215.000							230.000	230.000	230.000							
UK	Cut flowers		7.560										6.050								
UK	Ornamental tree nursery	12.000	6.000									6.000	6.000								

Party	Industry	Total CUN MB Quantities										Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
UK	Strawberry (& raspberry in 2005)	80.000	63.600									68.000	54.500								
UK	Raspberry nursery		4.400									4.400	54.500								
USA	Chrys. Cuttings/roses	29.412										29.412	0								
USA	Cucurbits – field	1187.8	747.839	598.927	588.949	411.757	340.405	218.032	59.500	11.899		1187.800	747.839	592.891	486.757	407.091	302.974	195.698	59.500		
USA	Eggplant – field	76.761	101.245	96.48	79.546	62.789	34.732	21.561	6.904	1.381		76.721	82.167	85.363	66.018	48.691	32.820	19.725	6.904		
USA	Forest nursery seedlings	192.515	157.694	152.629	133.140	125.758	120.853	106.043				192.515	157.694	122.032	131.208	122.060	117.826	93.547			
USA	Ginger	9.2										9.2	0								
USA	Orchard replant	706.176	827.994	405.415	405.666	314.007	226.021	203.591	18.324	6.230		706.176	527.600	405.400	393.720	292.756	215.800	183.232	18.324		
USA	Ornamentals	210.949	162.817	149.965	138.538	137.776	95.204	70.178	48.164	48.164		154.000	148.483	137.835	138.538	107.136	84.617	64.307	48.164		
USA	Nursery stock - fruit trees, raspberries, roses	45.789	64.528	12.684	51.102	27.663	17.954	7.955	1.591	0.541		45.800	64.528	28.275	51.102	25.326	17.363	7.955	1.591		
USA	Peppers – field	1094.782	1498.53	1151.751	919.006	783.821	463.282	212.775	28.366			1094.782	1243.542	1106.753	756.339	548.984	463.282	206.234			
USA	Strawberry fruit – field	2468.873	1918.40	1733.901	1604.669	1336.754	1103.422	1023.471	753.974	531.737	415.067	2052.846	1730.828	1476.019	1349.575	1269.321	1007.477	812.709	678.004	415.067	
USA	Strawberry runners	54.988	56.291	4.483	8.838	8.837	7.381	7.381	3.752	3.752		54.988	56.291	4.483	8.838	7.944	4.690 + 2.018	6.036	3.752		

Party	Industry	Total CUN MB Quantities										Total CUE Quantities								
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013
USA	Tomato – field	2876.046	2844.985	2334.047	1840.1	1406.484	994.582	336.191	54.423	10.741		737.584	2476.365	2065.246	1406.484	1003.876	737.584	292.751	54.423	
USA	Turfgrass	352.194	131.600	78.040	52.189	0							131.600	78.04	0					
USA	Sweet potato	224.528			18.144	18.144	18.144	14.515	8.709						18.144	18.144	14.515	11.612		
USA	Research								2.768	2.768										

ANNEX IV– Part B: Trends in MB Structural and Commodity Nominations and Exemptions

List of nominated (2005- 2014) and exempted (2005 - 2013) amounts of MB granted by Parties under the CUE process for each commodity.

Party	Industry	Total CUN MB Quantities										Total CUE MB Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Australia	Almonds	1.900	2.100									1.900	2.100								
Australia	Rice consumer packs	12.300	12.300	10.225	9.200 +1.8	9.2	7.82	5.66	3.653	2.374	1.187	6.150	6.150	9.205	9.200	7.820	6.650	4.870	3.653	1.187	
Belgium	Artefacts and structures	0.600	0.307									0.590	0.307								
Belgium	Antique structure & furniture	0.750	0.199									0.319	0.199								
Belgium	Churches, monuments and ships' quarters	0.150	0.059									0.150	0.059								
Belgium	Electronic equipment	0.100	0.035									0.100	0.035								
Belgium	Empty silo	0.050	0.043									0.050	0.043								
Belgium	Flour mill see mills below	0.125	0.072									See mills below	0.072								
Belgium	Flour mills	10.000	4.170									9.515	4.170								
Belgium	Mills	0.200	0.200									0.200	0.200								
Belgium	Food processing facilities	0.300	0.300									0.300	0.300								

Party	Industry	Total CUN MB Quantities										Total CUE MB Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Belgium	Food Processing premises	0.030	0.030									0.030	0.030								
Belgium	Food storage (dry) structure	0.120	0.120									0.120	0								
Belgium	Old buildings	7.000	0.306									1.150	0.306								
Belgium	Old buildings and objects	0.450	0.282									0	0.282								
Belgium	Woodworking premises	0.300	0.101									0.300	0.101								
Canada	Flour mills	47.200	34.774	30.167	28.650	26.913	22.878	14.107	11.020	7.848	5.044	(a)47	34.774	30.167	28.65	26.913	22.878	14.107	11.020	5.044	
Canada	Pasta manufacturing facilities	(a)	10.457	6.757	6.067	4.740	4.740	2.084				(a)	10.457	6.757	6.067	4.740	3.529				
Canada	Commodities					0.068															
France	Seeds sold by PLAN-SPG company	0.135	0.135	0.100								0.135	0.135	0.096							
France	Mills	55.000	40.000	8.000								40.000	35.000	8.000							
France	Rice consumer packs	2.000	2.000									2.000	2.000								
France	Chestnuts	2.000	2.000	1.800								2.000	2.000	1.800							
Germany	Artefacts	0.250	0.100									0.250	0.100								

Party	Industry	Total CUN MB Quantities										Total CUE MB Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Germany	Mills and Processors	45.000	19.350									45.000	19.350								
Greece	Dried fruit	4.280	3.081	0.900								4.280	3.081	0.450							
Greece	Mills and Processors	23.000	16.000	1.340								23.000	15.445	1.340							
Greece	Rice and legumes		2.355										2.355								
Ireland	Mills		0.888	0.611									0.888								
Israel	Artefacts	0.650	0.650	0.600								0.650	0.6500								
Israel	Dates (post harvest)	3.444	3.444	2.200	1.800	2.100						3.444	2.755	2.200	1.800	2.100	1.040				
Israel	Flour mills (machinery & storage)	2.140	1.490	1.490	0.800	0.300						2.140	1.490	1.040	0.312	0.300					
Israel	Furniture-imported	1.4220	1.4220	2.0420								1.4220	0								
Italy	Artefacts	5.500	5.500	5.000								5.225	0	5.000							
Italy	Mills and Processors	160.000	130.000	25.000								160.000	65.000	25.000							
Japan	Chestnuts	7.100	6.500	6.500	6.300	5.800	5.400	5.350	3.489	3.317		7.100	6.800	6.500	6.300	5.800	5.400	5.350	3.489		
Latvia	Grains		2.502										2.502								
Netherlands	Strawberry runners post harvest		0.120	0.120		0.120							0	0.120							
Poland	Medicinal herbs & dried mushrooms as dry commodities	4.000	3.560	1.800	0.500							4.100	3.560	1.800	1.800						

Party	Industry	Total CUN MB Quantities										Total CUE MB Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Poland	Coffee, cocoa beans	(a)	2.160	2.000	0.500								2.160	1.420	1.420						
Spain	Rice		50.000										42.065								
Switzerland	Mills & Processors	8.700	7.000									8.700	7.000								
UK	Aircraft			0.165										0.165							
UK	Mills and Processors	47.130	10.195	4.509								47.130	10.195	4.509							
UK	Cereal processing plants		8.131	3.480					(a)				8.131								
UK	Cheese stores	1.640	1.248	1.248								1.640	1.248	1.248							
UK	Dried commodities (rice, fruits and nuts) Whitworths	2.400	1.256									2.400	1.256								
UK	Herbs and spices	0.035	0.037	0.030								0.035	0.037								
UK	Mills and Processors (biscuits)	2.525	1.787	0.479								2.525	1.787								
UK	Spices structural equip.	1.728										1.728	0	0.479							
UK	Spices stored	0.030										0.030	0								
UK	Structures buildings (herbs and spices)	3.000	1.872	0.908								3.000	1.872	0.908							

Party	Industry	Total CUN MB Quantities										Total CUE MB Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	
UK	Structures, processors and storage (Whitworths)	1.100	0.880	0.257								1.100	0.880	0.257							
UK	Tobacco equipment	0.523										0.050									
UK	Woven baskets	0.770										0.770									
USA	Dried fruit and nuts (walnuts, pistachios, dried fruit and dates and dried beans)	89.166	87.719	91.299	67.699	58.912	19.242	10.041	2.419	0.822	0.740	89.166	87.719	78.983	58.921	45.623	19.242	5.000	2.419	0.740	
USA	Dry commodities/ structures (cocoa beans)	61.519	61.519	64.028	52.256	51.002						61.519	55.367	64.082	53.188						
USA	Dry commodities/ structures (processed foods, herbs and spices, dried milk and cheese processing facilities) NPMA	83.344	83.344	85.801	72.693	66.777	37.778	17.365	0.200			83.344	69.118	82.771	69.208	54.606	37.778	17.365			
USA	Smokehouse hams (Dry cure pork products) (building and product)	136.304	135.742	40.854	19.669	19.699	4.465	3.730	3.730	3.730	3.730	67.907	81.708	18.998	19.699	18.998	4.465	3.730	3.730	3.730	
USA	Mills and Processors	536.328	505.982	401.889	362.952	291.418	173.023	135.299	74.51	25.334	22.800	483.000	461.758	401.889	348.237	291.418	173.023	135.299	74.510	22.800	
USA	Research								0.159	0.159											