MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

UNEP

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

VOLUME 2

MAY 2015

EVALUATION OF 2015 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE

INTERIM REPORT

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

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Reproduction: UNON Nairobi

Date: May 2015

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

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fax: + 44 1438 748844

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

ISBN: 978-9966-076-11-3

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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.

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MAY 2015 REPORT OF THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

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INTERIM REPORT

MBTOC INTERIM CUN REPORT – MAY 2015

Common Acronyms

1,3-D	1,3-dichloropropene
A5	Article 5 Party
ASD	Anaerobic soil disinfestation
CUE	Critical Use Exemption
CUN	Critical Use Nomination
DMDS	Dimethyl disulphide
DOI	Disclosure of Interest
EU	European Union
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
MITC	Methyl isothiocyanate
MOP	Meeting of the Parties
MS	Metham (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

2015 Evaluation of Critical Use Nominations for Methyl Bromide and Related Matters – Interim Report

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2015 Evaluation of Critical Use Nominations for Methyl Bromide and Related Matters

1.1 Scope of the Report

The 2015 interim report provides evaluations by MBTOC of Critical Use Nominations (CUNs) submitted for methyl bromide (MB) for 2016 and 2017 by seven Parties: three non-A5 (Australia, Canada and USA) and fourA5 (Argentina, China, Mexico and South Africa). As per provisions set out in Decision IX/6 (Annex I, MOP16), CUNs were required to be submitted by the Parties to the Ozone Secretariat in accordance with the timetable shown in paragraph 1 of Annex I, Decision XVI/4. One Party failed to meet these guidelines, however MBTOC still did its best to evaluate this nomination and provide a recommendation. Now that the process is better known, A5 Parties are requested to meet the deadlines as set out by the Parties in Annex 1. Given that January 1st, 2015 was the deadline for phasing-out methyl bromide in A5 Parties, they are now able to submit CUNs according to the provisions set out in the Protocol.

This report also provides; 1) interim recommendations for the CUNs for which the Parties provided information as per the timelines set at the 26th Meeting of the Parties, 2) information from Parties on stocks (Decision Ex.1/4 (9f)), 3) partial information on actual MB consumption for critical uses (in accordance with Decision XVII/9), and 4) indication of adoption rates of alternatives, as evidenced by trend lines on reduction of MB for 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 may have been available for use, although for non A5 Parties stocks are now small (see Table 1-3). MBTOC notes that stock volumes have significantly decreased in recent years.

Standard presumptions used in the 2015 round were the same as those used in the 2014 evaluations of the CUNs. These have not changed for many years but they are nevertheless subjected to continual review. However, any changes proposed by MBTOC are required to be approved by the Parties 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 1stJanuary 2005. The same requirements apply to Parties operating under Article 5(1) after 1stJanuary 2015. 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 of the Protocol, which all critical uses need to meet in order to qualify for an exemption (see Annex 1 of this report). TEAP and its MBTOC have provided guidance to the Parties on recommendations regarding 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, XXIII/4,XXIV/5 and XXV/4).

Decision XXIV/5 differed from past decisions in that it reinforced that Parties '*take all reasonable steps to explore further the possibility of transitioning to technically and economically feasible alternatives… and to ensure that the Methyl Bromide Technical Options Committee is fully aware of these efforts*'.

Decision XXV/4 requests Australia and Canada to submit, by the 36th OEWG (now 37th), the available results of their research programmes on alternatives to MB to the TEAP for its consideration. It is anticipated that TEAP will consider the progress presented by Parties in response to this decision when making its final recommendations. This same Decision further requests TEAP to analyse the impact of national, subnational and local regulations and law on the potential use of

methyl bromide alternatives, to report annually on the status of re-registration and review of methyl bromide uses for the applications reflected in the CUNs, including any information on health effects and environmental acceptability and 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.

MBTOC considers that any chemical or product registered for a particular use has been through the rigours of the national local regulatory authorities and accepts that these fall within guidelines for health effects and environmental acceptability. MBTOC particularly takes note of those products, which are generally listed in any CUN application.

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. When the requirements of Decision IX/6 are not met, MBTOC does not 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 16thMeeting of the Parties.

MBTOC recommended less MB than requested in a CUN when technically and economically feasible alternatives were considered to be available or, when the Party failed to show that there was no technically and economically feasible alternative for part of the nomination. MBTOC may have accepted that some allocation was appropriate to permit timely phase out of MB. In this round, MBTOC did not recommend two nominations as important information essential to the assessment had not been supplied and the nomination did not meet the requirements of Decision IX/6. In this round of CUNs, as in previous rounds, MBTOC considered all information provided by the Parties, including answers to questions from MBTOC and all additional information submitted by the Parties up to the date of the evaluation.

Now that technically and economically feasible alternatives have been identified for virtually all applications of MB, regulations on the use of these alternatives often determine their availability to the end users. In view of the large numbers of sectors which have moved effectively to alternatives, it was particularly important in this round for the Parties, and particularly for A5 Parties submitting CUNs, to clearly identify why MB is considered critical for the specific circumstances of the nomination. Comparative information on the economic feasibility/infeasibility of the use of alternatives with respect to MB is also becoming more critical to the outcomes of present and future CUNs. In particular, MBTOC needs annual updates of the economics information evaluating the costs of alternatives.

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), XXIII/4(4), XXIV/5 and XXV/4 set out provisions which request Parties to submit by 1st February each year information on how criteria in IX/6(1) are 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 MB 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 tables of the historic amounts of MB nominated and agreed for each critical use (Annexes III and IV). Additionally Parties provide

accounting frameworks on amounts used for critical uses and stocks as required under Dec Ex.1/4 (9f). (Table 1-3). The same requirements apply to A5 Parties after 2015.

For 2014, the Meeting of the Parties (MOP) authorised Australia to use 29.760 tonnes of MB for strawberry runners and rice 1.187 tonnes. The Party reported that 30.428 tonnes was used for the critical uses in 2014. For Canada in 2014, the MOP authorised 5.261 tonnes for strawberry runners and 5.044 tonnes for mills and the Party reported that 8.360 tonnes was used for the critical uses in 2014. For the United States in 2014, the MOP authorised 231.540 for strawberry fruit production and 3.730 tonnes for use on dry cure pork (Annex III and IV). In their allocation regulation for critical uses, the Party reported that 415,067 tonnes and 373,660 tonnes in 2014 and 2015 respectively, had been approved for pre-plant soil uses and postharvest uses respectively (Federal Register79, No. 147 July 31, 2014).

This is the second year that A5 Parties have submitted CUNs. Under Decision Ex1/4. (9f) those A5 Parties which are granted critical uses need to provide accounting frameworks for these uses in this round (2015) and in future years if CUNs are again submitted.

1.2.4 Trends in Methyl Bromide Use for CUEs since 2005

Decision XVII/9 requires TEAP to show trends in the phase out of the critical uses of MB (Fig 1-1 and Fig 1-2, Annexes III and IV). Since 2005, there has been a progressive downward trend in the amounts of MB requested for CUNs by all Parties for both soil and post- harvest uses, although this has occurred at different rates. Figs 1-1 and 1-2 show reduction trends in amounts approved/nominated by Parties for 'Critical Use' from 2005 to 2016 for all the remaining soil and commodity uses in non-A5 Parties. A5 Party trends will be added in the next round in 2016 when sufficient data to show trends becomes available. The complete trends in phase out of MB by country, as indicated by change in CUE, are shown in Annexes III and IV.

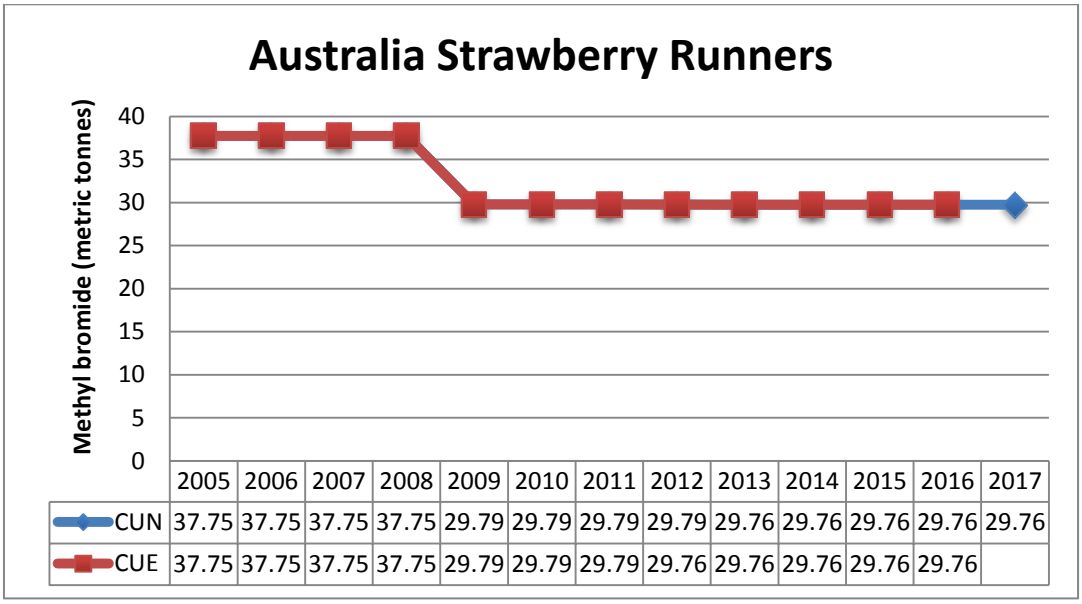
The nominated amounts and the apparent rate of reduction in MB or adoption of alternatives achieved by Parties are shown in Table 1-4, as well as Figures 1-1 and 1-2. It is noted that for those non-A5 countries that have pre-2005 stocks of MB that are being drawn down, the reductions in CUEs from year to year cannot be taken directly as evidence of adoption of alternatives since pre-2005 stocks may have been used (or may still be used) in the same sectors.

1.2.5 Disclosure of Interest

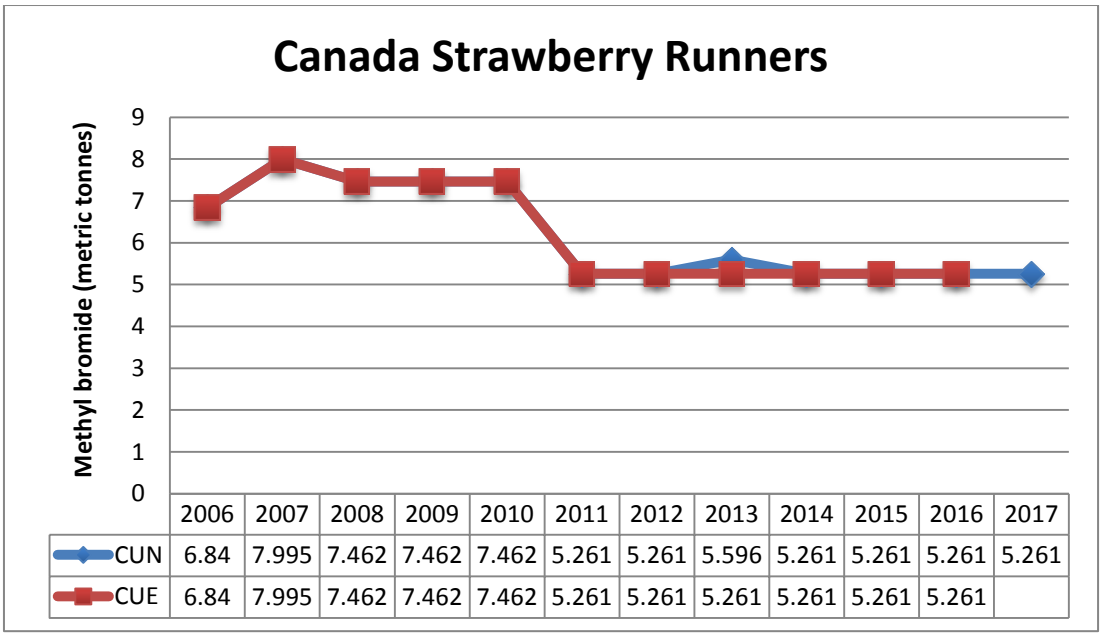
As in past reports, MBTOC members were requested to update their disclosure of interest forms relating specifically to their level of national, regional or enterprise involvement for the 2014CUN process. The Disclosure of Interest declarations for 2015, updated in March 2015can be found on the internet at http://ozone.unep.org/new_site/en/disclosure_of_interest.php?body_id=6&committee_id=6 and a list of members in this report. As in previous rounds, some members withdrew from or abstained to participate in 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 further briefed members of recent updates introduced by the Parties to the Terms of Reference (TOR) of the TEAP/TOC, as per recent Decisions XXIV/8 and XXV/6.

Figure 1-1. Amounts of MB nominated and exempted for CUE uses in nominated preplant soil sectors from 2005 to 2017. Blue lines indicate the trend in CUN MB nominated and the red lines the amount of CUE MB approved by the Parties

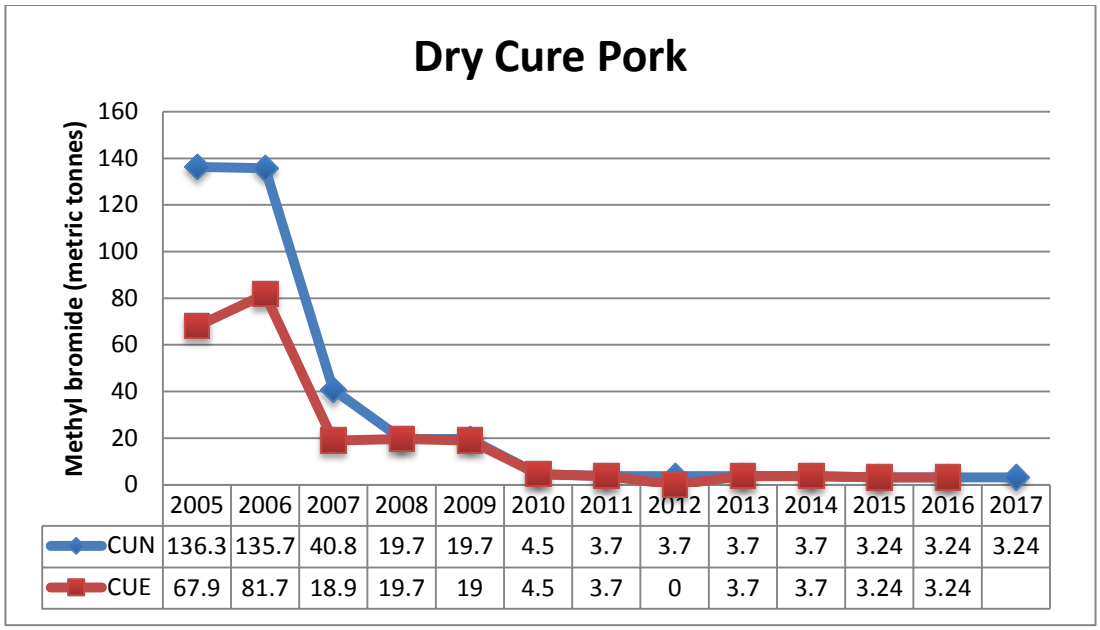


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CUN	37.75	37.75	37.75	37.75	29.79	29.79	29.79	29.79	29.76	29.76	29.76	29.76	29.76
CUE	37.75	37.75	37.75	37.75	29.79	29.79	29.79	29.76	29.76	29.76	29.76	29.76	



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CUN	6.84	7.995	7.462	7.462	7.462	5.261	5.261	5.596	5.261	5.261	5.261	5.261
CUE	6.84	7.995	7.462	7.462	7.462	5.261	5.261	5.261	5.261	5.261	5.261	

Figure 1-2. Amounts of MB nominated and exempted for CUE uses in dry cure pork from 2005 to 2017. Blue lines indicate the trend in the CUN MB nominated and the red lines the amount of CUE MB approved by the Parties



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CUN	136.3	135.7	40.8	19.7	19.7	4.5	3.7	3.7	3.7	3.7	3.24	3.24	3.24
CUE	67.9	81.7	18.9	19.7	19	4.5	3.7	0	3.7	3.7	3.24	3.24	

1.2.6 Article 5 issues

MB was due to be fully phased out in A5 Parties by January 1, 2015, 10 years after full phase out 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.

By end of 2013 (the last date for which full official reporting information is available), approximately 85% of the controlled consumption in A5 Parties had been phased out, ahead of the 2015 deadline. This was achieved largely as a result of investment projects implemented by the Montreal Protocol agencies, with MLF funding, bilateral cooperation and also national funding. The large majority of A5 Parties still reporting MB consumption in 2013 had agreements in place with the Executive Committee for full phase-out of MB by 1st January 2015 at the latest. These were usually accompanied by a commitment from the Party in question to put in place policy packages to restrict consumption and imports of MB for controlled uses after the phase-out. MBTOC notes that all A5 Parties submitting CUNs in this round (except South Africa) have received substantial funding from the MLF for complete phase-out of MB in their countries by 1st January 2015 at the latest, sometimes earlier.

MBTOC did note that some studies in some sectors included in MLF projects did not commence till relatively late in the project (i.e. 2012), however the evaluation of particular alternatives generally has occurred for a long time. MBTOC considered that at least for the latter case, that data from the country should be supplied showing that alternatives were ineffective and a critical use could be justified.

1.2.6.1. Reporting requirements and agreed conditions under Decision Ex.1/4

Decision Ex. I/4 taken at the 1st Extraordinary Meeting of the Parties (2004) set forth a series of requirements from Parties requesting CUNs after the phase out date, which non-A5 Parties have fulfilled over the past decade and now become relevant for A5 Parties. This Decision also includes some agreed conditions for requesting continuing CUNs.

Such requirements are fully considered by MBTOC during its CUN evaluations and also when preparing the 'Handbook of CUN nominations'. The following list has been prepared to assist A5 Parties with the preparation of CUNs.

The full text of Dec. Ex.I/4 is included in the Appendix II of this report for reference. In synthesis, Parties for which a CUE has been approved need to submit the following materials to the Ozone Secretariat (dates in brackets have been inserted by MBTOC so they apply to the A5 timeline):

> 1. *Information before 1 February 2005 [2015] on the alternatives available, listed according to their pre-harvest or post-harvest uses and the possible date of registration, if required, for each alternative;*
>
> 2. A ***national management strategy*** *for phase-out of critical uses of methyl bromide before 1 February 2006 [2016]. The management strategy should aim, among other things:*
>
> a. *To avoid any increase in methyl bromide consumption except for unforeseen circumstances;*
>
> b. *To encourage the use of alternatives through the use of expedited procedures, where possible, to develop, register and deploy technically and economically feasible alternatives;*
>
> c. *To provide information, for each current pre-harvest and post-harvest use for which a nomination is planned, on the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, to bring forward the time when it is estimated that methyl bromide consumption for such uses can be reduced and/or ultimately eliminated;*
>
> d. *To promote the implementation of measures which ensure that any emissions of methyl bromide are minimized;*
>
> e. *To show how the management strategy will be implemented to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible alternatives are available, in particular describing the steps which the Party is taking in regard to subparagraph (b) (iii) of paragraph 1 of decision IX/6 in respect of research programmes in non-Article 5 Parties and the adoption of alternatives by Article 5 Parties;*

1.2.7 Consideration of Stocks, Decision Ex.1/4 (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 non-A5 Parties in the first year for accounting in 2006, and then reports submitted in 2013 and 2014 are summarized in Tables 1-1 to 1-3 below. Similar data for A-5 Parties will be available as of 2016.

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 exempted 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, 2013 and 2014 as required under Decision XVI/6. The earlier CUN reports identified 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

(a) 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 2013, as reported by Parties in 2013 under Decision XVI/6.

Party	Critical use exemption authorized by MOP for 2013	Quantity of MB as reported by Parties (metric tonnes)				
		Amount on hand at start of 2013	Quantity acquired for CUEs in 2013 (production +imports)	Amount available for use in 2013	Quantity used for CUEs in 2013	Amount on hand at the end of 2013
Australia	32.134	0	31.523	31.523	31.523	0
Canada	13.109	0.916	11.951	12.867	11.460	1.407
Japan	3.317	0.816	1.190	2.006	1.667	0.339
USA	562	?[(c)] 627[(a)]	562	1189	562	?[(c)] 357[(b)]

(a) Amount of pre-2005 stocks available at the start of 2013
(b) Amount of pre-2005 stocks available at the end of 2013
(c) Amount of post 2005 stocks are not reported

Table 1-3. Quantities of MB 'on hand' at the beginning and end of 2014, as reported by Parties in 2014under Decision XVI/6.

Party	Critical use exemption authorized by MOP for 2014	Quantity of MB as reported by Parties (metric tonnes)				
		Amount on hand at start of 2014	Quantity acquired for CUEs in 2014(production +imports)	Amount available for use in 2014	Quantity used for CUEs in 2014	Amount on hand at the end of 2014
Australia	30.947	0	30.428	30.428	30.428	0
Canada	10.305	1.407	8.424	9.831	8.360	1.471
USA	442	327	442	799	356	140

(a) Amount of pre-2005 stocks available at the start of 2014
(b) Amount of pre-2005 stocks available at the end of 2014
(c) Amount of post 2005 stocks are not reported

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

	Quantities Nominated													Quantities Approved											Interim rec.
Party	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**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 (24MOP)**	**2015 (25 MOP)**	**2016 (26 MOP)**	**2016 or 2017**
Australia	206.950	81.250	52.145	52.900	38.990	37.610	35.450	34.660	32.164	30.947	29.79	29.79	29.79	146.600	75.100	48.517	48.450	37.610	36.440	28.710	31.708	32.134	30.947	29.79	29.79	[29.79]
Canada	61.992	53.897	46.745	42.241	39.115	35.080	19.368 +3.529	16.281	13.444	10.305	5.261	5.261	5.261	61.792	53.897	52.874	36.112	39.020	30.340 +3.529	19.368	16.281	13.109	10.305	5.261	5.261	[Unable]
EC[1]	5754.361	4213.47	1239.873	245.00	0	0	0	0	0	0	0	0	0	4392.812	3536.755	689.142	245.146	0	0	0	0	0	0	0	0	0
Israel	1117.156	1081.506	1236.517	952.845	699.448	383.700	232.247	0	0	0	0	0	0	1089.306	880.295	966.715	860.580	610.854	290.878	0	0	0	0	0	0	0
Japan	748.000	741.400	651.700	589.600	508.900	288.500	249.420	221.104	3.317	0	0	0	0	748.000	741.400	636.172	443.775	305.380	267.000	239.746	219.609	3.317	0	0	0	0
New Zealand	53.085	53.085	32.573	0	0	0	0	0	0	0	0	0	0	50.000	42.000	18.234	0	0	0	0	0	0	0	0	0	0
Switzerland	8.700	7.000	0	0	0	0	0	0	0	0	0	0	0	8.700	7.000	0	0	0	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	377.170	234.78	3.240	9552.879	8081.753	6749.060	5355.976	4261.974	3232.856 +2.018	2055.200	993.706	562.328	442.337	377.170	234.780	[3.249]
Argentina	-	-	-	-	-	-	-	-	-	-	245	223		-	-	-	-	-	-	-	-	-	-	170		[40+Unable]
China	-	-	-	-	-	-	-	-	-	--	120	114		-	-	-	-	-	-	-	-	-	-	114		[99.75]
Mexico	-	-	-	-	-	-	-	-	-	-	140	120.978		-	-	-	-	-	-	-	-	-	-	84.957		[84.957]
South Africa	-	-	-	-	-	-	-	-	-	-	-	81.60														[74.062]
TOTALS	**18704.241**	**15617.837**	**10677.552**	**8297.739**	**6244.487**	**4044.380**	**2928.142**	**1460.163**	**740.533**	**483.589**	**917.191**	**266.561**	**266.561**	**16050.089**	**13418.200**	**9160.714**	**6990.039**	**5,254.838**	**3572.183**	**2343.024**	**1261.304**	**610.888**	**483.589**	**412.221 + 368.957**	**269.941**	[302.018]

[1]Members 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 – 2015 Round for 2016 and 2017 Exemptions

Most Parties requesting CUNs in 2015 sent information to the Ozone Secretariat by the January 24, deadline, however one Party did not meet the deadline and also failed to provide the necessary information for the CUN assessment. After repeated requests, the Party finally supplied information in April, three months after the deadline. In future, Parties are requested to respect the timetables as specified by the Parties in their relevant decisions and MBTOC for the submission of additional information.

Information on CUNs was forwarded by the Secretariat to MBTOC co-chairs, who in turn provided this information to MBTOC members for preliminary assessment and to confirm that it complied with requirements of Decision IX/6 and Annex 1 of the 16th MOP. Where some evidence was missing, MBTOC requested further information of the Parties prior to the interim assessment. Detailed interim assessments of all CUNs were conducted by MBTOC at a meeting in Manila (The Philippines) from 23-27 March 2015. The meeting was attended by 18 MBTOC members with expertise in soils, SC and QPS applications of methyl bromide. MBTOC worked as a single body, not in sub-committees. The three co-chairs appointed working groups to address the different tasks assigned to MBTOC including CUNs, but also others as included in its Progress Report. Recommendations were discussed and signed off in plenary and by consensus. Comments made by members not attending the meeting were considered during evaluations. This scheme allowed members with specific expertise to make contributions where they were most useful and for all the committee to fully participate in the decision making process.

During the meeting, MBTOC held a teleconference with the US delegation with participation of experts from the USA on alternatives for the ham sector. MBTOC also conducted a field visit to irradiation facilities offering an alternative to MB use for QPS purposes and to the International Rice Research Institute where overviews of their research on sustainable rice production, soil management and Panama disease of bananas were given.

For preplant soil use of MB, Australia and Canada submitted CUNs for identical amounts to the previous rounds, highlighting difficulties with phase out of MB for the strawberry runners sector in particular. With respect to A5 Parties, Argentina submitted CUNs for the strawberry fruit (open field) and tomato sectors (protected), China for both protected and field production of ginger and Mexico for raspberry and strawberry runners produced in the open field.

For MB use in the postharvest and structure sectors, three CUNs were received, one from the USA, for dry cure pork and two from South Africa for Mills and House disinfestation.

The total nominated amount for all countries for 2016 was 568.178 tonnes; all these nominations were for A5 Parties. For 2017, non-A5 Parties have nominated 38.261 tonnes, a reduction of 88% with respect to the previous year (this is largely due to the USA not submitting a CUN for strawberry fruit). MBTOC has recommended 229.561 tonnes for A5 Parties for 2016 and 33 tonnes for non-A5 Parties for 2017. Two nominations, one for 2016 (A5) and one for 2017 (non-A5) remain 'unable to assess' at this time. The grounds used for these recommendations are given in detail for the relevant CUNs in Tables 1-9, 1-10 and 1-11.

In general the CUNs were submitted due to the following alleged issues: regulatory restrictions that did not allow partial or full use of alternatives, difficulties in the scale-up of alternatives and that potential alternatives were considered uneconomical, insufficiently effective and/or were unavailable. 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, 1-10 and 1-11 provide this information for each CUN as prepared by the MBTOC economist. MBTOC notes the economic information supplied by the nominating Parties continued to improve in this round.

MBTOC also notes that some Parties required repeat sets of questions to be sent from MBTOC in order to provide supporting information for the nominations. This is not the correct process as the onus is on the Party to justify the need for MB as required to meet Decision IX/6. It is also important that data is provided with the initial nomination to demonstrate the lack of effectiveness of alternatives under the specific circumstances of the nomination, especially where alternatives, which are available in the country of the nomination, are widely adopted for the same sectors globally.

1.3.1 Critical Use Nomination Review

The meeting was 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 assessing the CUNs submitted in 2015, as in previous rounds, MBTOC applied as much as possible the standards contained in Annex I of the final report of the 16thMOP 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. The most recent CUE approved by the Parties for a particular CUN was used as baseline for consideration of continuing nominations, except in the case of the new nominations submitted for the first time, in this case from South Africa. In that case, however, historical MB use provided with the nomination was taken into account, even though there were difficulties with its interpretation.

In evaluating 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 to allow for continued production of that crop within 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% 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 (MBTOC, 2011).

The outcome of evaluations of CUNs for the soil and structural treatments are presented in Table 1.9, 1.10 and 1.11 below.

1.3.2 Achieving Consensus

In accordance with Decision XX/5(9) and subsequent Decisions (XXI/11(4), XXII/6(4) and XXIII/4(3) and XXIV/5 and 8)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….'.*

In keeping with this mandate as well as the new working scheme put in place by the co-chairs, all members were given access to the information and were able to discuss issues related to all nominations (either in person or by electronic means), but only those members able to physically participate in the meeting formed consensus. All views were discussed fully in plenary and issues debated until a consensus position was reached. No minority positions arose during the meeting.

Several members recused from recommendations on nominations as required by MBTOC's working procedures. These included Alejandro Valeiro (recusing from Argentina strawberry fruit and tomato), Cao Cao (China ginger),Eduardo Willink (Argentina strawberry fruit and tomato), Stappies Staphorst (South African mills and houses)and Ian Porter (Australian strawberry nurseries). Recusals took place either as a result of a member's disclosure in observance of MBTOC's guidelines or due to a voluntary self-recusal to avoid any perceived conflict of interest. One member was asked to rewrite his disclosure, but chose not to recuse from the CUN deliberations despite this being a requirement of TEAPs terms of reference.

1.4 MBTOC Soils: Interim Evaluations of 2015 Critical Use Nominations for Methyl Bromide for 2016 and 2017

1.4.1 Critical Use Nomination Assessment

Table 1.5 identifies the quantities recommended by MBTOC after consideration of all the information provided by the Parties requesting critical uses. In summary, the Australian and US nominations were recommended in full as the Parties gave sufficient substantiation that alternatives were economically infeasible or impacted by regulatory issues. The Canadian nomination was considered 'unable to assess' as the Party did not provide sufficient information to show that they are complying with Decision IX/6. The Argentinean tomato was reduced because it was considered that alternatives were available for a proportion of the nomination and the strawberry nomination was considered 'unable to assess' as the strawberry nomination lacked supportive information to demonstrate the unsuitability of alternatives. The CUNs submitted by China and Mexico were only partially recommended after adjustments related to MBCTOC's standard presumptions or to avoid contingency increases. Further clarification will be required if subsequent CUNs are submitted. The detailed descriptions can be found in Table 1-5.

Table 1-5. Summary of the interim recommendations (in square brackets) for CUE's for preplant uses of MB (tonnes) submitted in 2015 for 2016 and 2017

Country and Sector	**Article 5 Parties**		**Non A5 Parties**	
	Nomination by Party for 2016	**Interim Recommendation for 2016**	**Nomination by the Party for 2017**	**Interim Recommendation for 2017**
1. **Australia**				
Strawberry runners			**29.760**	**[29.760]**
2. **Canada**				
Strawberry runners			**5.261**	**[Unable]**
3. Argentina				
Tomato and pepper	**100**	**[45]**		
Strawberry fruit	**77**	**[Unable]**		
4. China				
Ginger, open field	**90**	**[78.75]**		
Ginger, protected	**24**	**[21]**		
5. Mexico				
Strawberry runners	**64.960**	**[43.539]**		
Raspberry runners	**56.018**	**[41.418]**		
TOTAL	**411.978**	**[229.707]**	**35.021**	**[29.760]**

1.4.2 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 2015 round were:

i) The Australian research program is trialling many options for replacement of MB and the Party is required to provide a full overview to the 37th OEWG in 2016.

ii) The Canadian nomination has been relying on a groundwater study to determine whether Pic can be registered on Prince Edward Island, but this study has again stalled. The Party further

states that no funding or research efforts have been out in place since June 2014. MBTOC considers this does not align with the requirements set forth by Decision IX/6.

iii) The Argentinian nominations are for sectors where a number of alternatives have been adopted in non A-5 Parties, however specific issues with cold soils and market windows are of concern for uptake of the major alternatives.

iv) Mexican raspberry and strawberry runner sectors developed recently and were incorporated into the MB phase-out project at a late stage. Two years results with alternatives are showing promise but more certainty is required.

v) The only chemical alternative available in China for ginger is chloropicrin. Initial results with this fumigant are encouraging, but time is needed to implement integrated control programs for the key pathogen *Ralstonia solanacearum*. Research shows good results with 1,3-D/Pic, but this mixture is not presently registered in China

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

1.4.3 General Comments on the Assessment for Preplant Soil Use

MBTOC continues to encourage Parties to consider a review of regulations covering the registration, use and adoption of alternatives, particularly those regarding barrier films to reduce dosage rates of MB and its alternatives, and associated emissions. 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 cases, the mandatory use of MB is specified at a high dosage, in some cases for treatment of certified propagation material. Also regulations on the use of alternatives or their lack of registration are preventing their uptake for a substantial proportion of the remaining CUNs for preplant soil use.

1.4.4 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".*

Where these have impacted a nomination, the Party or MBTOC may have adjusted quantities to allow for effective use of the alternative. A description of any changes has been made available in the CUN text boxes (Tables1.9and 1.11).

As requested for all nominations in the past, any future nominations submitted by any Party should include information on expected rates of adoption of alternatives following registration, in accordance with paragraphs 34-35 of Annex 1 of the 16thMOP, as this information would assist MBTOC in its evaluation of these CUNs.

1.4.5 Decision XXV/4

In response to Decision XXV/4 from the 25th MOP, MBTOC notes that all of the non-A5 nominations contained a discussion of national, subnational or local regulations impacting the potential use of alternatives to MB. In addition, both Non-A5 and A5 nominations contained information on the status of the registration of alternatives and substitutes for MB. These comments are summarized below for each Party.

1.4.5.1 Regulations impacting use of alternatives by country

- **Australia:** Methyl iodide has been withdrawn by the registrant from Australia and is no longer available to the strawberry runner industry. BOC/Linde ceased funding research on ethane dinitrile (EDN) for strawberry runners. Future development of EDN is uncertain.

Nordiko is no longer pursuing registration of methyl bromide recaptured on carbon due to inconsistency of formulation. Meanwhile trials to generate registration data for an 80:20 mix of chloropicrin/1,3-D are underway. Australia has a certification program in place to assure the sanitation of strawberry runners. Only certain fumigants and rates are approved for use by the authorities. Three years of studies have not demonstrated bio-equivalency between 20g/m^2 of MB and standard rates of 25g/m^2, so registration of the lower rate is not proceeding. Pic Plus®, while registered in Australia and part of an active research program, is not approved for use for certified runners at this time.

- **Canada:** Strawberry runners produced on Prince Edward Island are primarily exported to North Carolina in the USA. The runners must meet the phytosanitary requirements of Canada, the United States government and the North Carolina Department of Agriculture. Chloropicrin is still not permitted on Prince Edward Island and so is not available for use in strawberry runner production there. A protocol has been developed for a chloropicrin groundwater study. Depending on the results of the study, chloropicrin may be allowed for use on PEI in the future, however it is presently on hold. 1,3-D was de-registered in Canada after December 31, 2011. Re-evaluation of MITC generators is ongoing. A groundwater warning statement is currently on Canadian labels, which prevents the use of these products on PEI.

- **China:** The only registered alternative to MB for ginger in China is chloropicrin.

- **Argentina:** Chloropicrin is not registered as a stand-alone product in Argentina, but combinations of 1,3-D/pic products are registered. Dazomet is not registered for edible crops.

- **Mexico:** Chloropicrin alone, 1,3-D/Chloropicrin mixtures, metham sodium and dazomet are registered in Mexico. Dimethyl disulfide (DMDS) is now registered in Mexico.

- **South Africa**: Sulfuryl fluoride is not presently registered.

1.4.5.2 Health effects of MB use and environmental acceptability

Over the past two decades numerous studies have characterized the health hazards resulting from exposure to methyl bromide. Its acute and chronic toxicities are very high and in many countries it is classified as "toxicity class I". It is known as a developmental, neurologic and respiratory toxin (Gemill *et al*., 2013, De Souza *et al*., 2013, Bulathsinghala *et al.*, 2014). Other known target organs are the heart, adrenal glands, liver, kidneys and testis (Gemill *et al*., 2013).

Accidental exposure to high concentrations of MB has been reported in many instances including fumigation of museums in Japan (Yamano and Nakadate, 2006), when handling the fumigant in a manufacturing facility in India (De Souza *et al*., 2013), when opening imported freight containers (Baur *et al*., 2010) and even in a home used for vacations (Sass, 2015).

Recent research findings reinforce suggested links between exposure to MB and health problems, including increased risk of developing prostate cancer, derived from occupational and community exposure (Budnik *et al*., 2012, Alavanja *et al*., 2013, Cockburn *et al.*, 2011). In another study (Gemill *et al*., 2013), a correlation was found between impaired foetal growth during the third trimester and exposure to methyl bromide in residential areas

Risk of exposure is especially high when small disposable canisters (i.e. 500 to 750g) are used for MB fumigation for pre plant soil under plastic sheets (Yamano *et al*., 2001). Canister applications have been eliminated for soil use in all non-Article 5 and in many A5 countries as this application is considered to be less efficient than other methods for the control of soil borne pathogens. Besides, this treatment is considered to be more dangerous to workers than injection methods, because trained contractors are not generally involved in MB application. This practice is not considered as effective for pathogens' control as use of MB/Pic mixtures and also can lead to high emissions of MB as the

gas is released immediately beneath the plastic sheets. MB also notes that in some circumstances, MB can sometimes leak out from the canister. MBTOC notes with concern that canister use is still allowed for preplant use and quarantine uses in a number of A5 countries e.g. China, Egypt Jordan and Mexico.

The environmental acceptability of MB is handled by national regulatory authorities in each country**.**

1.4.6 Sustainable Alternatives for Preplant Uses

MBTOC urges Parties to consider the long term sustainability of treatments adopted as alternatives to MB. The combination of chemical and non-chemical alternatives in an IPM program provides excellent 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. soil less culture, grafting, solarisation, steam, bio-disinfestation 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.

MBTOC recognizes the potential benefit of the recent establishment of a California DPR "Strawberry Non Fumigant Workgroup" to evaluate and adopt further chemical and non-chemical technologies such as: anaerobic soil disinfestation; soilless substrate systems and steam (CDPR, 2013).

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 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 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/m^2) 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/m^2) 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

	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 ass 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 since 2009 (standard presumptions).

Film Type	**Maximum MB Dosage Rate (g/m^2) 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

1.4.7 Adjustments for Standard Dosage Rates using MB/Pic Formulations

As in previous assessments, 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 *et al.,* 2006; Santos *et al*., 2007; Hamill *et al.,* 2004; Hanson *et al.,* 2006), (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/m^2 (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/m^2 using standard PE films*

1.4.8 Use/Emission Reduction Technologies - Barrier films and dosage reduction

Decision XXI/11 (para 9) requested further reporting on Decision IX/6 to ensure Parties adopted emission controls where possible. For preplant soil use, this includes the use of barrier films or other mitigation strategies such as high moisture sealing and the 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.

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. A recent change in the regulations – presently allowing use of VIF in California - should lead to an increase in the adoption of barrier films in that State. 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.

As of December 1, 2012, EPA issued new set of soil fumigant product label changes, implementing important new protections for workers and bystanders. In the frame of these changes, the State of California now allows the use of VIF films for fumigation with MB, which were formerly prohibited (CDPR, 2012abc; EPA, 2013). Studies continue to show the advantages of barrier films and other technologies for reducing emissions and improving efficacy of alternatives as well as MB (Quin *et al*. 2013; Chellemi *et al*. 2013).

Table 1-9. Interim evaluation of CUNs from non A5 Parties for preplant soil use submitted in 2015 for 2017

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]	CUE for 2014 [10]	CUE for 201511	CUE for 2016[12]	CUN for 2017	MBTOC interim recommendation for 2017
Australia	Strawberry runners	35.750	37.500	35.750	35.750	29.790	29.790	29.790	29.760	29.760	29.760	29.760	29.760	29.760	[29.760]

MBTOC Interim Recommendation for 2017:

MBTOC recommends this nomination of 29.760 tonnes for 2017 on the understanding that efforts to find alternatives continue, and there is good progress with some alternatives (e.g. new application technologies for MITC generators; formulations of 1,3-D/Pic (TF-80®); EDN; etc.). The Party has submitted a new transition plan. MBTOC understands that certification authorities require at least two years of data demonstrating alternatives deliver equivalent efficacy to MB/Pic before changes to the rules of the Certification Scheme could be granted, but urges the Party to accelerate the schedule in order to phase out MB as soon as possible.

Nomination by the Party:

The quantity requested for this CUN is 29.760 tonnes, an amount that has remained unchanged for this industry since 2009.

Circumstances of the Nomination by the Party:

The Party states that the key pests affecting strawberry runner production are fungi (*Phytophthora, Pythium, Rhizoctonia* and *Verticillium spp*.) and weeds (*S. arvensis*, *Agrostistenuis* sp*, Raphanus* spp., *Poa annua, Cyperus* spp). The nomination is based on a "*unique*" soil and temperature situation: soils with very high clay and organic matter content requiring fumigation treatment under cold temperatures.

In its CUN the Party arguments that runner production under such conditions, requires treatment with MB:Pic (50:50 at a MB dosage of 25 g/m2) to meet the certification standards. The Victorian runner industry only produces runners in soils treated with MB:Pic, and is not using any other methods other than substrates for the foundation stock production stage . Some non-chemical alternatives are not feasible. Plant resistance is unreliable as an alternative to MB:Pic for delivering certified runners (Fang *et al* 2012). Integrated soil disinfestation with combinations of existing, registered fumigants is now considered the most likely and quickest approach for delivering a viable alternative to MB for the runner industry. The concept of the strategy is to apply low doses of existing registered fumigants (e.g. Pic, 1,3-D, and MITC generators) and herbicides (e.g. isoxaben, metolachlor, napropamide) in combinations that avoid potential crop phytotoxicity.

So far, results with Pic Plus®, show that this alternative needs the development of complementary treatments to improve the control of weeds and pathogens, and increase runner yields to a similar level as with the current MB based production system.

TF-80® (1,3-D/Pic, 20:80) showed great promise in trials in reducing the risk of phytotoxicity occurring in strawberry runners in Toolangi, Victoria because of its low concentration of 1,3-D. Co-application of alternative fumigants (Pic Plus® and TF-80®) with the herbicide isoxaben increased weed control and runner yields in replicated trials to levels equivalent to MB/Pic. Ethane dinitrile (EDN) shows promise for soil disinfestation if systems can be developed to retain this product for longer periods in soil. However, these products are not yet registered for soil disinfestation use in Australia. On the other hand, it appears that all fumigant alternatives showed lower pathogen control compared with MB/Pic. High levels of pathogen control are essential for production of certified runners of high health, and to manage the risk of litigation. To address this issue, new research in 2014/15 is investigating the co-application of

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]	CUE for 2014 [10]	CUE for 201511	CUE for 2016[12]	CUN for 2017	MBTOC interim recommendation for 2017
	specific fungicides, together with herbicides and alternative fumigants for improved pathogen control. Although the MB dosage rate exceeds MBTOC's standard presumption of 20 g/m^2, the lower rate is still unregistered in Australia. According to the Party, three years of trials with lower MB rates do not support bioequivalency of these rates. The Party insists that soilless systems are not yet technically feasible for adoption into generations beyond the foundation stock. **MBTOC interim assessment for MB use in this sector in 2017:** MBTOC still 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 certified nursery production system as well as stock plants resulting in healthy nursery material (López-Galarza *et al*, 2010, Rodríguez-Delfín 2012). MBTOC acknowledges that the Party has provided the economic analysis supporting their assertion that the expansion of the use of soilless substrates beyond the foundation stock could not be economically feasible. MBTOC also recommends that the Party address technical issues associated with the production of foundation stock using soilless systems to improve current yields and overcome the problems reported. While MBTOC once more recognizes the Party's past efforts in research and development of MB alternatives (Mattner, 2012)*, these efforts have not resulted in significant commercial uptake of alternatives. Furthermore, there have been essentially no significant reductions made for this production region since 2005 and no reduction in use rate as this is regulated by certification rules. MBTOC notes that after more than twelve years there is yet no plan to phase out MB for this sector. MBTOC urges the Party to accelerate the schedule in order to reduce this nomination and phase out MB and soon as possible. **MBTOC comments on Economics in 2015:** • A comprehensive economic analysis by the Party shows that while foundation stock can be grown in a soilless system, mother and certified stock cannot. According to the CUN the selling prices of mother and certified stock would have to increase almost 7 fold (from A$0.34 per runner to A$2.03 and A$2.00 per runner respectively) to break even. Both operating and capital costs are about five times higher with a soilless system. The main reason is the capital cost of setting up the soilless system and a yield loss of around 18%. Prices are assumed to stay the same for the two procedures. These differences do not include the compliance costs with municipal regulations, or the costs of waste treatment, but on the other hand the cost of using methyl bromide does not include the real cost of damage to the ozone layer. Soilless systems are more labour intensive, and labour costs in Australia are very high. With MB/Pic pre-plant soil treatment harvesting is done by machine, while with a soilless system it will be done by hand. The additional labour cost is already included in the operating costs and is a large reason for the discrepancy in operating costs. **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i)Emission reduction:** No, but the Party states that standard films perform the same as VIF for the reduction of emissions in the cold temperatures and heavy wet soils typical for strawberry runner production in Victoria. Party also states that use of VIF did not improve the efficacy														

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]	CUE for 2014 [10]	CUE for 201511	CUE for 2016[12]	CUN for 2017	MBTOC interim recommendation for 2017
	of reduced rates of MB to an acceptable level for the strawberry runner industry. • **Dec. IX/6 b(ii)Research program:** Approved and funded research program is currently in place at the time of this nomination. • **Dec. IX/6 b(iii) Appropriate effort:** Research effort is adequate - funded research program currently in place at the time of this nomination.														

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]	CUE for 2014[10]	CUE for 2015[11]	CUE for 2016[12]	CUN for 2017	MBTOC interim recommendation for 2017
Canada	Strawberry runners (PEI)	6.840	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	5.261	5.261	5.261	5.261	[U]

MBTOC Interim Recommendation for 2017:

MBTOC is unable to assess this nomination for 5.261 t for use in soils for growing strawberry runners on Prince Edward Island (PEI) in 2017.

MBTOC considers that, according to the nomination, there is no evidence that a research program is in place and that an appropriate effort to secure alternatives is being made as required by Dec. IX/6 b (iii). According to the nomination, the PEI Adapt Council funding has been discontinued with no new funding available since March 2014, and no further work has been pursued with an expert previously contacted. Since 2009, the Party has been relying on the adoption of Pic, but this has been held up by regulatory issues in PEI for the past 6 years. During this period, MBTOC has been requesting a clarification of why Pic is allowed to be used on PEI in MB/Pic formulations, but the reason is still unclear. MBTOC requires clarification of these issues to make a full assessment.

Nomination by the Party for 2017:

The Party has nominated 5.261 t of MB, which is the same amount granted as a CUE for 2016 and for all previous years CUEs since 2011. It is for use for multiplication on runners on 26.3 ha of land, which includes the two final stages of multiplication of plants exported from PEI. The nomination is based on a reduced rate of MB of 20 g/m² under high barrier films for the entire fumigated area (26.3 ha), which is consistent with MBTOC's standard presumptions.

Circumstances of the nomination by the Party:

The Party has attempted to replace MB with 1,3-D in the past, but it was banned for use in Prince Edward Island in January 2003 due to potential ground water contamination. Chloropicrin (PIC 100) is registered in Canada, but the PEI authorities have denied a permit for its use until further groundwater testing has been conducted. Long awaited studies on potential groundwater contamination of Pic 100 finally commenced in December 2013. However, following the launch of the study, Health Canada's Pest Management Regulatory Agency (PMRA) initiated a special review of chloropicrin as a result of the European Union's decision to prohibit its use. In June 2014, PEI authorities informed Environment Canada that they will not authorize the use of chloropicrin through the issuance of a research permit as part of the groundwater monitoring study until the PMRA's special review is completed. Given that the study cannot proceed without a research permit from the PEI Government to use chloropicrin, the study has been put on hold.

The company at PEI has tested organic production from 2006 - 2009 with different varieties, but found that significant reductions in yield resulted, ranging from 40% to 70%. Only one variety using the organic production system compared favourably to conventional production. MB:Pic 67:33 at 50 g/m^{2}is the only formulation and rate registered for use in strawberry runners in PEI, and although this exceeds MBTOC's standard presumption of 20 g/m^2 , the grower petitioned PMRA to use a lower rate under barrier films. PMRA, in the absence of a formal label amendment, granted permission to use a lower rate, but at the grower's own risk and liability. The CUN for 2017 is based entirely on a reduced rate for MB of 20 g/m^2 for the entire critical area (26.3 ha).

MBTOC interim assessment for MB use in this sector in 2017:

After thorough review of the information provided by the Party, MBTOC understands that the use of micro-propagated plants from USA and the scale up into soilless substrates for the first stage of multiplication of runners at PEI to produce approximately 60,000 runners have replaced or avoided the use of methyl bromide in stages for which MBTOC believes there are effective alternatives. The nomination is requesting MB for the final two multiplication stages.

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]	CUE for 2014[10]	CUE for 2015[11]	CUE for 2016[12]	CUN for 2017	MBTOC interim recommendation for 2017
	Canada considers the first stage of this field production and multiplication as foundation stock, however this is different nomenclature to other countries and this has caused some confusion in past years. Whilst soilless production is technically feasible for the later stages of production, MBTOC agrees from the information on economics that the use of soilless culture for the remaining runners may be uneconomical, but still considers this method could be feasible for part of the remaining nomination. For this reason, in previous years MBTOC agreed with the Party that the focus should be to find suitable alternatives for soil disinfestation and urged the Party to complete the groundwater studies to adopt chloropicrin either alone or in combination with other alternatives. But, since 2009, the official tests have not been done according to the nomination. MBTOC also notes the paradox that every year a 5.261 tonnes CUE is granted, the grower applies Terr-O-Gas® (67:33) containing 33% chloropicrin. In other words, even if the permit for testing chloropicrin is not granted, the nomination states almost 2.6 tonnes of the product are being used each year in mixes with MB. MBTOC notes that metham sodium, metham potassium and dazomet are also registered in Canada and could be considered for use in PEI if a permit is issued. The Party, however, admitted that grower's ability to find alternatives to methyl bromide is currently limited because many of the feasible alternatives used in other jurisdictions are either not registered in Canada or prohibited from use in PEI and, as such, they cannot be trialled. Also according to the nomination, the PEI Adapt Council funding has been discontinued with no new funding available since March 2014 and no further work has been pursued with an expert previously contacted as he has taken on a new role with less time available for research related to strawberry runner production. **MBTOC comments on economics in 2014 for 2017:** Canada's nomination is submitted mainly on the basis that there are no technically feasible alternatives or substitutes available to the growers that are acceptable from the standpoint of environment and health. In previous years, MBTOC has recommended that the grower transition to soilless substrates for 50% of its foundation stock, which was the equivalent to a reduction of 4% of the total amount requested. Canada's nomination has provided a justification as to why this transition is not economically viable. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i)Emission Reduction:** Yes, uses barrier films with a reduced application rate of MB conforming to MBTOC's presumptions • **Dec. IX/6 b(iii) Research Program:** No evidence was provided to prove that a research program is in place. The proposed groundwater studies for pic were halted, and no new alternatives are currently tested. • **Dec. IX/6 b(iii) Appropriate Effort:** The Party has not demonstrated that it is engaged in an active research program. According to the nomination, the groundwater studies were suspended, as the PEI permit was not granted. The PEI Adapt Council funding has been discontinued with no new funding available since March 2014. No further work has been pursued with an expert previously contracted as he has taken on a new role with less time available for research related to strawberry runner production.														

[1]1ExMOP and 16MOP; [2]16MOP+2ExMOP+17MOP; [3]MOP17+MOP18; [4]MOP18+MOP19; [5]MOP19+MOP20; [6]MOP20+MOP21; [7]MOP21+MOP22; [8]MOP22, [9]MOP23, [10]MOP24, [11]MOP25, [12]MOP26

Table 1.10 Interim evaluation of CUNs from A5 Parties for preplant soil use submitted in 2015 for 2016.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
Argentina	Tomato	100	100	45									

MBTOC Interim Recommendation for 2016:

MBTOC recommends a reduced nomination of 45 tonnes of MB for this use in 2016.

Nomination by the Party for 2016:

The Party nominated 100 tonnes of MB for critical uses for tomato production in protected cultivation in the critical regions of Mar del Plata and La Plata at the rate of 20 g/m^2 for use in 2016 .The target pests were nematodes (*Naccobus* spp. and *Meloidogyne* spp.), diseases [*Rhizoctonia* spp., *Sclerotinia* spp., *Phytophthora* spp., soil fungi disease complex (damping off) in seed beds and crops], weeds (*Cynodon, Cyperus*, etc.) and soil Insects (*Agrotis* sp., *Agriotes* sp., *Melolontha* sp.). MB is used in regions where cold and heavy clay soil conditions prevail, representing 31.25% of the total protected tomato production area.

Circumstances of the nomination by the Party:

The Party stated that 1,3-D/Pic did not provide sufficient control of key pests in the critical areas, mainly due to soil types, which were heavy clay soils and to soil temperatures (5 to 23 ºC). Chloropicrin alone did not control the entire pest complex including weeds and is not registered as a single product in Argentina. Metham sodium gave erratic and insufficient performance for weed and disease control, because the heavy clay soils inhibited movement of this fumigant throughout the soil. Dazomet is not registered for edible crops, plus trials with this fumigant showed insufficient nematode control. Long term efficacy was not enough for the dual cropping system (tomato and pepper). Steam was very costly and time consuming. Application with currently available equipment was extremely slow and size of equipment was too big for use inside greenhouses. Grafting is a fairly new technology for Argentina, with some commercial and native rootstocks presently under study. Availability of rootstocks in sufficient amounts could be problem. According to the Party, cold climate, heavy soil conditions and overlapping key production period make solarization and biofumigation unsuitable for the regions La Plata and Mar del Plata.

VIF and TIF are not presently produced in Argentina. Both products are fairly new, and depended on the imports of some raw materials not produced in Argentina. Due to difficulties in importing products to the country, it is not widely used and promoted.

MBTOC interim assessment for MB use in this sector in 2016:

The Party provided sufficient information on the historic cropping areas, MB usage, specific definition of the critical area, and reasons why alternatives to methyl bromide were not technically and economically feasible. Using the information provided in the nomination, MBTOC recommends 45 tonnes of MB as follows, For the CUN in 2016, the Party used a dosage rate of 35 g/m^2 and a formulation of 70:30 (MB:Pic). According to MBTOC's standard presumptions, the maximum dosage rate is 17.5 g/m^2 or half of the dosage rate on which the nomination is based. On these grounds, the nominated amount of 100 tonnes has been reduced by 50% to 50 tonnes. In addition, MBTOC considers that effective alternatives are available including grafting, resistant cultivars, and 1-3,D+Pic, and has made a further reduction of 5% of the nominated amount (5 tonnes) to allow for adoption of such alternatives. MBTOC considers that a 3 year adaptation period would allow the Party to adopt alternatives, gradually reduce MB use and finally phase out entirely.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
	Grafting tomatoes and peppers onto resistant rootstocks is an effective disease control method presently in use in many A5 countries such as China, Egypt, Lebanon, Mexico, Morocco, Romania, Tunisia and Turkey (MBTOC, 2011; 2015). This technology is mainly used to control a wide spectrum of vegetable diseases and nematodes in solanaceous and cucurbitaceous crops (Louws *et al.*, 2010; Yilmaz *et al*., 2011). In addition, this technique is being increasingly used to enhance yield, fruit quality, growth promotion, extend production periods and crop longevity, promote more efficient fertilizer use, reduce crop density and enhance tolerance to soil salinity, low temperature and flooding (Louws *et al*., 2010, Turhan *et a*l., 2011; Wahb-Allah, 2014). The Party acknowledges that grafting is a promising alternative and has conducted preliminary trials with very promising results (Mitidieri *et al*., 2005). In this 2015 CUN, the Party reports that grafted plants are produced in many tomato growing regions for example Mendoza, Corrientes and Buenos Aires. Use of resistant cultivars is also a very effective strategy used to increase yield and manage soilborne diseases and nematodes in vegetables around the world (Devran and Sogut 2010; Christos *et al*., 2011; Fery and Thies 2011; Jari *et al*., 2011). Resistant cultivars, just like rootstocks, are commercially available for soilborne diseases and nematodes in many countries and should be easily obtainable in Argentina. 1,3-D/Pic is a key alternative to MB, which is widely accepted commercially for controlling soil nematodes and fungi and has consistently shown to be as effective as MB (Minuto e*t al.*, 2006; Porter *et al*., 2006; Ji *et al*., 2013). Application costs are similar or lower than those of MB. Since this fumigant combination is registered in Argentina, MBTOC considers that 1,3-D/Pic may be used for the particular circumstances of this nomination. **MBTOC comments on economics in 2015 for 2016:** The CUN assumes a substantial yield reduction when the fields are fumigated with 1,3 D compared to MB. However, the Party did not report on the breakdown of the area sown for a long cropped tomato crop in the nominated areas and also why it is not possible to use 1,3 D/Pic with the tomato double crop, whilst it is possible with pepper. In addition, no information on the economic impact of the extended plant back has been provided. It is also unclear how pepper, a very short crop, could have the same yield and revenue as a long crop of tomato or double cropped tomato crop followed by pepper. MBTOC still considers 1,3-D/Pic economically feasible. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i) Emission Reduction:** Low impermeable films are not adopted but have been trialed through the projects • **Dec. IX/6 b(iii) MLF Assistance/Adoption of Effective Alternatives:** Trials and research have been conducted through the MLF projects implemented in Argentina and also directly by national institutions (e.g. INTA, EEAOC) and various universities. No reference related to the research in Argentina was provided with the nomination. • **Dec. IX/6 b(iii) Appropriate Effort:** MBTOC assumed considerable research has been conducted during the MLF funded projects but was unable to assess the research effort as no references or reports were provided of local R and D.												

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
Argentina	Strawberry Fruit	70	77	U									

MBTOC recommendation for 2016:

MBTOC is unable to assess this nomination.

To be able to reassess this nomination MBTOC requires information on the studies that demonstrate the plant back periods for 1,3-D/Pic in Lules (warm conditions) and Mar del Plata (cooler conditions) as compared to methyl bromide. This is particularly important for the Lules region as no information in this respect was supplied in the nomination. The Party is also requested to provide an economic assessment for the using of 1,3-D/Pic applied on an annual basis as against a biennial treatment as this is considered a more effective treatment than that shown in the CUN..

Nomination by the Party for 2016:

The Party nominated 77 tonnes of MB as a critical use for strawberry fruit on an area of 225 ha, which corresponds to a MB rate of 35g/m^2 in two key production regions (Mar del Plata and Lules). The key pests in Mar del Plata are fungi (*Phytophthora, Verticillium*), soil insects, nematodes and weeds (*Cyperus*). Key pests in Lules are fungi (*Phytophthora, Verticillium*, Anthracnosis, *Rhizoctonia, Fusarium, Pythium, Macrophomina*). A 70:30 MB:Pic formulation is used in strip treatment (beds only)so only 50% of the area is effectively treated. The nomination bases the need for MB on the fact that alternatives, particularly 1,3-D/Pic, are not effective for high moisture soils in warmer regions or heavy clay soils (Lules) and that phytotoxicity occurs in the cold soil conditions of Mar del Plata. Missing specific market windows is also of concern.

Circumstances of the nomination by the Party:

The Party states that 1,3-D/Pic does not control the entire pest spectrum attacking strawberries and has a longer plant back time or a phytotoxic effect, which leads to missed market windows. Metham sodium at the registered rate does not achieve yields comparable to MB treatments. According to the Party low soil temperatures and heavy rainfall typically present at the time when fumigation needs to happen to ensure optimum yields and a timely harvest, challenge the adoption of alternatives. Chloropicrin alone is not registered and does not control weeds. Dazomet is not registered for edible crops. Methyl iodide, which proved effective in trials, is no longer being considered for registration. Solarization and biofumigation are not considered practical in the critical areas and VIF and TIF are fairly new products that need to be imported.

According to the Party, results of trials conducted from 2001 to 2013 showed that 1,3-D/PIC, an alternative that is widely adopted in strawberry fruit crops worldwide, gave variable results in the Mar del Plata region, but good yields in the Lules region. Dazomet is not registered for edible crops. Metham sodium at a high rate of 0.25 L/m^2 with 2 drip tapes obtained similar yields as MB:Pic (70:30) at a rate of 40 g/m^2, but that rate is not registered. According to the Party, Pic is a technically and economically feasible alternative to MB, but Pic alone is not registered in Argentina. DMDS is a promising alternative to MB, but it is not available. Non-chemical alternatives, in particular solarization, are widely used in the North, East and West of Argentina, but cannot be used in the central areas.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
	MBTOC interim assessment for MB use in this sector in 2016: The Party stated that 1,3-D/Pic and other alternatives (i.e. metham sodium, metham potassium, metham ammonium) are ineffective under the particular circumstances of the nomination, however the nomination shows that higher yields can be obtained with 1,3-D/Pic in Lules. The Party shows economic information which assumes an 11 week delay in plant back times for 1,3-D/Pic, but this is inconsistent with results reported in other regions of the world where similar sub-tropical conditions prevail. In the absence of data showing otherwise, MBTOC is unable to clarify the large losses caused by 1,3D/Pic and for this reason is unable to fully assess this nomination. For this reason, the Party is requested to provide the technical replicated trial studies and economic data to support the impact of uptake of alternatives, especially for the Lules region. As growers presently crop biennially in Argentina, MBTOC is also requesting the Party to consider the impact and economics of annual treatments as this is the key practice used in other key strawberry regions of the world. MBTOC agrees that 1,3-D/Pic may be more difficult to use in cooler regions, but also requests further replicated research studies demonstrating the effect on yields and longer plant back times for the cooler strawberry production regions in Argentina. MBTOC is also aware of references indicating positive results with other alternatives, such as metham ammonium, 1,3-D/Pic, metham sodium and metham potassium in the critical regions: Del Huerto, 2013 found no difference between the performance of MB and 1,3-D/Pic. Jaldo *et al*.(2007) showed that 1,3-D/Pic injected in the soil gave better yields that MB in Lules/Tucumán. Aldercreutz and Szczesny, (2008, 2010), showed that yields obtained in Mar del Plata with metham sodium and metham ammonium were comparable to those produced when fumigating with MB. Bórquezy Aguero (2007) found that weed control achieved with metham ammonium, metham sodium and metham potassium in Lules, was comparable to that obtained with MB 70:30 and that there were no significant differences in the total yields obtained with these treatments. Other studies confirmed these results (Bórquez and Mollinedo, 2009, 2010; Aldercreutz and Szczesny, 2008; Bórquez y Aguero, 2007). MBTOC is unclear why these results are not applicable to the regions nominated. Also some of the studies cited by Argentina to support the ineffectiveness of alternatives on related crops for other regions in the world, actually showed that alternatives were as effective as MB (e.g. Cebolla and Serrano 2009). MBTOC acknowledges that alternatives are available for strawberry fruit and encourages the Party to consider further evaluation of Pic, DMDS, metham sodium and Pic/DMDS to assist with phasing out this nomination. MBTOC also notes that the Party has been supported by the MLF with a number of demonstration, investment and technical assistance projects since 1997 and that many alternatives have been trialed and found successful in this sector (MLF, 2014 a, b). **MBTOC comments on economics in 2015 for 2016:** The economic analysis provided by the Party shows that treatment with 1,3-D/Pic misses the market window and fetches lower revenues than MB. **For Mar del Plata** • The Party information assumes a yield reduction over two seasons - from 93 to 62 t/ha – when using 1,3-D/ Pic because of the differences in plant back times caused by the heavy clay soils and low soil temperatures, but the data used to calculate this information needs further clarification. In particular, a further economic comparison is required for annual treatments. Additionally, it is requested that to accurately assess the nomination, technical data is												

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									

required to show the effect of extended plant back times and also the impact of this delay on yields. This is required as this information is different to that reported internationally for strawberry fruit production.

- From the yield reduction the Party calculates a symmetrical gross revenue reduction as prices are assumed to be the same for the two treatments.
- The Party identifies that the operating costs for the two treatments are similar, but these are not shown. Then the nomination argues that weed control costs of 1,3-D Pic would be greater than for methyl bromide, as will conversion to a one year production system. In this case, yields are still assumed to be lower (15-20%) and the costs of fumigants, tarps and transplants will be higher. However, these costs are not given and are required to be able to fully assess the nomination.

For Lules

- The Party argues that with 1,3-D Pic weed control is insufficient and that the planting time is short because of low soil temperatures and rainy conditions and a prolonged plant back time. As a result, the strawberry harvest misses the market window and fruit is sold at the high-season price rather than the early-season price. MBTOC is unable to clarify the effect of the long plant back period shown in Lules and requires further comparisons of treatments applied in the warmer soils of Lules using the standard plant back periods prescribed for its application.
- In the nomination, yield is shown to increase with 1,3-D Pic, but despite this, the fall in prices under the present scenario in the nomination results in a loss in revenue of around 50%.
- The "with methyl bromide" price is taken as $1.69/kg and the "with 1.3-D Pic" as $0.72
- Again, costs of production are expected to be similar for the two treatments, in this case without the caveats.

Comments requested in Dec. XX1/11 (para 9):

- **Dec. IX/6 b(i) Emission Reduction:** Low permeability films are available and have been trialed through the projects apparently with good results, but are not yet adopted.
- **Dec. IX/6 b(iii) MLF Assistance/Adoption of Effective Alternatives:** Trials and research have been conducted through the MLF projects implemented in Argentina and also directly by national institutions (e.g. INTA, EEAOC) and various universities.
- **Dec. IX/6 b(iii) Appropriate Effort:** MBTOC assumed considerable research has been conducted during the MLF funded projects and provided references, but the Party has denied the usefulness of this data for the regions associated with the nomination. MBTOC is unaware if trials within the specific areas of the nominations are being conducted.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
China	Ginger Open field	90	90	[78.75]									

MBTOC interim recommendation for 2016:

MBTOC recommends a reduced amount of 78.75 tonnes of MB for this use in 2016 after an adjustment of the dose rate to conform to MBTOC's standard presumptions.

Nomination by the Party for 2016:

China nominated 90 tonnes of MB as a critical use for 2016, for open field ginger production on an area of 229.59 ha at a rate of 40g/m^2 .The target pests are, *Ralstonia solanacearum*, *Pythium* spp*. Meloidogyne* spp. and *Cyperus rotundus*. MB is used in regions where soil-borne pathogen pressure is high and this only represents a small percentage (0.24%) of the total ginger cropping area. The request is only for ginger grown in the Shandong region where this crop is grown continuously and where pest pressure is high.

Circumstances of the nomination by the Party:

China is using small disposable canisters of MB (681 g/canister), using standard polyethylene films. MB is applied in canisters (98:2), as cold gas at a rate of 40g/m^2, which is below the rate registered in China. According to the Party, chloropicrin is the only chemical alternative registered in China for this sector. Chloropicrin did not provide effective control of *Meloidogyne* spp and *Cyperus rotundus*. In addition, chloropicrin causes phytotoxicity and needs longer fumigation time forcing farmers to postpone the planting time which affects yield, quality and market windows. However a recent study confirms that chloropicrin is a promising alternative with good efficacy against *Ralstonia solanacearum*, which can be used successfully in integrated pest management programmes in China (Mao *et al*., 2014).

In spite of their proven efficacy, other chemical alternatives, 1,3-dichloropropene, dazomet, iodomethane, metham sodium, dimethyl disulfide and sulfuryl fluoride are not registered for use in this sector in China. SF however has been shown to control root-knot nematodes and to reduce the levels of key soil pathogens in research trials (Cao *et al*., 2014). Chloropicrin and 1,3 D have been formulated in capsules for trial work. Trials with Pic are encouraging (Mao *et al*., 2014). The tested 1,3-D/Pic capsule formulation provides a promising method for soil pest and disease control, which at the same time reduces environmental emissions and potential human exposure in greenhouse production of vegetables (Qiu Xia *et al*., 2013). Telone C-35 is an excellent MB alternative and has provided acceptable weed control efficacy (Ji *et al.,* 2013), but this formulation is not registered.

According to the Party, non-chemical alternatives (crop rotation, bio-fumigation, solarization, steaming) are not technically and economically feasible. Crop rotation is used in other regions of China instead of methyl bromide, since growers are not acquainted with methyl bromide and its use is not allowed by the government. However, pest and disease control resulting from rotation is very poor.

Barrier films (VIF and TIF) are produced in China, but are not used for ginger production due to their high cost and low efficacy under low temperatures. MB is applied every year during early spring or late autumn.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
	MBTOC interim assessment for MB use in this sector in 2016: MBTOC recommended a reduced amount of 78.75 tonnes of methyl bromide after adjusting the rate to the standard presumptions (35 g/m^2). The Party states that alternatives are not available for this nomination, particularly 1,3-D/Pic, which is not registered in China. MBTOC notes that other countries which in the past applied MB canisters on a small scale basis have phased out for this sector (e.g. Japan). In China the registered dosage rate for MB varies between 50 and 75 g/m^2 (Cao, pers. com 2014). The amount requested in the nomination is based on a dosage rate of 40 g/m^2 (without VIF or TIF) applied with MB canisters. This rate is higher than the MBTOC's standard presumptions; the target pests in China, also include *Ralstonia* and nutsedge (Cyperus). MBTOC considers that in the absence of effective alternatives MB/Pic 50:50 can be suitable for this sector, but China would need to develop technology to formulate and apply this formulation. MBTOC considers that barrier films should be used in the future and urges the Party to consider accessing these films. MBTOC is also aware that Pic combined with DMDS or Pic +fosthiazate have shown promising results in China (Cao, 2014, pers. comm.). MBTOC notes that since 1994 the Party has been supported by the MLF with one demonstration project, three project preparation grants and one investment project comprising eight tranches and that many alternatives have been trialled. Funding from the MLF committed the Party to phase out its whole MB consumption for controlled uses by the end of 2014 (MLF, 2014 ab). MB canisters are used because they provide small-scale farmers with an easy application method and the ability to apply targeted amounts of MB to small areas where injection machinery may be difficult to use (TEAP, 2008). However, MB canisters have been banned for soil use in many Article 5 countries, as this application is considered less efficient than injection methods and more dangerous to workers since trained contractors are not required for their application. This practice also leads to high emissions of MB. In some situations, MB gas has been found to leak during storage because of poor air tightness of canisters. Even though the Party has not presented a phase-out plan, MBTOC expects phase out to take place as soon as possible. According to reports presented to the Ex Com, satisfactory pest and disease control has been obtained in ginger crops with the combination of high dosages of chloropicrin, improved application methods of this fumigant and dazomet, other chemicals and biological nematicides, in an IPM approach. Pic is used for soil fumigation in areas where the main ginger soil-borne pathogens *Pythium* spp. and *Ralstonia solanacerum* are main pests. MBTOC suggests that DMDS and Pic may be useful to consider for this nomination. **MBTOC comments on economics in 2015 for 2016:** The price of ginger is reported to be lower with chloropicrin (MB: $1.31/kg; Pic: $0.65/kg) because of the quality impact of root-knot nematodes. Yield with MB is 96.45 t/ha, while with Pic it is 86.22 t/ha, again because of the effect of root-knot nematodes. Gross revenue with Pic is 44% of that of MB because of the yield and price difference. Net revenue is 25% of that of MB; put another way, net revenue has declined by well over two thirds.												

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
	Comments requested in Dec. XX1/11 (para 9) • **Dec. IX/6 b(i) Emission Reduction:** VIF and TIF are produced in China, but are not used for ginger production due to very high cost and low efficacy under low temperatures. MB is applied every year during early spring or late autumn. • **Dec. IX/6 b(iii) MLF Assistance/Adoption of Effective Alternatives:** Research has been conducted on chemical alternatives (chloropicrin + DMDS, chloropicrin + fosthiazate and chloropicrin + avermectins). It is expected that some chemicals will be registered by 2018. China is trying also to develop the flame sterilization technology. • **Dec. IX/6 b(iii) Appropriate Effort:** Yes considered appropriate as experiments are being conducted to register chemical alternatives by 2018.												
China	Ginger Protected	24	24	[21]									
	MBTOC interim recommendation for 2016: MBTOC recommends a reduced amount of 21 tonnes of MB for this use in 2016.A dosage rate reduction has been made so it conforms to MBTOC's standard presumption of 35g/m^2. **Nomination by the Party for 2016:** China nominated 24 tonnes of MB as acritical use for protected ginger production on 40.8 ha at a rate of 40 g/m^2 for use in 2016.The target pests are *Ralstonia solanacearum*, *Pythium* spp*. Meloidogyne* sp*p* and *Cyperus rotundus*. MB is used in regions where soilborne pathogen pressure is high and this only represents a small percentage of the total ginger cropping area(8.16%). The request is only for ginger grown in the Shandong region where this crop is grown continuously and where pressure from the target pests is high. **Circumstances of the nomination by the Party:** China is using small disposable canisters of MB (681 g/canister), using standard polyethylene films. MB is applied in canisters (98:2), as cold gas at a rate of 40g/m^2, which is below the rate registered in China. According to the Party, chloropicrin is the only chemical alternative registered in China for this sector. Pic did not provide effective control of *Meloidogyne* spp and *Cyperus rotundus*. In addition, chloropicrin causes phytotoxicity and needs a longer fumigation time obliging farmers to postpone the planting time which affects yield, quality and marketing. However, a recent study confirms that Pic is a promising alternative with good efficacy against *Ralstonia solanacearum*, which can be used successfully in integrated pest management programmes in China (Mao et al., 2014). In spite of their proven efficacy, other chemical alternatives such as1,3-dichloropropene, dazomet, iodomethane, metham sodium, dimethyl disulfide and sulfuryl fluoride are not registered for use in ginger in China. In research trials, SF has been shown to control root-knot nematodes and reduce the levels of key soil pathogens (Cao *et al*., 2014). Pic and 1,3 D have been formulated in capsules for trial work and results are encouraging (Mao et al., 2014). The 1,3-D/Pic capsule formulation provides a promising method for soil pest and disease control, reducing both environmental emissions and potential human exposure in greenhouse vegetable cultivation (Qiu Xia *et al.,* 2013). Telone C-35 is an excellent MB alternative and has provided acceptable weed control efficacy (Ji *et al*., 2013), but this formulation is not registered.												

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									

According to the Party, non-chemical alternatives (crop rotation, bio-fumigation, solarization, steaming) are not technically and economically feasible when used alone but maybe useful in an IPM program. Areas not to using methyl bromide use crop rotation; in such areas growers are not acquainted with MB and its use is not allowed by the Government, however, results with crop rotation are very poor.

Barrier films (VIF and TIF) are produced in China, but are not used for ginger production due to their high cost, difficult application and low efficacy under low temperatures. MB is applied every year during early spring or late autumn.

MBTOC interim assessment for MB use in this sector in 2016:

MBTOC recommends a reduced amount of 21tonnes of MB for this use. An adjustment has been made in accordance with standard presumptions for MB use with low permeability barrier film (35 g/m^2).

The Party states that alternatives are not available for this nomination, particularly as 1,3-D is unavailable for use in China. MBTOC however notes that other countries which applied MB using canisters on a small scale basis have phased out for this sector (eg. Japan). In China the registered MB application rate varies between 50 and 75g/m^2 (Cao, pers. com 2014). Although the amount requested is based on a use rate of 40g/m^2 (without VIF or TIF), the application is based on the use of canisters of MB which are less efficient than soil injection methods and thus the rate proposed is considered appropriate. This rate is higher than the rates of standard presumptions but target pests in China include *Ralstonia* and nutsedge (*Cyperus*), which are more difficult to control. MBTOC considers that in the absence of effective alternatives MB/Pic 50:50 can be suitable for this sector, but China would need to develop technology to formulate and apply this formulation. MBTOC considers that barrier films should be used in future and urges the Party to consider accessing these films. MBTOC is also aware that Pic + DMDS or Pic+fosthiazate have shown promising results (Cao, 2014, pers. comm.).

MBTOC notes that since 1994, the Party has been supported by the MLF with one demonstration project, three project preparation grants and one investment project comprising of eight tranches and that many alternatives have been trialled. Funding from the MLF committed the Party to phase out its entire MB consumption for controlled uses by the end of 2014 (MLF, 2014 ab).

MB canisters are used because they provide small-scale farmers with an easy application method and the ability to apply targeted amounts of MB to small areas where injection machinery may be difficult to use (TEAP, 2008). However, they have been banned in many Article 5 countries as this application is considered less efficient for soil-borne pathogen control than injection methods. Use of canisters is also considered more dangerous to workers because trained contractors are not involved in its application. This practice also leads to high emissions of MB.

Even though the Party did not present a phase-out plan, MBTOC expects this to occur as soon as possible. According to reports presented to the ExCom, satisfactory pest and disease control has been achieved in ginger crops with the combination of high dosages of chloropicrin, improved application methods of this fumigant and dazomet, plus other chemicals and biological nematicides within an IPM approach. Pic is used for soil fumigation in areas where the main ginger soil-borne pathogens *Pythium* spp. and *Ralstonia solanacerum* are main pests.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
	MBTOC comments on economics for 2016: The price of ginger is lower with chloropicrin (MB: $1.31/kg, Pic: $0.65/kg) because of quality impact of root-knot nematodes. Yield with MB is 96.45 t/ha, while with Pic is 86.22 t/ha, again because of the effect of root-knot nematodes. Gross revenue with Pic is 44% of that of MB (because of the yield and price difference). Net revenue is 25% of that of methyl bromide; put another way, net revenue has declined by well over two thirds. **Comments requested in Dec. XX1/11 (para 9):** •**Dec. IX/6 b(i) Emission Reduction:** VIF and TIF are produced in China, but are not used for ginger production due to very high cost and low efficacy under low temperatures. MB is applied every year during early spring or late autumn. •**Dec. IX/6 b(iii) MLF Assistance/Adoption of Effective Alternatives:** Research trials within the MLF-funded investment project commenced in this sector in 2008 and will be completed in 2014. Promising results have been obtained. Additionally, active research is being conducted on chemical alternatives (chloropicrin + DMDS, chloropicrin + fosthiazate and chloropicrin + avermectin). It is expected that some chemicals will be registered by 2018. China is trying also to develop the flame sterilization technology. •**Dec. IX/6 b(iii) Appropriate Effort:** Yes, considered appropriate as experiments are being conducted to register chemical alternatives by 2018.									

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
Mexico	Raspberries	41.418	56.018	[41.418]									

MBTOC Interim Recommendation for 2016:

MBTOC recommends a reduced amount of 41.418 tonnes of MB for use in raspberry nurseries for 2016.

The reduction was adjusted to conform with MBTOC´s standard presumption dose of 20 g/m^2 for uncertified nursery production and to comply with Decision Ex. I/4, which considers an increase in methyl bromide consumption for critical uses only permitted under unforeseen circumstances. Under the Decision Ex. I/4 new production areas should not use MB, but use alternatives instead. The recommendation was based on the same amount of MB exempted by the Parties in 2014. Trials have been initiated three years ago and are showing promising results. MBTOC considers that one more year of trials should be sufficient to support rapid adoption of alternatives.

Nomination by the Party for 2016:

The quantity requested for this CUN is 56.018 tonnes for use in raspberry nursery stock production in the Jalisco and Michoacan States. MB formulations applied are 50:50, broad acre, in dosages of 22.4 g/m^2, once a year and not under VIF.

MBTOC notes that this nomination is based on a dosage rate of 22.4 g/m^2 that is higher than the standard presumption of 20 g/m^2 for nurseries without specific certification regulations.

Circumstances of the nomination by the Party:

The raspberry nursery industry in Mexico is recent (since 2008) and evolving. According to the Party, methyl bromide is the only fumigant in current use and producers have no experience in the use of alternatives. Trials with methyl bromide alternatives were initiated only in 2012. This new industry is growing rapidly and the land area requiring methyl bromide is said to continue to increase while the trials are ongoing. The party is requesting increased methyl bromide compared to 2014 CUE, in anticipation of the expanded acreage for this industry.

The Party states that the key pests affecting strawberry runner production are fungi *Phytophthora, Pythium, Fusarium*, *Rhizoctonia, Verticillium, Colletotrichum, Macrophomina phaseolina*, nematodes *Meloidogyne, Pratylenchus* and weeds *including Cyperus* spp and *Malva neglecta*.

According to the nomination, available alternatives do not control target pests adequately to meet “market standards”. No certification thresholds are established or required by regulations. A research program was initiated in 2012 and showed –after the second year, -promising results especially with 1,3-D/Pic,Pic + metham sodium followed by DMDS + Pic and metham Sodium. A new round of trials commenced in 2014/15 to obtain additional data on the efficacy of these alternatives (López-Aranda *et al*.; 2012 & 2014; Cotero *et al*., 2013; SEMARNAT – UNIDO, 2013).

MBTOC understands that three years of trials should be sufficient to decide on the best alternatives and that rapid adoption of these alternatives will follow. The Party assumes that soilless systems would be expensive and require a significant investment as the required infrastructure does not exist.

	MBTOC interim assessment for MB use in this sector in 2016: MBTOC acknowledges that an active research program was initiated and recognizes that some additional time is needed to conduct trials to determine the efficacy of alternatives under Mexican conditions. MBTOC realizes that the projected rate of 22.4 g/m^2 in the CUN was based on the 2014 dosage rate, calculated as an average of 67:33 and 98:2 when these formulations were still in use. The requested amount of 56.018 tonnes has been reduced to 50.016 tonnes to comply with MBTOC's standard presumption of 20 g/m^2 using barrier films for unspecified open field nursery stock. The Party indicated that the nominated area for 2016 has increased to 250 ha with a concomitant increase in MB requested by the Party. In line with Decision Ex.I/4, MBTOC has adjusted the CUN as this Decision prevents an increase in methyl bromide consumption under critical uses, except for unforeseen circumstances. Decision Ex.I /4 reads *"…that each Party should aim at significantly and progressively decreasing its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available…*" and decided that "…*The management strategy should aim, among other things…to avoid any increase in methyl bromide consumption except for unforeseen circumstances…".* MBTOC further notes that some Parties adopted a policy whereby they will not nominate methyl bromide for treatment of increased acreage in a specific industry. MBTOC does not recommend the increased amount requested and has adjusted the recommendation to the 2014 CUE level. The recommendation is thus based on the amount of MB exempted in 2014. Trials have been initiated three years ago but there is reportedly insufficient data for the Party to gain full confidence with the performance of alternatives in this relatively new industry. MBTOC considers that since results are showing feasibility, one more year of trials should be enough and rapid adoption of alternatives should follow after that. MBTOC notes that since 1998 the Party has been supported by the MLF with two demonstration and two technical assistance projects plus four project preparation grants, and one investment project also funded bilaterally by Italy and Canada and that many alternatives have been trialled across a range of sectors (MLF, 2014a), although for the raspberry sector these started relatively recently (SEMARNAT-UNIDO, 2014). Funding from the MLF committed Mexico to phase out its entire controlled MB consumption by the end of 2013 (MLF, 2014b). **MBTOC comments on economics in 2015 for 2016:** The nomination was not based on economic arguments. Alternatives are not used commercially and there is little information on the cost and feasibility. Data on production costs are however provided for future comparison. **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i) Emission Reduction**: Most growers do not use VIF or TIF, although some growers are beginning to try it. The research program includes low permeability films. Formulation is 50:50 which contributes to emission reduction. • **Dec. IX/6 b(ii) MLF Assistance/Adoption of Effective Alternatives:** Trials in an MLF project commenced in this sector in 2011/2012 and will be completed in 2015. Promising results have been obtained. • **Dec. IX/6 b(iii) Appropriate Efforts:** A research program is in place on the key alternatives.

Country	Industry	CUE for 2015[1]	CUN for 2016	MBTOC interim recommendation for 2016									
Mexico	Strawberries	43.539]	64.960	[43.539]									

MBTOC Interim Recommendation for 2016:

MBTOC recommends a reduced amount of 43.539 t of MB for use in strawberry nurseries in 2016.

The nominated amount was adjusted to conform with MBTOC´s standard presumption dosage rate of 20g/m^2 for uncertified nursery production and to comply with Decision Ex. I/4, which mandates that an increase in methyl bromide consumption for critical uses is to be permitted under unforeseen circumstances only. Under the Decision Ex. I/4 new production area should not use MB, but rather use alternatives. The recommendation was thus based on the amount of MB exempted in 2014. Trials have been initiated three years ago and they are showing promising results. MBTOC considers that one more year of trials should be sufficient to support rapid adoption of alternatives.

Nomination by the Party for 2016:

The quantity requested for this CUN is 64.960 tonnes, for use in strawberry runner production in the Jalisco and Michoacan States. MB formulations applied are 50:50, broad acre, in dosages of 20 g/m^2, once a year and normally not under VIF.

Circumstances of the nomination by the Party:

The strawberry nursery industry in Mexico is evolving, and small low/medium technology production systems now coexist with large “professional” nursery producers similar to those found in Spain and California that were previously the source of transplants for many berry growers in Mexico. Trials with methyl bromide alternatives were initiated only in 2012. This new industry is growing rapidly and the land area requiring methyl bromide is said to continue to increase while the trials are ongoing. The Party is requesting increased methyl bromide compared to 2014 CUE, in anticipation of the expanded acreage for this industry.

The Party states that key pests affecting strawberry runner production are fungi, *Phytophthora, Pythium, Fusarium, Rhizoctonia, Verticillium, Colletotrichum*, and weeds, such as *Cyperus* spp. and *Malva neglecta*.

According to the nomination, available alternatives do not control target pests adequately to meet “market standards”, although no certification thresholds are established or required by regulations. However, a research program was put in place in 2012 and showed, for the third year now, promising results especially with 1,3-D/Pic, and Pic+ metham sodium, followed by DMDS + Pic and metham sodium. A new round of trials began in 2014/15 to obtain additional data on the efficacy of the alternatives (López Aranda *et al*.; 2012 & 2014; Cotero *et al*., 2013; SEMARNAT – UNIDO, 2013). The Party anticipates that soilless systems would be expensive and require a significant investment, as the required infrastructure does not exist.

MBTOC understands that three years of trials should be enough to decide on the best alternatives for this sector and that rapid adoption of alternatives should follow after that.

MBTOC interim assessment for MB use in this sector in 2016:

MBTOC acknowledges that an active research program was initiated and recognizes that some additional time is needed to conduct trials to determine the efficacy of alternatives under Mexican conditions. MBTOC further notes that although the nominating industry is recent and uses more sophisticated

	management approaches, there are traditional nurseries in the country that do not use MB fumigation at all (INIFAP; 2011). In a first stage the Party calculated the nominated amount on the basis of a dose rate of 22.4 g/m^2 so MBTOC adjusted it to its standard presumption dose of 20 g/m^2 for uncertified production. In addition, Decision Ex.I /4 reads*"…that each Party should aim at significantly and progressively decreasing its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available…*" and further that "…*The management strategy should aim, among other things…to avoid any increase in methyl bromide consumption except for unforeseen circumstances…".* MBTOC further notes that some Parties have adopted a policy whereby they will not nominate methyl bromide for the purpose of increasing the acreage of a specific industry. With this scope, MBTOC does not recommend the increased amount requested and has based this recommendation on the 2014 CUE level. MBTOC understands that in the meantime, the expected new production area should benefit from the preliminary results of the trials to date and expand on the basis of the available alternatives, not MB. Otherwise, the expanded area would be based on a technology already banned and the effort to reconvert it to the alternatives would be increased year by year. MBTOC notes that since 1998 the Party has been supported by the MLF with 2 demonstration and 2 technical assistance projects plus 4 project preparation grants, and one investment project also funded bilaterally by Italy and Canada, and that many alternatives have been trialed across a range of sectors (MLF, 2014a), although trials for strawberry runners started more recently (SEMARNAT-UNIDO, 2014). Funding received from the MLF committed Mexico to phase out its entire controlled MB consumption by the end of 2013 (MLF, 2014b). **MBTOC comments on economics in 2015 for 2016:** The nomination was not based on economic arguments. The Party stated however that: • Because MB alternatives are not used commercially, there is little information on their cost and feasibility, especially because nursery production requires cleaner plants than does fruiting fields. • Data on the production costs with methyl bromide are however provided for future comparison. • For strawberries the cost of application of chloropicrin and 1.3D-Pic is roughly comparable to that of methyl bromide, while application of metham sodium is around a third of the cost **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i) Emission Reduction**: Most growers do not use VIF or TIF, although some growers are beginning to try it. The research program includes low permeability films. Formulation is 50:50 which contributes to emission reduction. • **Dec. IX/6 b(ii) MLF Assistance/Adoption of Effective Alternatives:** Trials in an MLF project commenced in this sector in 2011/2012 and will be completed in 2015. Promising results have been obtained. • **Dec. IX/6 b(iii) Appropriate Efforts:** A research program is in place on the key alternatives.

[1]1ExMOP and 16MOP; [2]16MOP+2ExMOP+17MOP; [3]MOP17+MOP18; [4]MOP18+MOP19; [5]MOP19+MOP20; [6]MOP20+MOP21; [7]MOP21+MOP22; [8]MOP22, [9]MOP23, [10]MOP24,[11]MOP25

1.5. Interim Evaluation of CUNs: Structures and Commodities

A group of MBTOC members, appointed by the co-chairs, assessed the three CUNs in the SC sector submitted in 2015, one of which was for use in 2017 (USA) and two for use in 2016 (South Africa). Discussion was later held in plenary to consider the proposed recommendations and reach consensus. Information provided during the bilateral discussion held during the MBTOC meeting held via teleconference with the US delegation and experts on alternatives to MB for cured ham were also considered in the course of these assessments.

1.5.1 Standard rate presumptions

MBTOC assessed the SC CUNs for appropriate MB dosage rates and deployment of MB emission/use reduction technologies, such as appropriate sealing techniques.

Decision IX/6 requires that critical uses should be permitted only if '*all technically and economically feasible steps have been taken to minimise the critical use and any associated emission of methyl bromide*'. Decision Ex.II/1 also mentions emission minimisation techniques, requesting Parties "…*to ensure, wherever methyl bromide is authorised for critical-use exemptions, the use of emission minimisation techniques that improve gas tightness or the use equipment that captures, destroys and/or reuses the methyl bromide and other techniques that promote environmental protection, whenever technically and economically feasible.*"

With the beginning of the CUN process in 2005, MBTOC published its standard presumptions for structures (20g m^{-3}) and indicated that the European Plant Protection Organization's (EPPO) published dosage rates for commodities should be considered standard best practice for fumigation worldwide. Since that time all Parties submitting CUNs stated their adherence to those practices. The EPPO dosage rates for commodity treatment vary by commodity, sorption rate and environmental conditions. They can be found in annexes to the MBTOC 2006 Assessment Report (MBTOC, 2007). Where possible, reduced dosages, combined with longer exposure periods, can reduce MB consumption, while maintaining efficacy (MBTOC 2007).

1.5.2. Details of the evaluation

The total MB volume nominated in 2015 for post-harvest uses in 2016 and 2017 was 84.84 tonnes. MBTOC recommended 3.240 tonnes for the non-A5 nomination in 2017 and 74.062 tonnes for the A5 nominations from South Africa in 2016 (Table 1-11 and 1-12). Table 1-12 provides the MBTOC-SC interim recommendation for the CUN submitted. The South African nominations were approved as shown after the Party provided detail to substantiate the need for MB after the meeting (Table 1-11).

Table 1-11. Summary of the interim recommendations for a CUE for postharvest uses of MB (tonnes) for 2016 or 2017 submitted in the 2015 round.

Country and Sector	**Nominations (tonnes)**		**Recommendation (tonnes)**	
	2016	**2017**	**2016**	**2017**
South Africa - Mills	13.00		[5.462]	
South Africa - Structures	68.60		[68.60]	
United States -Dry cure pork		3.240		[3.240]
Total	**81.60**	**3.240**	**[74.062]**	**3.240**

Table 1-12. **Interim evaluation of CUNs from non A5 Parties for structures and commodities submitted in 2015 for 2017**

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]	CUE for 2014[10]	CUE for 2015[11]	CUN for 2016[12]	CUN for 2017[12]	MBTOC Recommendation for 2017
United States	Dry Cure Pork	67.907	40.854	18.998	19.669	18.998	4.465	3.73	3.730	3.730	3.730	3.240	3.240	**3.240**	**[3.240]**

MBTOC interim recommendation for 2017:

MBTOC recommends 3.240 tonnes, the amount nominated by the Party for use in US Southern dry cure pork in long storage in 2017.

Nomination by the Party for 2017:

The Party nominated 3.240 tonnes, the same amount granted by the Parties for this use in 2015.

Circumstances of the nomination:

Presently, there is still no commercially effective and economically feasible alternatives to methyl bromide for the specialised disinfestation of ham houses containing Southern dry cure pork, a unique regional, traditional product, that is stored (cured) for long periods. Previous reductions in methyl bromide consumption have been achieved through improvements in fumigation practice, reduced curing time and reduced frequency of fumigation. The nomination states that there is no further scope for reduction through similar changes. The pests of this product are the red-legged ham beetle (*Necrobia rufipes*) and the ham mite (*Tyrophagus putrescentiae*), with the mite being particularly difficult to control to US food hygiene standards (nil tolerance on inspection). Many ham houses using short curing times do not now use methyl bromide fumigation.

There is an ongoing multi-university, multi-state research program, which is focused on improving processing sanitation, IPM and pest control through a variety of possible fumigants and physical processes (Amoah *et al.,* 2012, 2013; Phillips and Schilling, 2013). The Party has previously reported processors and researchers were trying steam cleaning, use of approved disinfectants with acaricidal properties, dips and coatings, to protect hams in store. The results of investigations with various alternative fumigants and nonchemical treatments on the ham mite *Tyrophagus putrescentiae* have not yet been fully successful (e.g. Abbar *et al*., 2012, 2013, 2014; Abbar and Phillips, 2014; Zhao *et al*., 2012 a, b). Recently, a commercial trial was carried out with phosphine applied as magnesium phosphide for mite control (Abbar *et al*., 2013). While this was successful in controlling the mites, corrosion damage to exposed electronics in the houses was unacceptable.

Southern dry cure pork processors only fumigate when the pests, or signs of the pests, are present.

MBTOC interim assessment for MB Use in this sector in 2017:

The US has a continuing and robust research program into methyl bromide replacement for this specific situation and commodity. A number of promising lines of investigation have been identified. These include various dips, some insecticide formulations and sulfuryl fluoride fumigation with added heat. No effective and viable replacements on a commercial scale have been identified at this time, though use of phosphine appears most promising with some modifications in application technique. MBTOC notes that there are well-known techniques for preventing phosphine-related corrosion, including sealing and other protection of the susceptible components. There appears to be scope for further reduction in frequency of treatment through better pest monitoring and fumigation techniques. MBTOC notes that recapture is not currently used for reduction of emissions in the absence of alternatives and that

	there are recapture units commercially available. **MBTOC comments on economics in 2015 for 2017:** The CUN rests on technical infeasibility, so no economic analysis was conducted. **Comments requested in Dec. XX1/11 (para 9)** • **Dec. IX/6 b(i) Emission Reduction**: The CUN states that improvements in sealing and fumigant containment have been made. • **Dec. IX/6 b(iii) Research Program**: There is an ongoing program testing and trialling promising alternatives • **Dec. IX/6 b(iii) Appropriate Effort**: see above

Table 1-12. **Interim evaluation of CUNs from A5 Parties for structures and commodities submitted in 2015 for 2016.**

Country	Industry	CUE for 2015[11]	CUN for 2016	MBTOC Recommendation for 2016										
South Africa	Mills	--	**13.0**	[5.462]										
	MBTOC Interim recommendation for 2016: MBTOC recommends a reduced amount of 5.462 tonnes for 2016, for pest control by fumigation in specific mills/food processing facilities. MBTOC anticipates trialling of a full IPM program in this sector as a replacement for full site methyl bromide fumigations. **Nomination by the Party for 2016:** This nomination forms part of the initial CUN for 70 tonnes covering both fumigation of specific flour and grit mills (1.4 t) and domestic and industrial premises for control of wood destroying insect pests (68.6 t). In subsequent clarification with the Party, the nomination has been revised and disaggregated to give two separate nominations, of 13 t for specific mills and 68.6 t for domestic and industrial premises. There has been no previous nomination by the Party for these methyl bromide uses. **Circumstances of the nomination:** As inferred from the revised CUN, the Party nominated 13 tonnes of MB for the fumigation of flour mills of total capacity of 136,540 m³ for pest control against common stored product insect pests. Total volume to be treated annually was 362,390 m^3, at a calculated average rate of 35.9 g m^3, with individual mills typically treated either two or three times a year. Registered label rate for these fumigations was 48 g m^3. Grain mills in South Africa have to comply with stringent requirements relating to hygiene and the associated insect and pest free production and storage facilities. These relate to both local and international insect control and quality assurance standards. Full site treatments with either heat, sulfuryl fluoride or phosphine were considered as alternatives by the Party, but were found not feasible. Sulfuryl fluoride is not currently registered, though registration is under consideration. Phosphine fumigation was considered inappropriate because of the associated corrosion and risk of damage to sensitive electrical and electronic apparatus in mill machinery. Heat treatment was considered not feasible because of the capital cost of imported equipment needed to carry out the heating. The Party noted that there may be insecticide resistance in sprays that may be used for mill hygiene. **MBTOC interim assessment for MB use in this sector in 2016:** Whole site fumigation of flour mills with methyl bromide has been discontinued in most countries. Where whole site fumigation is still practiced, periodic treatments have been carried out with heat or various alternative fumigants (sulfuryl fluoride, hydrogen cyanide, phosphine). Some mills have never been fumigated with methyl bromide as whole site fumigations, with alternative approaches providing adequate insect infestation control. Effective pest control in mills in general requires a combination of measures applied rationally including as circumstances and registration permits, localised heat treatment, fumigation with hydrogen cyanide, phosphine or sulfuryl fluoride (as possible according to local registration and circumstances) and various diverse insect													

Country	Industry	CUE for 2015[11]	CUN for 2016	MBTOC Recommendation for 2016										
	control measures applied as an IPM system. Pest control intervention may be guided by appropriate pest monitoring. Change from an established system of periodic methyl bromide treatment requires some time to trial, refine and implement, hence the MBTOC recommendation for the nominated CUE, despite the general availability of alternatives for this situation. Changes to the mill and machinery structure may be needed to remove pest harbourage as part of the IPM system. MBTOC recommends a reduction in dosage rate used for mill treatment to 20 g m-3, consistent with MBTOC standard presumptions, subject to appropriate regulatory approval and in the absence of *Trogoderma granarium* (EPPO, 2014), a pest requiring a higher rate for effective control, Also a reduction in fumigation frequency to not more than twice a year is recommended to reduce methyl bromide use and emissions, consistent with Decision IX/6. On the basis of 2x annual total fumigated volume of 136,540m^3 at 20 g m^3, a revised CUE of 5.462 tonnes is recommended. MBTOC notes that there is scope for a further reduction in frequency of fumigations, combined with implementation of alternative measures. It urges that a research program is continued or put in place immediately to address alternatives as required under Decision IX/6. **MBTOC comments on economics for 2016:** The party argues that the cost of a 100 kg cylinder of Methyl Bromide gas (100%) required to fumigate a 4000 m^3 mill varies from R15 000.00 compared to more than R800 000.00 for the installation of a single heating plant for the same mill. The additional arguments that phosphine fumigation is not economically feasible because of the cost of the extended downtime required to complete a treatment and costs associated with rectification of corrosion damage produced by the phosphine treatment. **Comments requested in Dec. XX1/11 (para 9)** • **Dec. IX/6 b(i)Emission Reduction:** The CUN states that a high level of fumigant containment has been achieved. • **Dec. IX/6 b(iii)Research Program:** There is no ongoing program of testing and trialling promising alternatives given in the CUN • **Dec. IX/6 b(iii)Appropriate Effort:** see above													

Country	Industry	CUE for 2015[11]	CUN for 2016	MBTOC Recommendation for 2016										
South Africa	Houses	-	**68.6**	[68.6]										

MBTOC interim recommendation for 2016:

MBTOC recommends a CUE of 68.6 t for 2016 for this nomination.

Nomination by the Party for 2016:

The nomination was for 68.6 t of MB. There has been no previous nomination by the Party for this methyl bromide use.

Circumstances of the nomination:

The Party applied for 68.600 t of MB for the disinfestation of houses (estimated 2560 facilities annually of residential houses along coastal areas and partly inland at an treated volume of av. 1250 m³, equivalent to about 3,200,000 m³ in total at a dosage about 21 g/m³) against wood destroying insects. The treatments are carried out 'under sheets' to retain the fumigant. Infestation is typically in the attic and roof spaces.

Sale agreements for house and factory structures along the east coast of South Africa stipulate that the structure be free of "timber destroying insects" and that should such insects be found then the structure be made insect free. A Certificate of Clearance must be produced and this can only be produced once a fumigation has been undertaken. Fumigations are not undertaken if wood destroying insects are not detected.

Five target pests are given in the nomination – *Crypotermes brevis*, the West Indian drywood termite; *Hylotrupes bajalus*, the European house borer, and three small wood and furniture beetles, *Anobium punctatum* , *Lyctus brunneus* and *Nicobium castaneum*.

The Party states that the registration process for sulfuryl fluoride, a potential fumigant alternative in use elsewhere for this application, was commenced, but then could not be pursued further due to lack of sufficient company support. New efforts to source and register sulfuryl fluoride fumigant are being made. Heat as an alternative was regarded as not feasible due to lack of access into some roof spaces. Phosphine, without added heat, is unlikely to be feasible because of slower action, with fully effective treatments taking several days against wood boring pests without added heat.

The nomination did not distinguish between treatments for low level infestations of drywood termite, infestations of other wood destroying insects, particularly *Hylotrupes*, and multiple infestations of drywood termite with or without wood borers.

MBTOC interim assessment for MB use in this sector in 2016:

The dosage of methyl bromide used, estimated at about 20 g/m^3, is on average consistent with the MBTOC standard presumptions. MBTOC recognises that if methyl bromide-tolerant pests, such as *Hylotrupes*, are detected, increased dosage may be appropriate. Similar situations in the US, formerly

Country	Industry	CUE for 2015[11]	CUN for 2016	MBTOC Recommendation for 2016										
	treated with methyl bromide, are now mainly fumigated with sulfuryl fluoride, but heat has also been used. Drywood termite infestations can typically be treated by the 'search-and-destroy' system. In this process, the nests are located acoustically, electronically or with detector dogs and the located nests are eliminated by injection with appropriate, registered insecticide formulation. Baiting is not normally used, as the drywood termite nest, unlike subterranean termites, does not typically have contact with the ground. Extensive infestations of drywood termites, or where the termite species is a quarantinable pest, may merit whole site treatment. Established infestations of *Hylotrupes* and other wood boring insects in structural timber are likely to require whole site treatment. Alternatives to methyl bromide include heat treatments to moderate temperatures around 56^{o}C. MBTOC urges the Party to put in place a development and demonstration program with alternatives against wood destroying pests in houses and similar structures to assist rapid phase out of methyl bromide for the use in this CUN. **MBTOC comments on economics for 2016:** The CUN rests on technical infeasibility, so no economic analysis was conducted. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i) Emission Reduction:** The CUN states that a high level of fumigant containment has been achieved. • **Dec. IX/6 b(iii) Research Program:** There is no reported ongoing program of testing and trialling promising alternatives given in the CUN. • **Dec. IX/6 b(iii) Appropriate Effort:** Sourcing and registration of one in-kind alternative is being sought for this use.											

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ANNEX 1:

Decision IX/6 Critical Use Exemptions for Methyl Bromide

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:

Decision Ex. I/4. Conditions for granting and reporting critical-use exemptions for methyl bromide

Mindful of the principles set forth in the report[2] by the chair of the informal consultation on methyl bromide held in Buenos Aires on 4 and 5 March 2004, namely, fairness, certainty and confidence, practicality and flexibility, and transparency,

Recognizing that technically and economically feasible alternatives exist for most uses of methyl bromide,

Noting that those alternatives are not always technically and economically feasible in the circumstances of nominations,

Noting that Article 5 and non-Article 5 Parties have made substantial progress in the adoption of effective alternatives,

Mindful that exemptions must comply fully with decision IX/6 and are intended to be limited, temporary derogations from the phase-out of methyl bromide,

Recognizing the desirability of a transparent presentation of data on alternatives to methyl bromide to assist the Parties to understand better the critical-use volumes and to gauge progress on and impediments to the transition from methyl bromide,

Resolved that each Party should aim at significantly and progressively decreasing its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available,

Recognizing that Parties should revert to methyl bromide only as a last resort, in the event that a technically and economically feasible alternative to methyl bromide which is in use ceases to be available as a result of de-registration or for other reasons,

3. That each Party which has an agreed critical use under the present decision should submit available information to the Ozone Secretariat before 1 February 2005 on the alternatives available, listed according to their pre-harvest or post-harvest uses and the possible date of registration, if required, for each alternative; and on the alternatives which the Parties can disclose to be under development, listed according to their pre-harvest or post-harvest uses and the likely date of registration, if required and known, for those alternatives, and that the Ozone Secretariat shall be requested to provide a template for that information and to post the said information in a database entitled “Methyl Bromide Alternatives” on its web site;

4. That each Party which submits a nomination for the production and consumption of methyl bromide for years after 2005 should also submit information listed in paragraph 1 to the Ozone Secretariat to include in its Methyl Bromide Alternatives database and that any other Party which no longer consumes methyl bromide should also submit information on alternatives to the Secretariat for inclusion in that

[2] UNEP/OzL.Pro.ExMP/1/INF/1, para. 11.

database;

5. To request each Party which makes a critical-use nomination after 2005 to submit a national management strategy for phase-out of critical uses of methyl bromide to the Ozone Secretariat before 1 February 2006. The management strategy should aim, among other things:

(a) To avoid any increase in methyl bromide consumption except for unforeseen circumstances;

(b) To encourage the use of alternatives through the use of expedited procedures, where possible, to develop, register and deploy technically and economically feasible alternatives;

(c) To provide information, for each current pre-harvest and post-harvest use for which a nomination is planned, on the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, to bring forward the time when it is estimated that methyl bromide consumption for such uses can be reduced and/or ultimately eliminated;

(d) To promote the implementation of measures which ensure that any emissions of methyl bromide are minimized;

(e) To show how the management strategy will be implemented to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible alternatives are available, in particular describing the steps which the Party is taking in regard to subparagraph (b) (iii) of paragraph 1 of decision IX/6 in respect of research programmes in non-Article 5 Parties and the adoption of alternatives by Article 5 Parties;

6. To request the Meeting of the Parties to take into account information submitted pursuant to paragraphs 1 and 3 of the present decision when it considers permitting a Party to produce or consume methyl bromide for critical uses after 2006;

7. To request a Party that has submitted a request for a critical use exemption to consider and implement, if feasible, Technology and Economic Assessment Panel and Methyl Bromide Technical Options Committee recommendations on actions which a Party may take to reduce critical uses of methyl bromide;

8. To request any Party submitting a critical-use nomination after 2004 to describe in its nomination the methodology used to determine economic feasibility in the event that economic feasibility is used as a criterion to justify the requirement for the critical use of methyl bromide, using as a guide the economic criteria contained in section 4 of annex I to the present report;

9. To request each Party from 1 January 2005 to provide to the Ozone Secretariat a summary of each crop or post-harvest nomination containing the following information:

(a) Name of the nominating Party;

(b) Descriptive title of the nomination;

(c) Crop name (open field or protected) or post-harvest use;

(d) Quantity of methyl bromide requested in each year;

(e) Reason or reasons why alternatives to methyl bromide are not technically and economically feasible;

10. To request the Ozone Secretariat to post the information submitted pursuant to paragraph 7 above, categorized according to the year in which it was received, on its web site within 10 days of receiving the nomination;

11. To request the Technology and Economic Assessment Panel:

(a) To identify options which Parties may consider for preventing potential harmful trade of methyl bromide stocks to Article 5 Parties as consumption is reduced in non-Article 5 Parties and to publish its evaluation in 2005 to enable the Seventeenth Meeting of the Parties to decide if suitable mitigating steps are necessary;

(b) To identify factors which Article 5 Parties may wish to take into account in evaluating whether they should either undertake new accelerated phase-out commitments through the Multilateral Fund for the Implementation of the Montreal Protocol or seek changes to already agreed accelerated phase-outs of methyl bromide under the Multilateral Fund;

(c) To assess economic infeasibility, based on the methodology submitted by the nominating Party under paragraph 6 above, in making its recommendations on each critical-use nomination. The report by the Technology and Economic Assessment Panel should be made with a view to encouraging nominating Parties to adopt a common approach in assessing the economic feasibility of alternatives;

(d) To submit a report to the Open-ended Working Group at its twenty-sixth session on the possible need for methyl bromide critical uses over the next few years, based on a review of the management strategies submitted by Parties pursuant to paragraph 3 of the present decision;

(e) To review critical-use nominations on an annual basis and apply the criteria set forth in decision IX/6 and of other relevant criteria agreed by the Parties;

(f) To recommend an accounting framework for adoption by the Sixteenth Meeting of the Parties which can be used for reporting quantities of methyl bromide produced, imported and exported by Parties under the terms of critical-use exemptions, and after the end of 2005 to request each Party which has been granted a critical-use exemption to submit information together with its nomination using the agreed format;

(g) To provide, in consultation with interested Parties, a format for a critical-use exemption report, based on the content of annex I to the present report, for adoption by the Sixteenth Meeting of the Parties, and to request each Party which reapplies for a methyl bromide critical-use exemption after the end of 2005 to submit a critical-use exemption report in the agreed format;

(h) To assess, annually where appropriate, any critical-use nomination made after the end of 2006 in the light of the Methyl Bromide Alternatives database information submitted pursuant to paragraph 1 of the present decision, and to compare, annually where appropriate, the quantity, in the nomination, of methyl bromide requested and recommended for each pre-harvest and post-harvest use with the management strategy submitted by the Party pursuant to paragraph 3 of the present decision;

(i) 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;

(j) 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;

(k) To modify the handbook on critical-use nominations for methyl bromide to take the present decision and other relevant information into account, for submission to the Sixteenth Meeting of the Parties.

ANNEX III - Part A: Historic Trends in non A5 Preplant Soil Nominations and Exemptions for MB Use

List of nominated (2005 – 2015) and exempted (2005 – 2014) 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	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	29.760	**29.76**	35.750	37.500	35.750	35.750	29.790	29.790	23.840+ 5.95	29.760	29.760	**29.760**	**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	Chrysanthe mums	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 seeds	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	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	5.261	**5.261**	(a)14.792	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	**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									
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										

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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 solanaceous)	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						
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						

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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						
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									

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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										
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									

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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 (+Andalucia)									20.000	15.000	43.490 (+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										
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										

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	610.339	415.067	373.660	231.540	2052.846	1730.828	1476.019	1349.575	1269.321	1007.477	812.709	678.004	532.442	415.067	373.660	231.540
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				
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: Historic Trends in non A5 Structural and Commodity Nominations and Exemptions for MB Use

List of nominated (2005- 2016) and exempted (2005 - 2016) amounts of MB granted by Parties under the CUE process for each commodity.

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	1.187		6.150	6.150	9.205	9.200	7.820	6.650	4.870	3.653	1.187	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 Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	**5.044**		(a)47	34.774	30.167	28.65	26.913	22.878	14.107	11.020	5.044	**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 Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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 Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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 Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	0.310		89.166	87.719	78.983	58.921	45.623	19.242	5.000	2.419	0.740	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	3.730	3.730	67.907	81.708	18.998	19.699	18.998	4.465	3.730	3.730	3.730	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	**22.800**		

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
USA	Research								0.159	0.159															