MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

MAY2020

VOLUME 2: EVALUATION OF 2020 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED ISSUES

INTERIM REPORT

UN environment programme

Montreal Protocol on Substances that Deplete the Ozone Layer

United Nations Environment Programme (UNEP)
Report of the Technology and Economic Assessment Panel

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Foreword

May 2020 TEAP Report

The May 2020 TEAP Report consists of 3 volumes:

Vol 1: 2020 Progress report
Vol 2: 2020 Interim CUN assessment report
Vol 3: Decision XXXI/1 – Replenishment

This is Volume 2

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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
ExMOP	Extraordinary Meeting of the parties
EPA	Environmental Protection Agency
EPPO	European Plant Protection Organisation
IM	Iodomethane (methyl iodide)
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
Non-A5	Non-Article 5 Party
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

Evaluation of Critical Use Nominations for Methyl Bromide Submitted in 2020 and Related Issues

Interim Report

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1 Executive Summary

The amount of MB requested for critical use nominations has fallen from 18,700 t submitted for 2005 to 111.411 tonnes submitted for 2019/2020, and to 88.851 t submitted for this 2021/2022 period. The total amount requested this year represented a 20% reduction from the request for critical use nominations submitted in 2019.

In this round, MBTOC received six nominations for critical use from four parties for 59.871 t of methyl bromide (MB) use in 2021(five nominations) and 28.980 t for use in 2022 (one nomination).

Of the 88.851 t of MB nominated, 53.851 t (60%) was for pre-plant soil uses against soil-borne fungal pathogens, nematodes and weeds, and 35.000 t (40%) was for structure and commodity uses against insect pests.

MBTOC is making a total interim recommendation of 69.607 t.

The accounting framework information received from parties reporting under Article 7 showed that a total of approximately 21.66 t of stocks were reported as available in both non-Article 5 (non-A5) and Article 5 (A5) parties at the end of 2019. MBTOC notes, however, that the accounting information in this report does not accurately show the total stocks of MB held globally for controlled uses by A5 parties, as some parties have no formal mechanism to account accurately for stocks for non QPS and QPS uses and there is no requirement for parties to report pre-2015 stocks under the Montreal Protocol. MBTOC considers that these latter stocks may be substantial (>1,500 t).

An emergency use application was received from Canada requesting 1.764 t of MB granted by parties for CUE be carried forward from 2019 to 2020.

2 Scope of the Report

This 2020 interim CUN report provides an evaluation by MBTOC of the Critical Use Nominations (CUNs) for methyl bromide (MB) submitted for 2021and 2022 by four parties: two non-A5 (Australia and Canada) and two A5 parties (Argentina 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.

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).

Standard presumptions used in this round (2020) were the same as those used in the 2019 evaluations of the CUNs. These are subjected to continual review. However, it is required that any changes proposed by MBTOC 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.

3 Critical Use Nominations for Methyl Bromide

3.1 Mandate

Under Article 2H of the Montreal Protocol, parties not operating under Article 5(1) (non-A5 parties) were required to phaseout all production and consumption (defined as production plus imports minus exports) of MB after 1stJanuary 2005. The same requirements applied to parties operating under Article 5(1) (A5 parties) after 1stJanuary 2015. However, the parties agreed to a provision enabling exemptions for those uses of MB that qualify as critical. Under Decision IX/6 of the Protocol parties established criteria, which all critical uses need to meet in order to qualify for an exemption (see Annex I 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 XXV/4, XXVI/2, XXVII/3, XXVIII/7, XXIX/6, XXX/9 and XXXI/4).

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.

Under Decision Ex I/4 it is stated that amounts of MB applied for in subsequent CUNs should '*avoid any increase in methyl bromide consumption except for unforeseen circumstances.*'

3.2 Fulfilment of Decision IX/6

Decisions XVI/2 and 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, in the sense of Decision IX/6, or, when the party did not 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 (i.e. a transition time for phase-in of alternatives). 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.

In view of the large numbers of sectors which have moved effectively to alternatives, it was considered particularly important in this round for the parties, particularly for A5 parties submitting CUNs, to clearly identify why MB is considered critical for the specific circumstances of the nomination. Now that technically and economically feasible alternatives have been identified for virtually all applications of MB, specific regulations (either national or local) on the use of these alternatives often affect the feasibility of using these alternatives by the end users. 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 in comparison to those with present MB usage.

3.3 Accounting Frameworks for Critical Use

Under the Dec Ex 1/4 9(f), parties previously applying for Critical Uses are required to continue to submit Accounting Frameworks. MBTOC suggests that parties may wish to consider a revision to submission of frameworks to enable accurate information on stocks.

For this 2020 round, all parties nominating CUEs submitted Accounting Frameworks. The Frameworks showed that there were approximately 21t of stocks for those parties required to report stocks.

A number of decisions (Ex.I/4 (9f); XVI/2(4); XVII/9(5) and subsequent 'Critical Use' Decisions set out provisions which request parties to submit in Accounting Frameworks 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 sets the timeline for reporting and also 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 have provided accounting frameworks on amounts used for critical uses and stocks as required under Dec Ex.1/4 (9f) (Table1.3). The same requirements apply to A5 parties after 2015.

For 2019, the Meeting of the parties (MOP) authorised Australia to use 28.98t of MB (Table 1.3). The party reported using the full amount for the critical uses in 2019, with no stocks remaining. For Canada in 2019, the MOP authorised 5.261 t for strawberry runners and the party in its CUNs reported that 3.497 t was used for the critical use from new imports of MB and stocks held at the end of the year amounted to 1.763 tonnes. Canada applied for a critical use to carry forward these stocks into 2020 as conditions were unfavourable for treatment in 2019. For A5 critical uses, the parties authorized 41.3 t to be used by Argentina (15.7 t for strawberry fruit and 25.6 t for tomatoes) and 41 t for use by South Africa (1 t for mills and 40 t for houses) (Table 1.3).

This is the seventh 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 annually, if CUNs are again submitted. Additionally, parties were requested to submit National Management Plans as required under Decision Ex. I/4(3). This request has been confirmed by Decision XXXI/4 taken at the 31st MOP.

3.4 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 to Fig 1.4, Annexes III and IV). Since 2005, there has been a progressive downward trend in the officially reported amounts of MB requested for CUNs by all parties for both soil and post- harvest uses, although this has occurred at different rates. Fig 1.1 and Tables 1.4a-1.4c show reduction trends in amounts approved/nominated by parties for 'Critical Use' from 2005 to 2021 for all uses. Fig 1.2 shows the reduction trend for the remaining soil uses in both non-A5 parties i.e. strawberry runners in Canada and Australia (Fig 1.3) and the reduction trends in Argentina (i.e. strawberry fruits and tomatoes) and Fig 1.4 the current and past commodity and structure uses in South Africa since 2015. The complete trends in phase-out of MB by country, as indicated by change in CUE, are shown in Annexes III and IV.

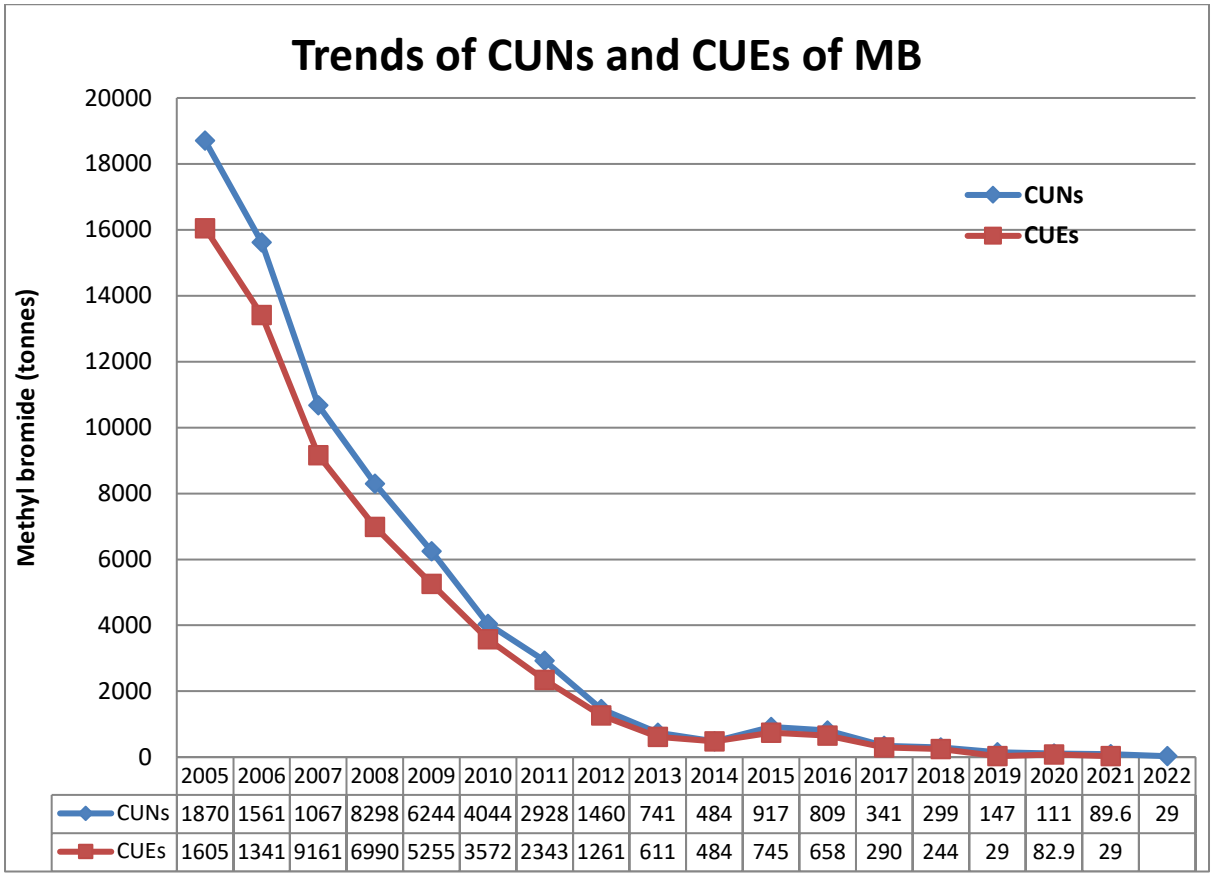
The nominated amounts and the apparent rate of reduction in MB or adoption of alternatives achieved by parties are shown in Figures 1.1 to 1.4. It is noted that for all parties that have pre-2005 (non A5 parties) or 2015 stocks (A5 parties) of MB that are being drawn down, the reductions in CUEs from year to year or uses not identified for CUEs cannot be taken directly as evidence of adoption of alternatives since pre-2005/2015 stocks may have been used (or may still be used) in the same sectors.

MBTOC also notes that no detailed management plans were received from Argentina and South Africa, however also noted their progress in reducing nominated amounts for the CUNs.

3.5 Disclosure of Interest

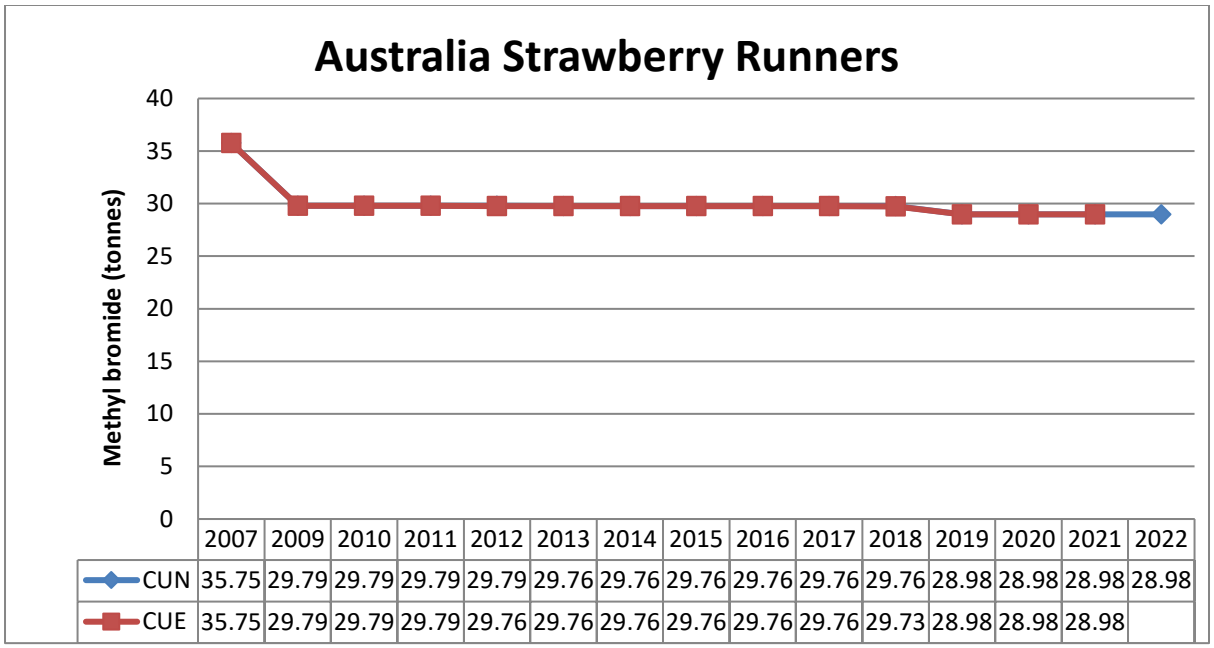
As in past assessments, MBTOC members were requested to update their disclosure of interest forms relating specifically to their level of national, regional or enterprise involvement for the 2020 CUN process. The Disclosure of Interest declarations for 2020, updated in February 2020 can be found on the Ozone Secretariat websiteat:https://ozone.unep.org/science/assessment/teap/methyl-bromide-toc-members and a list of members at the end of this report. As in previous rounds, some members recused 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. Details of recusals can be found in section 4.2.

Figure 1.1 Amounts of MB nominated (CUN) and exempted (CUE) for uses in pre-plant soil and commodities sectors from 2005 to 2022 by non-A5 and A5 countries

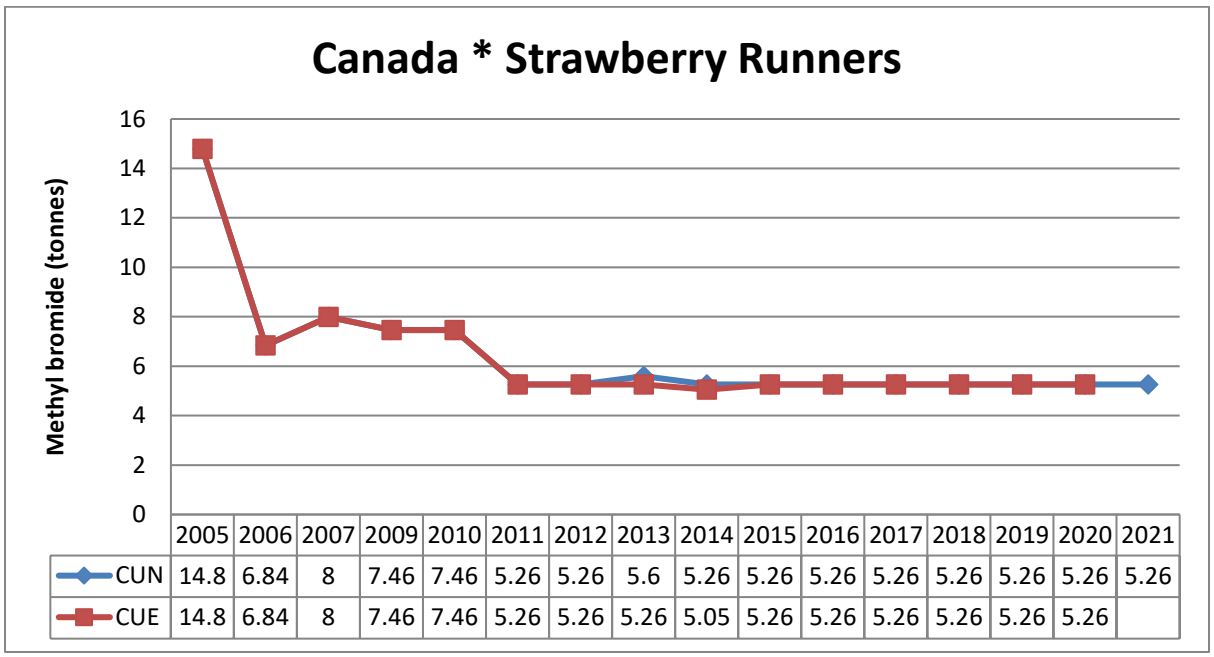


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CUNs	1870	1561	1067	8298	6244	4044	2928	1460	741	484	917	809	341	299	147	111	89.6	29
CUEs	1605	1341	9161	6990	5255	3572	2343	1261	611	484	745	658	290	244	29	82.9	29	

Figure 1.2 Amounts of MB nominated (CUN) and exempted (CUE) for uses in pre-plant soil sectors from 2005 to 2022 or 2021 by non-A5 countries: Australia and Canada respectively. Blue lines indicate the trend inMB nominated in the CUN and the red lines the amount of MB approved as a CUE by the parties



	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CUN	35.75	29.79	29.79	29.79	29.79	29.76	29.76	29.76	29.76	29.76	29.76	28.98	28.98	28.98	28.98
CUE	35.75	29.79	29.79	29.79	29.76	29.76	29.76	29.76	29.76	29.76	29.73	28.98	28.98	28.98	



	2005	2006	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CUN	14.8	6.84	8	7.46	7.46	5.26	5.26	5.6	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
CUE	14.8	6.84	8	7.46	7.46	5.26	5.26	5.26	5.05	5.26	5.26	5.26	5.26	5.26	5.26	

* Prince Edward Island

Figure 1.3 Amounts of MB nominated (CUN) and exempted (CUE) for uses in pre-plant soil sectors from 2015 to 2021 by A5 countries: Argentina . Blue lines indicate the trend in MB amounts nominated in the CUN and the red lines the amount of MB approved as a CUE by the parties

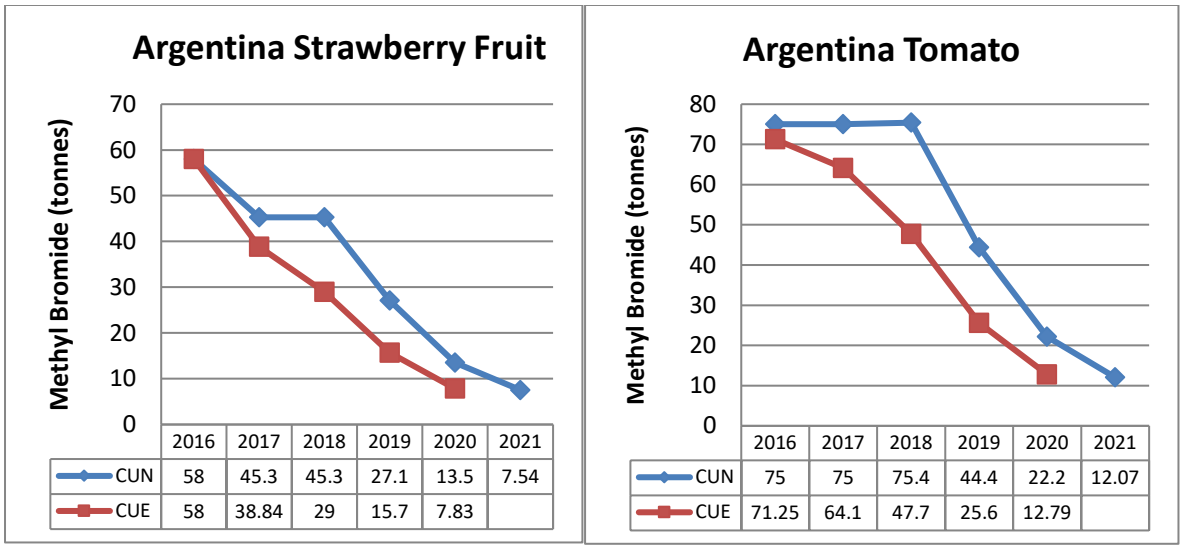
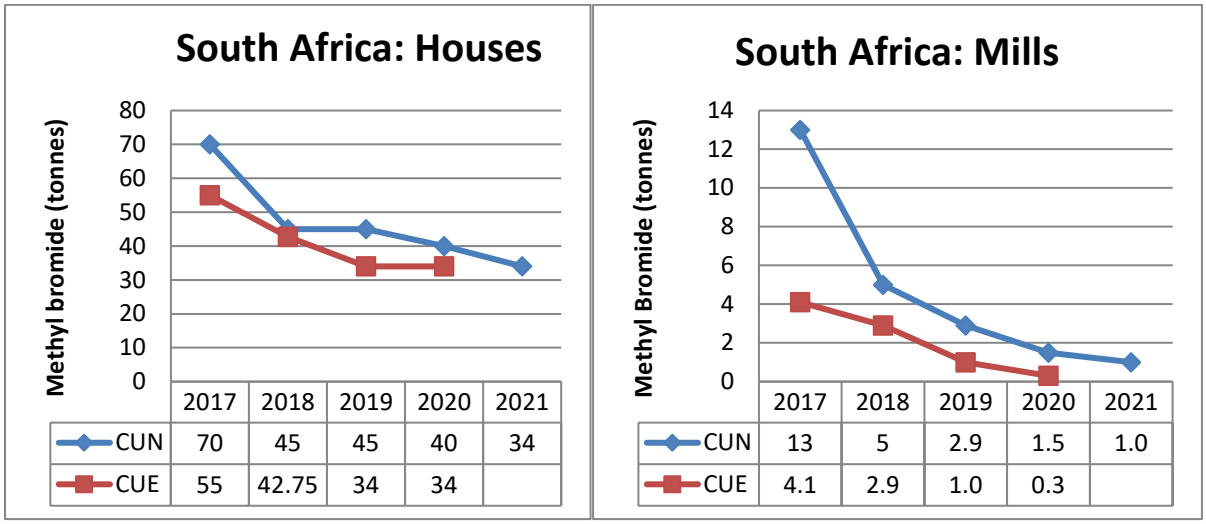


Figure 1.4 Amounts of MB nominated (CUN) and exempted (CUE) for uses in structural and commodity sectors from 2015 to 2021by A5 countries: South Africa (RSA). Blue lines indicate the trend in MB amounts initially nominated in the CUN and the red lines the amount of MB approved as a CUE by the parties



3.6 Article 5 Parties

MB was due to be fully phased out in A5 parties by January 1, 2015, 10 years after the phase-out date for 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.

In A5 parties, 91.5% of previous controlled uses were replaced by the 2015 deadline, largely as a result of investment projects implemented by the Montreal Protocol agencies with MLF funding, bilateral cooperation and also national funding. MBTOC notes that one A5 party submitting CUNs in this round (Argentina) has previously received substantial funding from the Multilateral Fund (MLF) for complete phase-out of MB by 1st January 2015 at the latest.

By end of 2019, over 99% of the global consumption for non-exempt uses has reportedly (under Article 7) been phased out. This assumption is provided parties report accurately. The reduction does not account for stocks still being used for non-controlled uses.

MBTOC is concerned that not all parties are aware of the need to report all uses (whether controlled or not) under Article 7 of the Protocol and urges the parties to reinforce the mechanisms for reporting and if necessary, to provide assistance to parties finding difficulties with their reporting obligations.

3.7 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 summary, 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;*

3.8 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.

To assist 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 2019 and 2020 are summarized in Tables 1.1 - 1.3 below.

MBTOC notes that reported stocks have significantly decreased in recent years, however the use of MB stocks makes the assessment of the rates of adoption of MB alternatives hard to assess. In A5 parties, there is no reporting mechanism for pre-2015 stocks and it is possible that there are substantial unreported stocks. There is also confusion in some parties as to whether stocks held by that party are for QPS or non QPS uses.

Reported stocks for controlled non QPS uses in non A5 parties are now small (see Table 1-3), but stocks held for other non-reported controlled uses may exceed 1500 t.

MBTOC suggests that accounting frameworks or Article 7 reporting could be improved to provide information on all stocks held by parties. This means that reporting would occur for parties which held any stocks of methyl bromide for controlled uses or have been granted critical uses of methyl bromide and still hold stocks and the exempt uses. These stocks would need to be reported as of the end of the year prior to the year of reporting**.**

MBTOC acknowledges that 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, 2017, 2018 and 2019as required under Decision Ex. 1/4 (9f). 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 Ex 1/4.

	CUEs authorized by MOP for 2005	**Quantity of MB as reported by parties (metric tonnes)**				
		Amount on hand at start of 2005[(a)]	**Quantity acquired for CUEs in 2005 (prod. +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 t; 2005 = 9,974 t.

Table 1.2 ***Quantities of MB 'on hand' at the beginning and end of 2018, as reported by parties in 2019***

Party	Critical use exemption authorized by MOP for 2018	Quantity of MB as reported by parties (metric tonnes)				
		Amount on hand at start of 2018	Acquired for CUEs in 2018 (prod.+imports)	Amount available for use in 2018	Used for CUEs in 2018	Amount on hand at the end of 2018
Australia	29.73	29.73	29.73	29.73	29.73	0
Canada	5.261	0.560	5.140	5.700	4.958	0.742
Argentina	76.7	76.7	76.7	76.7	76.7	0
China	87.24	87.24	87.24	87.24	87.24	0
RSA	45.65	4.8	45.65	50.45	45.4	? *

* Stocks reported by South Africa do not align from the reported data (full reported data not shown above).

Table 1.3 Quantities of MB 'on hand' at the beginning and end of 2019, as reported by parties in 2020

Party	Critical use exemption authorized by MOP for 2019	Quantity of MB as reported by parties (metric tonnes)				
		Amount on hand at start of 2019	Acquired for CUEs in 2019(prod. +imports)	Amount available for use in 2019	Used for CUEs in 2019	Amount on hand at the end of 2019
Australia	28.98	0	28.98	28.98	28.98	0
Canada	5.261	0.303	5.167	5.692	3.497	1.763
Argentina	41.3	0	41.23	41.23	41.23	0
RSA	41	8.7	41	49.7	29.8	19.9*

* Stocks reported by South Africa do not align from the reported data (full reported data not shown above).

Table 1.4a Summary of critical use nominations of MB (tonnes) for non A5 countries

Party	Quantity of MB Nominated																	
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
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	29.76	28.98	28.98	28.98	28.98
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	5.261	5.261	5.261	5.261	0
EC	5754.361	4213.47	1239.873	245.00	0	0	0	0	0	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	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	0	0	0	0	0
New Zealand	53.085	53.085	32.573	0	0	0	0	0	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	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	0	0	0	0	0
Total	**18704.241**	**15617.837**	**10677.552**	**8297.739**	**6244.487**	**4044.380**	**2928.142**	**1460.163**	**740.533**	**483.589**	**412.221**	**269.831**	**38.291**	**35.021**	**34.241**	**34.241**	**34.241**	**28.98**

Table 1.4b Summary of critical use exemptions of MB (tonnes) approved by the parties for non-A5 countries

Party	Quantity of MB Approved																
	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)**	**2017 (27 MOP)**	**2018 (28 MOP)**	**2019 (29 MOP)**	**2020 (30 MOP)**	**2021 (31st MOP)**
Australia	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	29.73	28.98	28.98	28.98
Canada	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	5.261	5.261	5.261	5.261	
EC	4392.812	3536.755	689.142	245.146	0	0	0	0	0	0	0	0	0	0	0	0	
Israel	1089.306	880.295	966.715	860.580	610.854	290.878	0	0	0	0	0	0	0	0	0	0	
Japan	748.000	741.400	636.172	443.775	305.380	267.000	239.746	219.609	3.317	0	0	0	0	0	0	0	
New Zealand	50.000	42.000	18.234	0	0	0	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	0	0	0	
USA	9552.879	8081.753	6749.060	5355.976	4261.974	3232.856 +2.018	2055.200	993.706	562.328	442.337	376.900	234.780	0	0	0	0	
Total	**16050.089**	**13418.200**	**9160.714**	**6990.039**	**5,254.838**	**3866.583**	**2343.024**	**1261.304**	**610.888**	**483.589**	**411.951**	**269.831**	**35.051**	**34.991**	**34.241**	**34.241**	**28.98**

Table 1.4c Summary of Critical Use Nominations and Exemptions of Methyl Bromide (tonnes) for A5 countries

Party	Quantity of MB Nominated							Quantity of MB Approved						
	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021
Argentina	245	177.0	120.3	120.7	71.5	35.70	20.33	134.3	129.25	102.94	76.70	41.31	20.62	
China	120	114.0	99.75	92.977	0	0	0	114.0	99.75	92.977	87.24	0	0	
Mexico	140	120.978	0	0	0	0	0	84.96	84.957	0	0	0	0	
South Africa	-	81.6	83.0	50.0	41.5	41.5	35.0	-	74.062	59.10	45.65	41.00	34.3	
Total	**505**	**411.978**	**303.05**	**263.677**	**113.0**	**77.20**	**55.33**	**333.26**	**388.019**	**255.017**	**209.59**	**82.31**	**54.92**	

4 CUNs Submitted in the 2020 Round for 2021 and 2022 Exemptions

All parties requesting CUNs in 2020 for critical use exemptions in 2021or 2022 sent information to the Ozone Secretariat around the January 24, 2020 deadline.

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, or MBTOC required clarification, a request of the information required was sent to the parties, via the Secretariat, prior to the interim assessment.

For pre-plant soil uses of MB, Australia and Canada submitted CUNs for the same amounts as in previous rounds, highlighting difficulties with phase-out of MB for the strawberry nursery sector specifically. With respect to A5 parties, Argentina submitted CUNs for the strawberry fruit (open field) and tomato sectors (protected) which were substantially lower than the previous year.

For MB use in the postharvest and structure sectors, two CUNs were received from South Africa. These were for 1.0 t for disinfestation of three old grain mills, and 34.0 t for disinfestations of domestic houses and similar premises against specific noxious pests.

For 2021, the total amount of MB nominated was 89.571 t; MBTOC has made an interim recommendation of 40.627 t.

For 2022, one party nominated 28.98 t of MB; MBTOC has made an interim recommendation for the full amount.

In general, the justification for CUNs being submitted by parties related to the following alleged issues; environmental conditions and regulatory restrictions 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 MBTOC to explicitly state the specific basis for the parties' economic statement relating to CUNs. Tables 1.09 -1.11 provide this information for each CUN as prepared by the MBTOC economist and the MBTOC members. MBTOC notes the standard of the economic information supplied by the nominating parties varied.

4.1 Critical Use Nomination Review Process

MBTOC conducted its interim assessment at a meeting in New Delhi, India from 2-6 March 2020. This meeting was held in accordance with the time schedule for the consideration of CUNs as required by Decision XVI/4 (see Annex 1). During the meeting in New Delhi, MBTOC conducted a field trip to observe rice fumigation for QPS with methyl bromide as well as successful alternatives (e.g. phosphine). Meetings were held with industry representatives to learn more about QPS use of methyl bromide in India.

Eleven MBTOC members (out of 17) with expertise in MB pre-plant soil use against soil-borne pathogens and weeds, pests in structures and commodities (SC) and in quarantine and pre-shipment (QPS) applications of MB attended the meeting. Arrangements were made to allow members who could not attend the meeting to participate in sessions via teleconference, whilst others provided their advice via email. MBTOC worked as a single committee, not in sub-committees; recommendations were discussed and signed off in plenary and by consensus. This schedule 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.

In assessing the CUNs submitted in 2020, 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. 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. The economic viability of production was also considered.

For 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 disinfestation standards in treated structures or mills. It was confirmed that methyl bromide fumigation was not specifically required for disinfestation of houses against wood-destroying insects in RSA (a CUN for this round of nominations) to obtain a valid `Beetle Certificate of Compliance', a requirement when selling a house there. MBTOC considers that sulfuryl fluoride should be trialled to determine if it can also be used to rid houses of insects and thus justify the sale of houses under the same certificate.

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

4.2 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 meetings.

Two members - Alejandro Valeiro (recusing from Argentina strawberry fruit and tomato) and Ian Porter (recusing from Australian strawberry nurseries)] voluntarily recused from recommendations on nominations as required by MBTOC's working procedures. Recused members remained able to respond to technical questions at the request of the MBTOC.

5 Interim Evaluation of 2020 Critical Use Nominations for Methyl Bromide for Pre-plant Soil Use in 2021 and 2022

5.1 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.

Detailed information on the nominations can be found in Table 1.9 and 1.10.

Table 1.5 Summary of the final recommendations (in square brackets) for CUE's for pre-plant use of MB (tonnes) submitted in 2020 for 2021or 2022 use

Country and Sector	Non-Article 5 Party Nomination	A5 Party Nomination	Interim Recommendation (tonnes)
1. Australia (2022)			
Strawberry runners	28.98		[28.98]
2. Canada (2021)			
Strawberry runners	5.261		[5.017]
3. Argentina (2021)			
Strawberry fruit		7.54	[4.35]
Tomato		12.07	[6.96]
TOTAL	**34.241**	**19.61**	**[45.307]**

5.2 Issues Related to CUN Assessment for Pre-plant Soil Use

Key issues which influenced assessment and the need for MB for pre-plant soil use of MB in the 2019round were:

i) For all nominations, except Australia, barrier films were considered as a technology to reduce rates and emissions of methyl bromide. For the strawberry runner industry in Australia, the party presented data demonstrating that heavy soil types trap methyl bromide as effectively with LDPE films as barrier films under the circumstances of the nomination. MBTOC still considers barrier films should be adopted as a treatment to reduce emissions, however this has no impact on the assessment as Australia has a regulation preventing a reduction in dosage rates of MB for the specific use and has presented data that lower rates are less effective.

ii) The Australian research program continues to trial many options for replacement of MB in strawberry runner production. Australia has put forward a transition plan based on the registration of MI (methyl iodide), which would lead to complete phase-out of MB by 2022, and a transition use of 50% in 2021, if MI becomes registered in time".

iii) When using alternative fumigants that are available for fruit production, the Australian strawberry fruit industry has reported significant losses due to charcoal rot (*Macrophomina phaseolina)* and concern exists about its potential increased prevalence in nursery industries after use of some alternatives to MB (Chamorro *et al*., 2016, Gomez *et al*., 2020). *Macrophomina* has a large host range and is reported in crops that have never used MB (soybean, cotton, sunflower, cassava, etc) (Kaur *et al*., 2012) and even in strawberry before the MB phase-out deadlines, or when MB was still in use under CUEs (Zveibil *et al.*, 2005; Koike, 2008; Baino *et al.*, 2011). Although problems are still reported with most alternatives under study, the party reports that MI has proven effective to control these pathogens, as well as other pests controlled with MB.

iv) The Canadian nomination had in the past been relying on a groundwater study to determine whether chloropicrin (Pic), a key alternative, can be granted a permit for use on Prince

Edward Island, but this study has not gone ahead and the grounds for banning Pic as a groundwater contaminant (whilst its mixtures with MB are permitted) are difficult to understand fully. Owing to this situation, MBTOC considers that soilless technologies which are presently adopted for certain stages of production are suitable as a technical alternative and have suggested to the party a number of technologies which should be considered for use in Canada which will impact future nominations, if sought.

v) The Argentinean nominations are for sectors where a number of alternatives have been adopted in all A5 and non-A5 parties, however according to the party, specific issues with cold soils and market windows are of concern for uptake of the major chemical alternatives. A key pest of tomato, the *Nacobbus aberrans* (false root-knot) nematode is requiring specific consideration as no resistant varieties or rootstocks have been identified for this pest.

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

5.3 General Comments on the Assessment for Pre-plant Soil Use

MBTOC continues to encourage parties to consider a review of regulations covering the registration, use and adoption of alternatives. MBTOC notes that a proportion of MB has been nominated for uses where regulations or legislation prevent reductions of MB dosage and encourages parties to review such regulations where possible. For a particular case, the mandatory use of MB is specified at a high dosage for treatment of certified propagation material. For other CUNs, regulations on the use of alternatives or their lack of registration are preventing their uptake for a substantial proportion of the remaining CUNs for pre-plant soil use.

5.4 Registration of Alternatives for all Controlled MB 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 (Tables1.9, 1.10 and 1.12).

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.

5.5 Decision XXV/4 Regulations Impacting the Use of Alternatives

In response to Decision XXV/4 from the 25th MOP, MBTOC notes that all of the non-A5 nominations contained a discussion of national, sub national 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.

5.5.1 Regulations impacting use of alternatives by country

- **Australia:** Several potential alternatives have been identified.TriForm-80® (1,3-D/Pic, 20:80) showed promise in trials in reducing the risk of phytotoxicity occurring in strawberry runners in Toolangi, Victoria, but is not technically feasible on its own as it does not control pathogens and weeds as effectively as MB/Pic. Co-application with herbicides, i.e. isoxaben and phenmedipham gave excellent results but these are not yet registered for strawberry runners in Australia. The industry has taken steps towards the registration of methyl iodide

(MI), which has been previously been identified as a feasible alternative. If registered successfully, adoption of MI would lead to MB phase-out by 2022 (see Table 1.9)

- **Canada**: Groundwater warning statements are currently on Canadian pesticide labels for all key fumigant replacements to MB and also for MB/Pic formulations, but the government of PEI only accepts MB/Pic mixtures to be used for soil disinfestation.

- **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. A decree currently in force in Mar del Plata prohibits use of alternatives and allows only MB for soil fumigation. For several years the party has reported that reviews are ongoing to change this situation in the near future, however MBTOC is not aware of any progress in this respect.

- **South Africa**: Sulfuryl fluoride received registration for mills and houses in January 2018. The party has argued for some time being needed for adoption and market penetration of this alternative. EDN registration is under consideration.

5.5.2 Health effects of MB use and environmental acceptability

Over the past two decades numerous studies have characterised 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 (Gemmill *et al*., 2013, De Souza *et al*., 2013, Bulathsinghala and Shaw, 2014). Other known target organs are the heart, adrenal glands, liver, kidneys and testis (Gemmill *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*., 2010a and 2010b) and even in a home used for vacations (Sass, 2015).

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; Cockburn *et al.*, 2011). In another study (Gemmill *et al*., 2013), a correlation was found between impaired foetal growth during the third trimester of human pregnancies and exposure to methyl bromide in residential areas. A recent study focused on toxicity effects from chronic use of methyl bromide, finding that effects of exposure at what are believed to be safe and appropriate concentrations of methyl bromide under federal guidelines are under-reported and not previously present in the literature. Patients included in this study developed similar syndromes of ataxia, urinary retention and psychiatric symptoms that were matched by unique abnormalities on MR imaging of the brain and serum lab abnormalities (McCall *et al.*, 2016).

Risk of exposure is or has been especially high when small disposable canisters (i.e. 500 to 750g) are used for MB fumigation for pre plant soil under plastic sheets or commodity use in non QPS and QPS applications. Canister applications have been eliminated for soil use in all non-A 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. Also, canister applications are not considered as effective for pathogen control as injection of MB/Pic mixtures, such applications are more likely to lead to high emissions of MB as the gas is released immediately beneath plastic barrier sheets. MBTOC also notes that, in some circumstances, MB can leak out from the canister. MBTOC notes with concern that canister use is still allowed for 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**.**

5.6 Sustainable Alternatives for Pre-plant 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 and countries in the world where successful chemical and non-chemical alternatives e.g. soil less culture, grafting, solarisation, steam, bio-disinfestation (biofumigation) and anaerobic soil disinfestation, are used as sustainable alternatives to MB for strawberry runners, strawberry fruit and tomato production. Several parties consider these techniques as viable alternatives, particularly when an integrated approach that combines different options is adopted.

5.7 Standard Presumptions Used in Assessment of Nominated Quantities

The tables below (Tables 1.6 and 1.7) present the standard presumptions applied by MBTOC for this round of CUNs for pre-plant soil uses. These standard presumptions were first proposed in the MBTOC report of October 2005 and were presented to the parties at the 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 most studies have shown that rates of 200 kg/ha (20 g/m^2) or less of MB: Pic 50:50 to be 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 sometimes involves regulations specifying the mandatory use of a specific 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.

Table 1.6 Standard presumptions used in assessment of CUNs for pre-plant 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 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 pre-plant soil use of MB by sector used since 2009 (standard presumptions) with or without barrier films.

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

5.8 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 soil-borne 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 pre-plant 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 (see previous MBTOC CUN reports: http://ozone.unep.org/en/assessment-panels/documents) 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*

5.9 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 pre-plant 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.,* 2002). These latter technologies have not been reported or adopted widely by parties.

In southeast USA, the reported use of barrier films in vegetable crops expanded rapidly to over 20,000 hectares in a few years. MBTOC notes that barrier films, particularly totally impermeable films (TIF), can be used with alternatives and this is consistently improving the performance of alternatives at lower dosage rates (Driver *et al*., 2011; Cabrera *et al.,* 2015; Weilland *et al.,* 2016) and making them more acceptable as a replacement to MB. For example, effectiveness at lower dosages can allow for greater areas to be treated with 1,3-D under township cap regulations in the US

Table 1.9 Interim recommendations for CUNs from non A5 Parties for pre-plant soil fumigation submitted in 2020 for use in 2021 and 2022.

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]	CUE for 2017[13]	CUE for 2018[14]	CUE for 2019[15]	CUE for 2020[16]	CUE for 2021	CUN for 2022	Interim recommendation for 2022
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	28.98	28.98	28.98	28.98	[28.98]

MBTOC interim recommendation for 2022:

MBTOC recommends 28.98 tonnes of MB for this use in 2022. The Party nominated 28.98 tonnes, stating that they will reduce the licensed amount to 0 tonnes if methyl iodide (MI) is registered in 2021 and accessible for all the treatments in 2022. In the 2018 nomination, the Party put forward a transition plan for phasing-out MB, based on the registration and availability of methyl iodide (MI), stating that if registration is achieved by 2021, then that year the nomination amount will be reduced by 50% (to 14.49 t from 28.98 t.), and CUN requests will cease entirely from 2022 onwards.

The Party nominated 28.98 t for 2022 to treat 119 ha (at a dosage rate of 25 g/m^2). However, the party commits to reduce this amount to 0 in 2021 if methyl iodide (MI) is registered by 2021 or research shows that there is a (are) registered substitute product(s) that is (are) as effective as MB/Pic in controlling soil-borne pathogens at that time.

Circumstances of the nomination by the Party:

The combination of the particular environmental conditions of Toolangi, Victoria, (i.e. heavy soil type, soil temperatures, wind), together with a small-size economic sector (10 growers producing on an area of 119 ha) and stringent regulations (e.g. registration requirements, minimum dosages, a strict certification system) constitute barriers for implementing alternatives. This region is suited for runner production because of its high elevation and climate, allowing for production of runners in the correct physiological state for fruit production. The heavy clay soils there are difficult to fumigate to the depth required to produce pathogen-free runners at the appropriate standard level, plus cold soil temperatures negatively impact the performance of some alternatives. Elsewhere in Australia, where conditions are different, runners are produced without recourse to MB, using alternative fumigants.

Key pests affecting strawberry runner production are fungi (*Phytophthora, Pythium, Rhizoctonia and Verticillium spp*.) and weeds (*Senecio arvensis, Agrostis tenuis, Raphanus spp., Poa annua, Cyperus spp)*. In its CUN, the party states that runner production under the conditions described, requires treatment with MB: Pic (50:50 at a MB dosage of 25 g/m^2) to meet certification standards. Other registered soil fumigants, such as 1,3-dichloropropene (1,3-D)/Pic (65:35), cause crop phytotoxicity and yield losses of up to 40%. Phytotoxicity is related to the high organic matter (5-10%) and clay content (> 50%) of soils at Toolangi, and the long residual times of alternative fumigants in these soils (Mattner *et al*., 2014). Presently, the Victorian runner industry only produces runners in soils treated with MB: Pic, except for the foundation stock production stage, which is produced in soilless substrates (Mattner *et al*., 2015, Mattner *et al.,* 2017). The party has found other non-chemical alternatives unfeasible for the moment. Plant resistance is unreliable as an alternative to MB: Pic for delivering certified runners (Fang *et al*., 2012). An alternative 1,3-D/Pic, 20:80 (Triform, TF80®), which was recently registered, showed promise in trials as the its low concentration of 1,3-D reduced the risk of phytotoxicity in the strawberry runners; however, the Party indicates that this fumigant is not technically feasible. Historically, VSICA has only approved MB/Pic as a treatment for runners, arguing that high levels of pathogen control are essential for production of certified high health runners with reduced risk of litigation.

Further research is being conducted with EDN +Pic and TF-80® with improved application technologies, and outdoor for soil-less production systems of runner tips. Trials continue with microwave use and results indicate the technology is in the early stages of development.

		Mixtures of methyl iodide (MI) and chloropicrin (Pic) have previously been shown to consistently control soil-borne pathogens as effectively as MB/Pic in runner trials. The runner industry has become the registrant for MI in Australia and is aiming to achieve registration of this fumigant in 2021 and full commercial use by 2022, subject to the independent processes of the regulatory authorities. In 2018, the Party put forward a transition plan for phasing-out MB, based on the registration and availability of methyl iodide (MI), stating that if registration is achieved by 2021, then that year the nomination amount will be reduced by 50% (of 28.98 tonnes), and CUN requests will cease entirely in 2022. **MBTOC assessment for MB use in this sector in 2022:** MBTOC accepts the party´s submission that MI/Pic is an efficient alternative to MB for control of pathogens and weeds on strawberry runners under the circumstances of this nomination. Mixtures of MI + Pic have been shown to control soil-borne pathogens consistently and as effectively as MB/Pic in runner trials, making this the most viable alternative, but which is yet not registered. MBTOC notes previous experiences with MI use in other countries where public perception and concerns over its use led to its market withdrawal and encourages the Party to continue researching other alternatives (ECHA, 2011; NIOSH, 1994; Safe Work Australia, 2019). MBTOC once again recognizes the Party's continued efforts in researching and developing an array of MB alternatives (Gomez *et al*., 2019; McFarlane *et al*., 2019a, b) in line with Decisions IX/6 and XXV/4. Soilless substrates in protected production systems are now in place for the Foundation stocks and in the Mother Stock. According to the economic assessments conducted by the Party, this option cannot be expanded to the final two certified runner generations as it is not economically feasible. **MBTOC comments on economics provided in CUN for 2022:** The Australian system is to propagate from a nucleus phase to foundation stock to mother stock (all of which have already migrated to soilless culture) and then the certified stock is grown in open fields. The number of plants increases at each phase. The Party acknowledges that the migration of the mother stock to soilless culture increased the cost, especially because of the greater labour requirement, this additional cost could be absorbed into the price of the certified stock. However, this pass-on in price was not possible in the case of certified stock as the labour requirement increased exponentially and Australian labour costs are very high. In the 2019 CUN the Party based their calculation of the cost of the certified stock on industry experience with the cost of producing the foundation stock. However, the industry acknowledges that the cost of mother stock would be more realistic as it was closer in scale to the cost of production of certified stock, hence the costs were recalculated for the 2020 CUN. The result which MBTOC considers as plausible is even greater losses because of the additional (large) labour requirement. **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b (i) Emission reduction:** Over the past years, improved agronomic practices implemented by Toolangi runner growers have significantly increased yield per hectare. MBTOC understands that improved productivity could have been used to reduce the area treated with MB, which would have reduced emissions. New approaches and products are available to reduce emissions, such as the use of TIF. MBTOC recognizes the party is working on their use. TIF has contributed to reduce emissions of fumigants in many other parts of the world. • **Dec. IX/6 b (ii) Research program:** An approved and funded research program is currently in place at the time of this nomination. • **Dec. IX/6 b (iii) Appropriate effort:** There is a 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]	CUE for 2017[14]	CUE for 2018[15]	CUE for 2019[16]	CUE for 2020[17]	CUN for 2021	Interim recommendation for 2021
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	5.261	5.261	5.261	5.261	[5.017]

MBTOC interim recommendation for 2021:

MBTOC recommends an amount of 5.017 tonnes, which represents a reduction of the MB requested for the production of G2A-stage tips as MBTOC considers that facilities presently being constructed by the applicant will be available to use soilless technologies by 2021.

MBTOC is still concerned that the authorities at PEI continue to ban the use of fumigant alternatives to methyl bromide, particularly when the nomination provided by the party states the following information from the national review of alternatives. That is, *"1. When used according to label directions, chloropicrin or products containing chloropicrin are unlikely to affect human health and are not expected to pose risks of concern to the environment. 2. Ground water analysis. No Canadian groundwater monitoring data on chloropicrin are available. However, information from American groundwater monitoring studies from California and Florida (the most important Pic users in the US) is available and was considered. There were no detections of chloropicrin in California. In Florida, Chloropicrin was detected in less than 0.1% of samples, at very low levels ranging from 0.02 to 1.2 µg/L. Therefore, residues of chloropicrin in drinking water (ground water) are not considered to be of concern to human health under the current conditions of use as a soil fumigant."*

MBTOC still acknowledges that according to the statement by the party that an effective chemical alternative, chloropicrin, is registered in Canada, but not permitted to be used in Prince Edward Island (PEI) because of potential groundwater contamination concerns by the government of PEI. As above, the reports and stated information in the nomination, by the Party show no groundwater contamination by chloropicrin of concern. This same situation exists for other alternatives like metham sodium or metham potassium. The label for these products approved by Health Canada's *Pest Management Regulatory Agency* contains a warning of potential of groundwater contamination. In applying a risk-averse approach and in the absence of any routine groundwater monitoring for chloropicrin, the authorities in PEI will not issue permits to use these substances, even for the purposes of trialling/testing, but do allow use of the MB/Pic mixture despite the concerns. In view of this situation, MBTOC considers that the Party's approach to adopt soilless substrate production as suitable to replace MB should be rapidly implemented to phase out MB as soon as possible and has assessed on this basis.

The Party has adopted barrier films (VIF or TIF) and uses a rate of MB (i.e. 20g/m^2), which meets MBTOC standard presumption for certification of propagation material. The Party label does not allow lower rates of formulations of MB:Pic (50:50) to be used for this purpose, so rates of MB are unable to be lowered further.

MBTOC acknowledges that soilless production is a non-chemical alternative to MB widely used in strawberry runner production (López-Galarza *et al*., 2010, Rodríguez-Delfín 2012). The Party has three years of testing Botanicoir soilless systems outdoors, but these trials have been affected by unforeseeable, external factors such as drought, hail, and crows. In addition, part of the harvest gets delayed by 3 weeks, which might affect the market. The Party has been constructing a greenhouse since 2019 to allow testing G2 runner tip production under controlled conditions. MBTOC recognizes the need for time to scale up of this technology, and therefore MBTOC recommends that adoption is possible for 10% of the nominated amount for the G2 tip production in 2021, when produced in soilless culture in the greenhouse, and has reduced the recommendation accordingly.

Nomination by the Party for 2021:

The party nominated 5.261 t of MB, which is the same amount granted as a CUE for 2020 and all previous CUEs since 2011. It is for strawberry runner production on 26.3 ha of land, including the two stages ((G1: 2 ha, G2-RT: 12.15 ha, G2-BR: 12.15 ha). of multiplication of plants, which are exported from PEI. The nomination is

		based on a reduced rate of MB of 20 g/m² (instead of 50 g/m^2) under high barrier plastic covering the entire cropping area, which is consistent with MBTOC's standard presumptions for certify propagate materials. **Circumstances of the nomination by the Party**: Chloropicrin is registered for use in Canada and thus can be used as a pre-plant fumigant for strawberry runners under certain conditions, however, the government of PEI does not allow its use due to concerns regarding groundwater contamination (the Island relies on groundwater for their potable water and the soil type is sandy). Metham sodium or metham potassium are also prohibited due to the same concerns. In applying a risk-averse approach, the authorities in Prince Edward Island will not issue permits for trialling or use of these alternative fumigant products, nevertheless use of Terr-O-Gas (MB/Pic 67:33) as a pre-plant fumigant in strawberry runner production is permitted because it has been successfully used by the grower for over 30 years and has not resulted in any known contamination of groundwater. The analysis by the party shows that shifts to Haygrove soilless cultivation would carry significant changes in production methods and that higher associated costs would result in significant market disruption in the near term, while only serving to address methyl bromide used for G1 foundation stock (405kgs). This represents only a small fraction of the problem as, due to the lack of alternatives, the grower would continue to require a chemical fumigant to produce G2 runner tips (2,430kg) and bare roots (2,430kg). The label for the fumigant does not allow to use lower rate for the MB use for this purpose. **MBTOC assessment for MB use in this sector in 2020:** MBTOC is of the opinion that soilless production is a suitable alternative for strawberry runner production and encourages the party to adopt the soilless cultivation system to phase out MB use. MBTOC considers soilless production to be technically feasible for all stages of production (López-Galarza *et al.*, 2010, Rodríguez-Delfín; 2012; Miranda *et al*., 2014), however the party has not yet trialled soilless production in the greenhouse, nor for the G1 generation in the context of PEI or the G2 Bare rooted production. MBTOC recognizes efforts to expand adoption of substrates for some stages of production and urges the party to consider expansion for all stages in the absence of chemical alternatives being available or adopted for pre-plant soil treatment as indicated by Dec. IX/6 b (iii). MBTOC is aware that chloropicrin (Pic), although an effective alternative, cannot be used in PEI due to groundwater concerns, and continues to be unclear as to why PEI allows the use of Pic in mixtures with MB, urging the party and regulators in PEI to use a consistent regulatory approach to all alternatives. The label for all key alternatives and MB is approved by Health Canada's *Pest Management Regulatory Agency* and contains a similar warning on all of potential to contaminate groundwater. The soilless production approach is more sustainable and safer than chemical fumigants. The open field substrate production scheme evaluated offers a less costly option than protected production in greenhouses, but trials have proven this outdoor system to be susceptible to environmental elements such as the weather and bird damage. Greenhouses and low plastic tunnels to cover outdoor soilless production rows may offer a further low-cost option to help reduce the impacts of unpredictable weather and animal pests. **MBTOC comments on economics provided in the CUN in 2020:** In the past, the Party has provided the cost of producing G2 runner tips with the Haygrove soilless system but has argued that the cost is 3.15 times that of the use of methyl bromide. MBTOC notes that unless the Party contends that the yield and the price at which the tips are sold remains unchanged, a comprehensive partial budget is required, as the impact on net revenue is the important variable, not merely the cost increase. In the absence of at least a partial budget, MBTOC cannot adequately evaluate the economic information provided in the nomination. In the latest CUN, as for the previous nomination, the party has provided cost data for the use of "Botanicor Precision Plus" growbags. Trials show some evidence of technical feasibility for two varieties of strawberries (Chandler and Camarosa) at certain plant densities. While promising, further trials are required to see whether these results are replicable. From an economic point of view, the Party shows that the costs of using the growbags are considerably higher than for methyl bromide, but that greater efficiencies were possible as more was learned about the best way of introducing them, i.e. of reducing costs or improving productivity. More time was also required for this to happen. At this stage a more comprehensive economic analysis would have to be undertaken.

		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:** A new research program focussed on substrate production as a key alternative to MB has been operational for three years. • **Dec. IX/6 b (iii) Appropriate Effort:** MBTOC recognizes the efforts to research substrates for later production stages and urges the party to expedite these research efforts to secure alternatives as indicated by Dec. IX/6 b (iii).

[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, [12]MOP26**,** [13]MOP27, [14]MOP28, [15]MOP29, [16]MOP30

Table 1.10 Final recommendations for CUNs from A5 parties for pre-plant soil fumigation submitted in 2020 for use in 2021.

Country	Industry	CUE for 2015[1]	CUE for 2016[2]	CUE for 2017[3]	CUE for 2018[4]	CUE for 2019	CUE for 2020	CUN for 2021	Interim recommendation for 2021
Argentina	Strawberry Fruit	70	58	38.84	29.00	15.7	7.83	7.54	[4.35]

MBTOC interim recommendation for 2021:

MBTOC recommends 4.35 t for strawberry fruit use in 2021. This reduction is based only on the adoption of barrier films (e.g. VIF, TIF) for the nominated areas. This includes 1.523 t for Mar del Plata [(17.5 ha x 58% X 15 g/m^2) and 2.827 t for Lules [(32.5 ha x 58% x 15 g/m^2). This rate of 15 g/m^2 is based on the use of VIF or TIF and row treatments that make up 58% of the field area.

MBTOC acknowledges the party has steadily reduced MB use from 70.0 t in 2015 to 7.83 t respectively in 2020.

Nomination by the Party for 2021:

The Party nominated 7.54 t for a total of 50 ha, with 2.64 t for Mar Del Plata (17.5 ha) and 4.90 t for Lules (32.5 ha) using a rate of 26 g/m^2 of 70:30 MB/PIC within rows that make up 58% of the fields.

MBTOC has recommended in the last four CUN rounds, the use of VIF/TIF in strawberry fruit to reduce dosage rates from 26 g/m^2 to 15 g/m^2 of MB in mixtures of MB/PIC. Growers all over the world have benefited greatly from using barrier technology to reduce the MB dosage, reducing MB emissions, and minimizing the legal requirement for large buffer zones which are in place in many countries (Chow and Scholten, 2016).

The target pests in Mar del Plata are the weeds, *Cyperus esculentus* and *C. rotundus* (nutsedges), and several strawberry pathogens (Phytophthora root and crown rots, *Verticillium*, Anthracnose, and Black root rot) and several insects pests (root weevils, white grubs, strawberry rootworm, cutworms, and nematodes). The target pests in Lules, Tucumán Province are primarily the plant pathogens Phytophthora root and crown rots, *Verticillium*, Anthracnose, *Rhizoctonia, Fusarium, Pythium and Macrophomina*.

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. 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 rate of 0.25 l/m^2 with two 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 also not available. Non-chemical alternatives, in particular combining biofumigation with solarisation is now being studied for potential use in this region.

MBTOC accepts that 1,3-D/Pic may be more difficult to use in cooler regions such as in some areas of Mar del Plata and recognizes the issues with commercial scale-up in some regions of the nomination. The Party showed MBTOC the impact of high disease pressure caused by leasing soils cropped recently with vegetables, particularly potatoes, which

	harbour some strawberry pathogens (e.g. *Rhizoctonia sp.*, *Verticillium sp*.). MBTOC suggests that this practice should be avoided where possible to improve the performance of alternatives. The Party also indicated that most growers get a two-year crop from one application of MB/Pic, however yields can be 50% less in the second year. **MBTOC assessment for MB use in this sector in 2021:** MBTOC has assessed that in the absence of alternatives being available that barrier films should be used for the remaining use. MBTOC notes that alternatives are available for strawberry fruit in other regions of Argentina and around the world, however this may require some improvements in application methods in order to be effective in these regions of Argentina. MBTOC acknowledges the Party for ongoing negotiations to change the decree in Mar del Plata that previously has prevented the use of alternatives such as Pic, DMDS, dazomet, metham sodium and 1,3D/Pic to assist with phasing out this nomination. MBTOC also commends the party for initiating studies to re-evaluate the use of solarization by combining it with high levels of residues, and they might consider the use of other carbohydrate sources that come from agricultural waste products (such as molasses). Any future nominations should provide a phase out plan and the results of scientific studies demonstrating the effects of the length of the plant back periods for 1,3-D/Pic in Mar del Plata (cooler conditions) and in Lules (warm conditions), as compared to MB (70:30), in accordance with Decision IX/6. Further validation is required to support the longer plant back times for 1,3-D/Pic in the heavy rainfall region of Lules. MBTOC also noted that a high proportion of the present MB/Pic use is applied through drip irrigation lines used to irrigate strawberry crops, however shank application of MB/Pic formulations is considered a more effective application method. Shank injection of methyl bromide has been shown to improve the performance of both MB/Pic mixtures and that of alternatives and could provide better yields in the second-year crop. MBTOC is also aware of references indicating that some alternatives may be effective, such as the use of allyl isothiocyanate to control *Macrophomina phaseolina* in strawberry fruit (Baggio *et al*., 2018) and combining dimethyl disulphide and chloropicrin for plant disease and weed control (Boyd et al., 2017). In addition, 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 than 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. Bórquez and Agüero (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 and Agüero, 2007). MBTOC is interested in receiving updates of trial results being conducted in the regions nominated. **MBTOC comments on economics provided in CUN for 2021:** The economic argument has not changed from the previous year. The argument is still based on the view that the 11-week delay and concomitant missed market window reduces prices more than enough to cancel out the benefit of the higher yields obtained with 1,3-D Pic. The party has not provided adequate information to support the delay caused by using any of the alternatives. MBTOC notes that the recommendation for the nomination was to reduce dosage rates of MB using barrier films only. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b (i) Emission Reduction:** Barrier films are available but to date have not been adopted on a commercial scale. • **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 notes that considerable research has been conducted during the MLF funded projects and provided references. MBTOC is however unaware of present trials and results within the specific areas of the nominations. Informal talks with industry on lifting a ban on alternatives to MB in Mar del Plata

- **Dec. Ex 1(4) Annex 1 National Management Strategies and Dec XXX1/4 (Recalling Submissions for NMPs):**No Management Strategy was provided as requested in Dec XXX1/4.

Country	Industry	CUE for 2015[1]	CUE for 2016[2]	CUE for 2017[3]	CUE for 2018[4]	CUE for 2019	CUE for 2020	CUN for 2021	Interim recommendation for 2021
Argentina	Tomatoes	100	71.25	64.10	47.70	25.6	12.79	12.07	[6.96]

MBTOC interim recommendation for 2021:

MBTOC recommends a reduced amount of 6.96 t for use in this sector in 2021. The reduction is based on a reduced dosage rate from 26.0 to 15.0 g/m^2 for adoption of barrier films (e.g. TIF) for the treated area (i.e. 58%) of the 80 ha nominated (80 ha x 0,58 x 15 g/m^2), in accordance with MBTOC's standard presumptions.

MBTOC recognizes that there are still some difficulties with the adoption of alternatives to control soil borne pathogens and particularly *Nacobbus aberrans* in the two nominated areas. Therefore, it has accepted that MB is still required for the full area of the nomination but with the use of VIF.

Nomination by the Party for 2021

The Party nominated 9.05 t for La Plata (60 ha x 0.58 x 26g/m^2) and 3.02 t for Mar Del Plata (20 ha x 0.58 x 26 g/m^2) for a total of 12.07 t (80 ha x0.58x 26= 12.07t).

Since the first CUN in 2014 for 2015 use, and in order to conform to its standard presumptions, MBTOC has recommended, the use of VIF/TIF in tomato protected cultivation to reduce dosage rates from 26 g/m^2 to 15 g/m^2 of MB and emissions of MB .Growers all over the world have benefited greatly from this barrier technology by reducing the MB dosage and minimizing the legal requirement for large buffer zones which are in place in many countries (Chow, 2016).

The target pests are nematodes (*Nacobbus aberrans* and *Meloidogyne* spp.), fungi (*Rhizoctonia* sp., *Sclerotinia* spp., *Phytophthora* spp.), soil fungi disease complex (damping off) in seedbeds and crops, weeds (*Cynodon* spp., *Cyperus* spp., etc.) and soil insects (*Agrotis* sp., *Agriotes* sp., *Melolontha* sp.). MB is used in regions where cold and heavy clay soil conditions prevail, representing 3.48 % of the total protected tomato production area (Total tomato area: 2300 ha, total area fumigated: 80 ha).

Circumstances of the nomination by the Party:

The Party states that 1,3-D/Pic does not provide sufficient control of key pests in the critical areas, mainly due to soil types (i.e. heavy clays) and to low soil temperatures. Chloropicrin alone did not control the entire pest complex especially weeds and is not registered for single application in Argentina. Metham sodium gave erratic and insufficient performance for weed and disease control, because the heavy clay soil restricts movement of this fumigant throughout the soil. Dazomet is not registered for edible crops, plus trials with this fumigant showed insufficient nematode control and required a long plant back period. Long-term efficacy of the above alternatives was not sufficient to last the entire year to cover pathogen control for the dual cropping system (tomato and pepper). Application of steam is very costly and time consuming. Application with currently available steam equipment is extremely slow and size of equipment too large for use inside greenhouses. Although potential production of grafted plants is high, no rootstocks resistant to *Nacobbus* are presently commercially available. According to the CUN, cold climate, heavy soil conditions and overlapping key production period make solarisation and biofumigation unsuitable for the nominated regions of La Plata and Mar del Plata.

MBTOC assessment for MB use in this sector in 2021:

MBTOC acknowledges that Argentina has made excellent progress in reducing MB in this sector. The 2020 nomination has been reduced by 98% compared to the 2015 nomination. In its response to MBTOC questions, the Party stated that the use of MB will be prohibited in the two coming years. This statement is consistent with the requirements of Decision IX/6. The Party also provided many new references not previously reported in the CUN. The Party is encouraged to continue efforts to change local

	regulations preventing use of chemical alternatives and to continue providing data of trials in all regions on chemical (e.g. methyl iodide, 1,3 D+ Pic, Dazomet) and non-chemical alternatives (crop rotation, steam, solarisation, biosolarisation, biofumigation, grafting on local and imported root stocks) to support its future nomination. *Nacobbus* is widely distributed in North and South America. It has been reported in Mexico, USA (California, Colorado, Nebraska, Utah, Wyoming), Bolivia, Chile, Ecuador and Peru. All these countries are producing tomato without MB (EPPO 2009;2017; Stone and Burrows, 1985). Substantial research efforts have been shown by the party in response to MBTOC questions. Promising non-chemical and chemical alternatives have been reported by the party including grafting and a combination of grafting and mycorrhizae *Rhizophagus intraradices* (Garita *et al*., 2019). In its response to MBTOC questions, the Party reported that excellent root stocks and varieties have been selected and grafting is more and more considered as a component of an IPM program. Tomato grafting is increasing. The Party estimates that during this season, grafted plants represents 10% of the total tomato planted area compared to the 2% of the last season (Martinez *et al.,* 2018; Carbone *et al.,* 2017; 2018; Garbi *et al.,* 2018a; 2018b; Bucco *et al*.,2017). Biosolarisation using various organic amendments (Martinez *et al*., 2014; Mitidieri *et al*., 2015, 2017a; 2017b; Brambilla *et al*., 2017a; 2017b; Pagliaricci *et al*., 2015; Lafi *et al.,* 2017) has been trialled**.** Biological control agents have been found to affect *N. aberrans* populations (Perez-Rodriguez *et al.,*2007; 2010; Franco-Navarro *et al.,* 2016; Sosa *et al.,* 2018; von Erffa, 2013; Gortari and Hours, 2019; Cortez Hernandez *et al.,* 2019; Caccia *et al.,* 2018; Marro *et al.,*2018). According to the Party's response, soil less culture (i.e. substrate cultivation and hydroponics systems) is increasing. Different organic and non-organics materials, and their combination have been tested. Commercial substrate and soluble fertilizers used in irrigation systems are available (Osvaldo, 2016; 2017; Osvaldo and Czepulis, 2017). MBTOC considers that specific chemical alternatives may be available for the control of *N. aberrans* and other parasitic nematodes. For example, fluensulfone (Nimitz®) is a contact nematicide with low human and environmental restrictions that targets nematodes, including *Nacobbus.* Hidalgo *et al.,* (2015) and Ioannis *et al*., (2019) reported a significant reduction in population density, reproduction rate, and root galling of *N. aberrans* after fluensulfone application on tomato. They concluded thatfluensulfone use in tomato and cucumber crops affected by *N. aberrans* could be considered as a good alternative to methyl bromide and other non-fumigant nematicides. Fluensulfone has also been identified as a key alternative to MB for nematode control on many other crops (berries, cucurbit, leafy and fruiting vegetables). Mixtures of 1,3-D/Pic (e.g. 40/60%) combined with fluensulfone showed lower galling index as compared to the fumigant alone (Castillo *et al*., 2016). Gilma *et al.* (2017) demonstrated that fluensulfone in combination with 1,3-D plus Pic 40:60(w/w) can be an effective tool to manage root knot nematodes in drip-irrigated fresh-market tomatoes with high *Meloidogyne spp.* infestation. Successful research on combined alternatives (biofumigation, solarisation) has also been conducted and promising results have been obtained (Garbi *et al.*, 2013; Mezquíriz *et al.*, 2013; Quiroga *et al.*, 2014). Vasquez Sanchez *et al.* (2018) reported that extracts of *Tagetes lunulata* and other wild plants (foliage tissue) have shown a significant nematicidal effect on *N.aberrans* because of the high concentration of nematotoxic compounds (total phenolic and flavonoids) in their tissue. In Mexico, *N. aberrans* attacking greenhouse peppers is controlled with various chemical and non-chemical control methods (Pérez-Rodríguez *et al.,* 2010; Cid del Prado 2016, 2018). In Mexico, Cristobal-Alejo *et al.* (2006) developed an integrated pest management program to control *N. aberrans* including fertilization, nematicide application (ethoprop) and biofumigation with chicken manure. It resulted in significant increases of plant height, foliage dry weight, stem diameter and crop yield, as compared to other treatments. Use of *P. chlamydosporia* in combination with nematicide application and environmentally friendly crop protection techniques that include incorporation of cabbage residues and composted manures has been recognised as a successful IPM tool for reducing *N. aberrans* populations (Prado-Vera and Zavaleta-Mejía,2010; Franco-Navarro *et al.,* 2016; EFSA, 2018). According to the party, growers in both production areas have been actively involved and supported by INTA and other institutions in the study of methyl bromide alternatives for many years, but to date the results have not been provided to MBTOC. MBTOC notes that the party has been supported by the MLF with a number of demonstrations, 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 considers that these potential alternative technologies will require time for scale-up in Argentina. However, MBTOC anticipates that it is possible to implement these and other alternatives to fully replace MB in the near future. Argentina is also encouraged to consider registration of herbicides for controlling nutsedge which are used in other countries as part of integrated control schemes. **MBTOC comments on economics provided in CUN for 2021:** • As in 2019, yield losses are reported from two grower associations. Unlike 2019, when the actual cost of production was also included in the CUN (albeit not itemized), now the party claims that the yield losses overshadow any lower costs emanating from a single tomato crop as opposed to two crops per year. The party argues that selling prices stay the same nationally so there is no price effect. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b (i) Emission Reduction:** Barrier films are used and available. • **Dec. IX/6 b (iii) MLF Assistance/Adoption of Effective Alternatives:** The party states that recent trials have been conducted, and a full list of research studies was provided this year to MBTOC. Previous trials and research were conducted through the MLF projects implemented in Argentina and also directly by national institutions (e.g. INTA, EEAOC) and various universities, some of which (e.g. grafting) have been adopted. • **Dec. IX/6 b (iii) Appropriate Effort:** Many references were provided demonstrating that research is being conducted in response to questions asked by MBTOC. • **Dec. Ex 1(4) Annex 1 National Management Strategies and Dec XXX1/4 (Recalling Submissions for NMPs):** No Management Strategy was provided as requested in Dec XXX1/4. The party has estimated that it will be able to phase out methyl bromide within the next two years.

6 Interim evaluation of critical use nominations of methyl bromide for commodities and structures submitted in 2020 for use in 2021

6.1 Standard Rate Presumptions

MBTOC received SC CUNs from only one party, South Africa, which consisted of two nominations as shown in Table 1.11.

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.*"

At 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 most 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; 2011;2015; 2019).

6.2 General Comments on the Assessment for Structure and Commodity Use

MBTOC continues to encourage parties to consider a review of regulations covering the registration, use and adoption of alternatives. For MB structure and commodity uses, MBTOC has endorsed the efforts of the Party to try to phase out MB by encouraging companies to register alternative chemicals for this sector. Sulfuryl fluoride was registered in January 2018 in RSA and this will assist with full adoption of in-kind alternatives to assist with the phase out of all the remaining MB use for both sectors applying for critical use. MBTOC is aware that the implementation of any alternative will require time for logistics of use and the training of fumigators to get full adoption the market.

6.3 Details of the Evaluation

The total MB volume nominated in 2020 for post-harvest uses in 2021 was 35.0 t. MBTOC's interim assessment has recommended 24.30 t for South Africa for 2020 (Table 1.11). Table 1-12 provides detail of the interim recommendation for structural and commodity uses for the CUNs submitted in this round.

Table 1.11. Summary of interim recommendations for the CUNs for postharvest uses of MB (tonnes) for 2021 submitted in the 2020 round.

Country and Sector	Nomination for 2020 (tonnes)	Interim Recommendation for 2020 (tonnes)
South Africa - Mills	1.00	[0.30]
South Africa - Houses	34.0	[24.0]
Total	**35.00**	**[24.3]**

Table 1.12 Interim recommendations for CUNs from A5 parties for structures and commodities submitted in 2020 for use in 2021.

Country	Industry	CUE for 2015[2]	CUN for 2016	CUE for 2016[3]	CUE for 2017[4]	CUE for 2018[5]	CUE for 2019[6]	CUE for 2020	CUN for 2021	Interim recommendation for 2021
South Africa	Mills	--	13.0	5.462	4.10	2.90	1.0	0.3	1.0	[0.3]

MBTOC interim recommendation for 2021:

MBTOC recommends a reduced amount of 0.3 tonnes for MB use in 2021, for pest control in grit mills. This recommendation is unchanged from the CUE approved for 2020 and a 70% reduction from the CUN sought by the Party for use in 2021. As for the previous nomination, the recommendation is based on a reduction in the number of fumigations to an amount of MB sufficient for one fumigation per year per mill at 24 g/m^3 (lowest registered dosage, but exceeding MBTOC standard presumption of 20 g m^3). This is recommended only as a further transitional measure to allow time for adoption and optimisation of alternatives in an IPM system, with phase-in of phosphine or an alternative whole-site fumigant, sulfuryl fluoride, if desired, in these small, old mills.

Nomination by the Party for 2021:

The Party nominated 1.0 tonnes methyl bromide for fumigation of mills, producing maize grits.

Circumstances of the nomination:

The Party nominated 1.0 t of MB for the fumigation of grit mills for pest control against common stored product insect pests. Use of methyl bromide fumigation was on a routine calendar basis, and not according to prevalence of pests. The treatments were to ensure output of non-infested product from the mills.

Grit mills in South Africa have to comply with stringent requirements for hygiene to attain insect and pest free conditions during production and storage. These relate to both local and international insect control and quality assurance standards. The Party is no longer applying for methyl bromide for the routine fumigations of the other grain mills formerly included in their CUNs. The alternatives used have in the mills not using methyl bromide have not been specified in detail. Full site treatments with phosphine have been considered as an alternative by the Party previously. It appears that this has been adopted for some mills previously using full-site methyl bromide treatment, but at a cost of increase downtime from the slower acting treatment. According to the Party, SF has recently been registered for mill fumigation but is not yet in use. Full site heat treatment was considered not feasible because of the high capital and running cost of imported equipment needed to carry out the heating.

MBTOC assessment for MB use in this sector in 2021:

In the 2018 assessment of the RSA CUN for treatment of mills, MBTOC considered that various suitable alternatives were available and feasible for the necessary disinfestation of all mills in the CUN. Details are unchanged from the 2018 final assessment (TEAP, 2018).

In the mills remaining in this nomination methyl bromide practices continue to be used except for a reduction on frequency of fumigation from five to three annual calendar-based treatments compared to past CUN nominations. As in the 2019 assessment of the equivalent CUN, MBTOC suggests that these mills can adopt an IPM system to control potential infestation in these mills adequately to meet outturn standards. Such an IPM system may include some engineering modifications to the

	machinery and structure to minimise insect entry, reduce grain residue accumulation and allow better cleaning. It may also include strategic treatment with non-MB processes of critical machinery and infestation-prone areas. Such processes are now commonly used elsewhere. As in the previous nomination, MBTOC suggests that a single treatment with methyl bromide annually is sufficient for application to clean up pests within the nominated mills. MBTOC notes that alternative strategies should be used to ensure that only a single MB treatment is all that is required. This recommendation takes into account the conditions and constraints (special needs) prevalent in Article 5 countries with regard to implement of new alternatives. Change from an established system of periodic routine MB treatment requires some time to trial, refine and implement, particularly under the constraints and conditions of A5 countries, hence continued partial MBTOC recommendation for this CUN, despite the general availability of alternatives for this situation and the transition of the large modern RSA grain mills, no longer included in the nomination. The recommendation acknowledges the current commercial difficulties in supply of sulfuryl fluoride for methyl bromide replacement in this particular situation. while providing sufficient insect control in the form of a fumigation plus IPM measures if sulfuryl fluoride remains unavailable in 2020. The quantity of methyl bromide has been rounded up to allow use of whole 100 kg cylinders for each mill treatment and to avoid the need for storage of part filled cylinders. MBTOC information from outside RSA suggests whole site heat treatments may be similar in running cost to existing MB use with moderate capital investment requirements, significantly less than indicated in correspondence about this CUN. Heat treatments may also be used in localised situations to treat particular machines, difficult to fully clean and to treat by other methods, as a component of an IPM approach. Use of heat, or fumigation with substances other than methyl bromide, in localised critical situations, such as in machinery on the grain pathway that are difficult to clean completely, may be useful in the circumstances of this CUN. Such measures may allow transition away from routine whole-site treatments. MBTOC would welcome documentation of the alternative measures adopted in this remaining methyl bromide use, with data on the infestation observed and its control. Decision IX/6 (1b,iii) refers to adoption of alternatives when shown to be suitable. **MBTOC comments on economics provided in CUN for 2021:** The cost of fumigation using MB compared to using phosphine is provided for some RSA mills, as has been the case in previous CUNs. The latter is considerably cheaper in every instance, but the Party states that it does not yet know the impact of longer fumigation times on revenues. The Party also states that whole-site heat treatment is too expensive due to running cost and the cost of importing equipment. The Party also argues that the cost of using the alternative, phosphine, must include the cost of the loss of production because of the greater down time required. However, this loss in production can be made up with extra production time. As this is expected to cost more (e.g. via overtime labour costs), this is the real cost of the additional downtime, rather than the putative loss in output. **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:** MBTOC welcomes the registration of sulfuryl fluoride and ethyl formate as alternative fumigants for mills, and adoption of phosphine as an alternative fumigant. • **Dec. IX/6 b (iii) Appropriate Effort:** MBTOC would welcome documentation of results of adoption of changed and non-MB practices in these old mills. • **Dec. Ex 1(4) Annex 1 National Management Strategies and Dec XXX1/4 (Recalling Submissions for NMPs):** No Management Strategy was provided as requested in Dec XXX1/4.

Country	Industry	CUE for 2015[11]	CUN for 2016	CUE for 2016	CUE for 2017	CUE for 2018	CUE for 2019	CUE for 2020	CUN for 2021	Interim recommendation for 2021
South Africa	**Houses**	--	68.6	68.6	55.0	42.75	40.0	34.0	34.0	[24.0]

MBTOC interim recommendation for 2021:

MBTOC recommends 24.0tonnes of MB for use in houses/structures in 2021, which represents a 40% reduction of the amount nominated by the party for 2019 (i.e. 40 t) or a 29.4 % reduction of the nominated amount of 34 t in this year's nomination. MBTOC considers that as SF is a suitable alternative for nearly all circumstances of this nomination and that SF can be transitioned in 3 years. In 2020 a transition of 10% is considered possible and by 2021, a further 30% transition to result in a total 40% reduction of the amount nominated in 2019. Further validation may be required during this time to determine the efficacy of SF for control of *Hylotrupes spp.,* particularly eggs.

Nomination by the Party for 2021:

This nomination is for structures (excluding food processing structures) of 34 tonnes and covers the fumigation of residential houses and industrial premises for control of wood destroying insect pests.

Circumstances of the nomination:

The Party initially applied for 35 t of MB in the application but reduced this to 34 t in response to MBTOC questions prior to assessment. The application is for annual disinfestation treatments against wood destroying insects of different structures (2,560 facilities and houses, mainly brick, mortar and iron structures) along coastal areas and partly inland at a treated volume of av. 600 m^3 to 850 m^3. The indicated traditional dosage of MB is 48 g/m^3 for 24 hours and in some certain circumstances only 36 g/m^3 for 36 hours. Five target pests in the described situation are presented in the nomination: *Cryptotermes brevis*, (West Indian Drywood Termite),*Hylotrupes bajalus* (House Longhorn Beetle {name according to the European Plant Protection (EPPO) database), and the small wood and furniture beetles, *Anobium punctatum* (Common Furniture Beetle), *Lyctus brunneus* (Common Powderpost Beetle), and *Nicobium castaneum* (Library Beetle). The gas tightness of the houses corresponds to the scale value 'A': less than 25% gas-loss within 24 hours or half-loss-time of pressure difference (e.g. 20 to 10 Pa ($t_{1/2}$)) greater than 1 minute.

The Party states that the primary pest that needs to be dealt with in house fumigations is *C. brevis*. The envisaged alternative treatment with sulfuryl fluoride (SF) should therefore be carried out at 15-30°C to obtain good efficacy of the treatment. The treatments are carried out either on whole houses under PVC 450 µm tarpaulin or on gas tight sealed parts of structures. The Party stated in their answer to MBTOC's question in 2019, that about 10-15% of the houses contain attics or roof space that can be treated without using MB. Application of heat, a worldwide used technique under similar circumstances was regarded by the Party as not feasible due to very high investment required for the heating units and excessive running costs compared with costs for MB treatment. For this nomination the Party indicated that due to a depressed market less fumigation of houses may occur.

The Party also stated that the transfer of registration of SF for houses had been made in 2019 and that further time was needed for market penetration. The Party indicated last year that once SF had been commercially launched in RSA and once all the training and accreditation had been undertaken there would be little further need for MB. The party also stated last year that they would however need of "*a few months transition*" between the regular use of MB and the full transition to SF.

	MBTOC assessment for MB use in this sector in 2021: MBTOC notes that control of wood boring insects, even in heavily infested houses within highly infested areas, with heat has been common practice for many years around the world (Hammond, 2015). Phosphine, without added heat, is unlikely to be feasible because of its slower action, with fully effective treatments taking several days against wood boring pests without added heat. Five key target pests are mentioned in the nomination: *C. brevis*, *H. bajalus*, and *A. punctatum*, *L. brunneus* and *N. castaneum*. MBTOC notes that lethal ct levels for both MB and alternatives (e.g. SF) against these pests differ significantly and are also dependent on temperature in the structure. Some particular, specified insects, Lyctid beetles and *H. bajulus*, may require more than the regular label rate for control including the control of most tolerant eggs. While the termite can typically be controlled at 36 g/m³ or less particularly at higher temperature (>25°C). In the nomination the Party distinguished between treatments for low level infestations of drywood termite, versus infestations of other wood destroying insects, particularly *H. bajulus*, or multiple infestations of drywood termite (with or without *H. bajulus*). Similar situations in the US, formerly treated with MB, are now mainly fumigated with SF (MBTOC Assessment reports 1998, 2002, 2006, 2010, 2014 and 2019), but heat has also been used. Drywood termite infestations can typically be treated using the 'search-and-destroy' system, where access is possible. 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, unlike subterranean termites, drywood termite nest in walls and ceilings and do not touch the soil. Established infestations of *H. bajulus* and other wood boring insects, in structural timber are likely to require whole site treatment. Alternatives to MB include heat treatments at moderately elevated temperatures around 56°C (Dreger, 2007; Lewis and Haverty,1996). MBTOC notes that for controlling termites, the ensured killing of the queens could be sufficient and can be achieved with fairly low ct products of SF in the range of 500 gh/m³ (20 g/m³ for 25 h) and exposure under sheeted and well-sealed houses. These conditions are commonly known to control of drywood termites (Osbrink *et al.,* 1987; Stewart, 1957). For the control of *H. bajulus*, higher ct products are necessary for complete control. MBTOC notes that for controlling wood boring insects in infested areas of houses like in attics or even in whole houses the use of heat has been proven as common practice for many years around the world (Hammond, 2015). The party mentioned that the dosage of SF for disinfestation of houses against wood boring insects should be carried out according to the schedules of ISPM 15 where recently SF has been included. MBTOC does not consider the dosages mentioned in ISPM-15 are applicable to disinfestation of wood boring insects in houses since nematodes which are also a target of ISPM require much higher dosage schedules than needed for pests of houses. In view of this lower dosages are appropriate as indicated. As described in the previous recommendation for 2020, two main types of species have to be controlled and these are able to be controlled at the doses suggested by MBTOC. Based on the party`s information on the timeline of the phase in of SF after its registration in 2019, MBTOC presumes that a significant phase in of SF (i.e. 10%) will occur in 2020. 2021 is the second year of phase in of the registered alternative SF to lead – also together with partial use of heat - to a further reduction of about 30 % of the previous use of MB (2019 as base). All these aspects are expected to lead to a significant further reduction of the nominated amount for 2021. The party states in its answer to the questions for this CUN that this phase in is expected to proceed in 2020 with data being available at the end of 2020. MBTOC recommended in similar cases, where a new chemical was registered and accessible for the market, 10 % reduction of the requested amount in the first year of phase in and another 30 % reduction in the second year of phase in should be possible. MBTOC recommends an amount of 24.0 tonnes. MBTOC has adjusted the nomination to a total of 11tonnes (29.4%) of the requested amount of 34 t to account for reduction by use of SF and reduction for partial use of heat. MBTOC urges the Party to present more details on its phase in program of SF and heat and supports the approach to phase in SF fully as quickly as possible after its registration in November 2019. Furthermore, the Party should pursue registration of other alternatives like ethyl formate or hydrocyanic acid (HCN) (Aulicky *et al*., 2014; Hnatek *et al*., 2018) to assist phase out of methyl bromide as quickly as possible for the described use in this CUN.

	MBTOC comments on economics for 2021: The Party states that heat treatments are not economic due to the costs of importation of equipment, especially for heating equipment for entire house and factory treatments. The cost of equipment for fumigation of houses with sulfuryl fluoride is around R150 000 (approx $10,000), which discriminates against small fumigators and acts as a barrier to entry. The Party also argues that, while sulfuryl fluoride is registered and is undergoing commercialisation, there are still concerns about its technical and economic feasibility. These concerns should, however, be resolved by the end of 2020. **Comments requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i) Emission Reduction:** In last year´s CUN stated that particularly in sheeted houses, a high level of fumigant containment had been achieved. This year, the Party claimed that theaverage MB usage on a house is only 30 kgs (with the average volume of 1250 m³, this corresponds to a dosage of 24 g/m³). The cost for this treatment is divided up between numerous fumigators. The necessary equipment for emission reduction is expensive. MBTOC has the opinion, that either the recapture would be carried out by a different company and the cost had to be paid by the client. This would surely lead to increased cost for the fumigation. On the other hand, part of this recaptured gas could be reused for a next treatment leading to a reduction of cost for MB in this next fumigation. The alternative could be that the fumigators divide the cost for the instrumentation for recapture among them and calculate the cost for the number of uses per year. • **Dec. IX/6 b(iii) Research Program:** MBTOC notes the recent, favourable adoption of heat, but very limited work is presented in the CUN on testing promising alternatives. MBTOC still recommends to look for cheaper apparatus for heat treatment in RSA. • **Dec. IX/6 b(iii) Appropriate Effort:** Registration of SF has been released in January 2018. • **Dec. Ex 1(4) Annex 1 National Management Strategies and Dec XXX1/4 (Recalling Submissions for NMPs):** No Management Strategy was provided as requested in Dec XXX1/4. The Party indicated in past CUNs that phase out the MB use could occur shortly after SF was registered as an alternative and made fully accessible to the market.

[1]MOP25, [2]MOP26**,** [3]MOP27, [4]MOP28, [5]MOP29, [6]MOP30, [7]MOP31

7. Emergency Use Application by Canada

As per Decision IX/7, Canada notified the Secretariat on 31 March 2020 that it expects to consume a quantity of methyl bromide, not exceeding 1.764 t for an emergency use in 2020.

Canada was granted a methyl bromide critical use exemption for 2019, in the amount of 5.261 t, for pre-plant soil fumigation of strawberry runners. However, local weather conditions in fall 2019 were unfavourable for fumigation and the grower was unable to pre-plant fumigate the full acreage, in preparation for the summer 2020 growing season. As such, the grower is expected to use their remaining 2019 stocks of methyl bromide (1.764 t) for an emergency use in spring 2020 (April-May), in order to complete pre-plant fumigation prior to the summer 2020 growing season.

The grower then expects to pre-plant fumigate in fall 2020, per Canada's critical use exemption for 2020, in advance of the 2021 growing season. Since the methyl bromide for the fall 2020 pre-plant fumigation has not yet been imported, any stocks of methyl bromide remaining from the emergency use will subtracted from the amount to be imported for the fall pre-plant fumigation. The party noted that total quantity of methyl bromide used for 2019 and 2020 for critical and emergency uses will not exceed the total quantity of methyl bromide approved by the Parties for critical use for 2019 and 2020.

MBTOC has no issue with the request from Canada and considers the issue could equally be a scheduling issue of amounts of MB granted by the parties for CUNs for which stocks could be held for the following season due to unfavourable conditions, and not an emergency use as specified in Decision IX/7.

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ANNEX I: 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 1a (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[1] 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 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

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

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: Trends in Non-A5 Pre-plant Soil Nominations and Exemptions for Uses of MB reported to have been phased out

(Includes list of nominated (2005 – 2016) and exempted (2005 – 2016) amounts of MB granted by parties under the CUE process for each industry sector).

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	See Section 1.2.4																							
Belgium	Asparagus	0.630	0.225											0.630	0.225										
Belgium	Chicory	0.600	0.180											0.180	0.180										
Belgium	Chrysanthemums	1.800	0.720											1.120											
Belgium	Cucumber	0.610	0.545											0.610	0.545										
Belgium	Cut flowers – other	6.110	1.956											4.000	1.956										
Belgium	Cut flowers – roses	1.640																							
Belgium	Endive (sep from lettuce)		1.650												1.650										
Belgium	Leek & onion seeds	1.220	0.155											0.660											
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										

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	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)	See Section 1.2.4																							
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										
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	Inclin.tomatocun	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						

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	Cut flowers – protected	303.000	303.000	321.330	163.400	113.821	72.266	52.955						303.000	240.000	220.185	114.450	85.431	63.464						
Israel	Fruit tree nurseries	50.000	45.000	10.000										50.000	45.000	7.500									
Israel	Melon – protected & field	148.000	142.000	140.000	87.500	87.500	87.500	35.000						125.650	99.400	105.000	87.500	87.500	70.000						
Israel	Potato	239.000	231.000	137.500	93.750	75.000								239.000	165.000	137.500	93.750	75.000							
Israel	Seed production	56.000	50.000			22.400								56.000	28.000			NR							
Israel	Strawberries – fruit (Sharon)	196.000	196.000	176.200	64.125	52.250	47.500	28.500						196.000	196.000	93.000	105.960	42.750							
Israel	Strawberries – fruit (Sharon &Ghaza)																		57.063						
Israel	Strawberry runners (Sharon)	35.000	35.000		20.000	15.800	13.570	13.500						35.000	35.000	28.000	31.900	15.825							
Israel	Strawberry runners and fruit Ghaza				87.875	67.500	67.500	34.000										47.250							
Israel	Strawberry runners (Sharon &Ghaza)																		22.320						
Israel	Tomatoes			90.000												22.750									
Israel	Sweet potato					95.000	20.000	20.000									111.500	95.000	20.000						
Italy	Cut flowers (protected)	250.000	250.000	30.000										250.000	187.000	30.000									
Italy	Eggplant (protected)	280.000	200.000	15.000										194.000	156.000										
Italy	Melon (protected)	180.000	135.000	10.000										131.000	131.000	10.000									
Italy	Pepper (protected)	220.000	160.000	67.000										160.000	130.000	67.000									
Italy	Strawberry Fruit (Protected)	510.000	400.000	35.000										407.000	320.000										
Italy	Strawberry Runners	100.000	120.000	35.000										120.000	120.000	35.000									

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	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									
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 (+Andalucia)	43.490									
Spain	Pepper	200.000	155.000	45.000										200.000	155.000	45.000									
Spain	Strawberry Fruit	556.000	499.290	80.000										556.000	499.290	0.0796									
Spain	Strawberry Runners	230.000	230.000	230.000	215.000									230.000	230.000	230.000									
UK	Cut flowers		7.560												6.050										
UK	Ornamental tree nursery	12.000	6.000											6.000	6.000										

Party	Industry	Total CUN MB Quantities												Total CUE Quantities											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
UK	Strawberry (& raspberry in 2005)	80.000	63.600											68.000	54.500										
UK	Raspberry nursery		4.400											4.400	54.500										
USA	Chrys. Cuttings/roses	29.412												29.412	0										
USA	Cucurbits – field	1187.8	747.839	598.927	588.949	411.757	340.405	218.032	59.500	11.899				1187.800	747.839	592.891	486.757	407.091	302.974	195.698	59.500				
USA	Eggplant – field	76.761	101.245	96.48	79.546	62.789	34.732	21.561	6.904	1.381				76.721	82.167	85.363	66.018	48.691	32.820	19.725	6.904				
USA	Forest nursery seedlings	192.515	157.694	152.629	133.140	125.758	120.853	106.043						192.515	157.694	122.032	131.208	122.060	117.826	93.547					
USA	Ginger	9.2												9.2	0										
USA	Orchard replant	706.176	827.994	405.415	405.666	314.007	226.021	203.591	18.324	6.230				706.176	527.600	405.400	393.720	292.756	215.800	183.232	18.324				
USA	Ornamentals	210.949	162.817	149.965	138.538	137.776	95.204	70.178	48.164	48.164				154.000	148.483	137.835	138.538	107.136	84.617	64.307	48.164				
USA	Nursery stock - fruit trees, raspberries, roses	45.789	64.528	12.684	51.102	27.663	17.954	7.955	1.591	0.541				45.800	64.528	28.275	51.102	25.326	17.363	7.955	1.591				
USA	Peppers – field	1094.782	1498.53	1151.751	919.006	783.821	463.282	212.775	28.366					1094.782	1243.542	1106.753	756.339	548.984	463.282	206.234					
USA	Strawberry fruit – field	2468.873	1918.40	1733.901	1604.669	1336.754	1103.422	1023.471	753.974	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: Trends in Non-A5 Structural and Commodity Nominations and Exemptions for Uses of MB reported to have been phased out

(Includes list of nominated (2005 – 2016) and exempted (2005 – 2016) amounts of MB granted by parties under the CUE process for each industry sector)

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										
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										

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	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										
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										

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
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								
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									
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											

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	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	3.240	67.907	81.708	18.998	19.699	18.998	4.465	3.730	3.730	3.730	3.730	3.730	3.240
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		
USA	Research								0.159	0.159															