MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

MAY 2023

VOLUME 2: EVALUATION OF 2023 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED ISSUES

INTERIM REPORT

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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

The 2023 TEAP Report

The 2023 TEAP Report consists of 3 volumes:

Volume 1: *TEAP 2023 Progress Report*

Supplement to the TEAP 2023 Progress Report: Decision XXXIV/3 Energy Efficiency Working Group Report

Volume 2: *Evaluation of 2023 critical use nominations for methyl bromide and related issues - Interim Report – May 2023*

Volume 3: *Decision XXXIV/2: Assessment of the funding requirement for the replenishment of the Multilateral Fund for the period 2024-2026*

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
MI	Methyl iodide (Iodomethane)
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPM	International Standard Phytosanitary Measure
LPBF	Low Permeability Barrier Film (including VIF films)
MB	Methyl Bromide
MBTOC	Methyl Bromide Technical Options Committee
MITC	Methyl isothiocyanate
MOP	Meeting of the parties
MS	Metham (metam) sodium
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 2023 and Related Issues

Interim Report

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1 Executive Summary

The amount of methyl bromide (MB) requested for critical use nominations has fallen from 18,700 t submitted in over 140 nominations for 2005 to less than 4.0 t submitted in one nomination for 2024.

In this round, MBTOC received one nomination for critical use for 3.857 tonnes of MB for preplant fumigation of a strawberry nursery at Prince Edward Island in Canada in 2024. The total amount requested this year by one party (Canada) represented a significant decrease (17%) in the amount approved for critical use in 2023. Australia and South Africa (RSA) who submitted CUNs in 2022, did not submit a CUN in this round.

After review, MBTOC has made an interim recommendation for the full amount to be recommended.

Country and Sector	Non-Article 5 Party Nomination (tonnes)	A5 Party Nomination (tonnes)	Interim Recommendation for 2024 (tonnes)
1. Canada (2024)			
Strawberry runners	3.857	Nil	[3.857]
TOTAL	**3.857**	**Nil**	**[3.857]**

The accounting framework information received from parties reporting under Article 7 showed that of the parties applying for CUNs in 2023 round, no stocks were reported as available at the end of 2022 in non-Article 5 (i.e. Canada). MBTOC is unclear what has happened to previously reported stocks for those countries who reported stocks for CUNs applied for in 2022, but not in 2023 (i.e. RSA).

As in previous reports, MBTOC notes that the accounting information in this report, does not accurately show the total stocks of MB held globally for controlled uses by A5 parties. This is because only parties applying for CUNs are required to report stocks, 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 (approximately 1,000 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 MB for controlled uses or exempt QPS uses. These stocks would need to be reported as of the end of the year prior to the year of reporting**.**

MBTOC is also 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.

2 Scope of the Report

This 2023 interim CUN report provides an evaluation by MBTOC of the Critical Use Nominations (CUNs) for methyl bromide (MB) submitted for 2023 and 2024 by one non A5 party. 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 34th 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 2023 round were the same as those used in the 2022 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, XXXI/4, XXXII/3, XXXIII/6 and XXXIV/9).

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 has 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.

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 reporting of all stocks held by a party and by all parties irrespective of whether they seek CUEs.

For this 2023 round, Canada has yet to submit an Accounting Framework.

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). The same requirements applied to A5 parties after 2015.

The Meeting of the parties (33rd MOP) authorised Australia to use 28.98 t and RSA to use 19.0 t of MB in 2022, but as no Accounting Framework has been required to be submitted from these parties MBTOC cannot report on the amount licensed or used. For Canada, for use in 2022, the MOP authorised 5.017t for strawberry runners and the party in its Accounting Framework reported that this amount was used for the critical use from new imports of MB, with no remaining stocks at the end of that year. For 2023, the MOP authorised 4.650t for the same use.

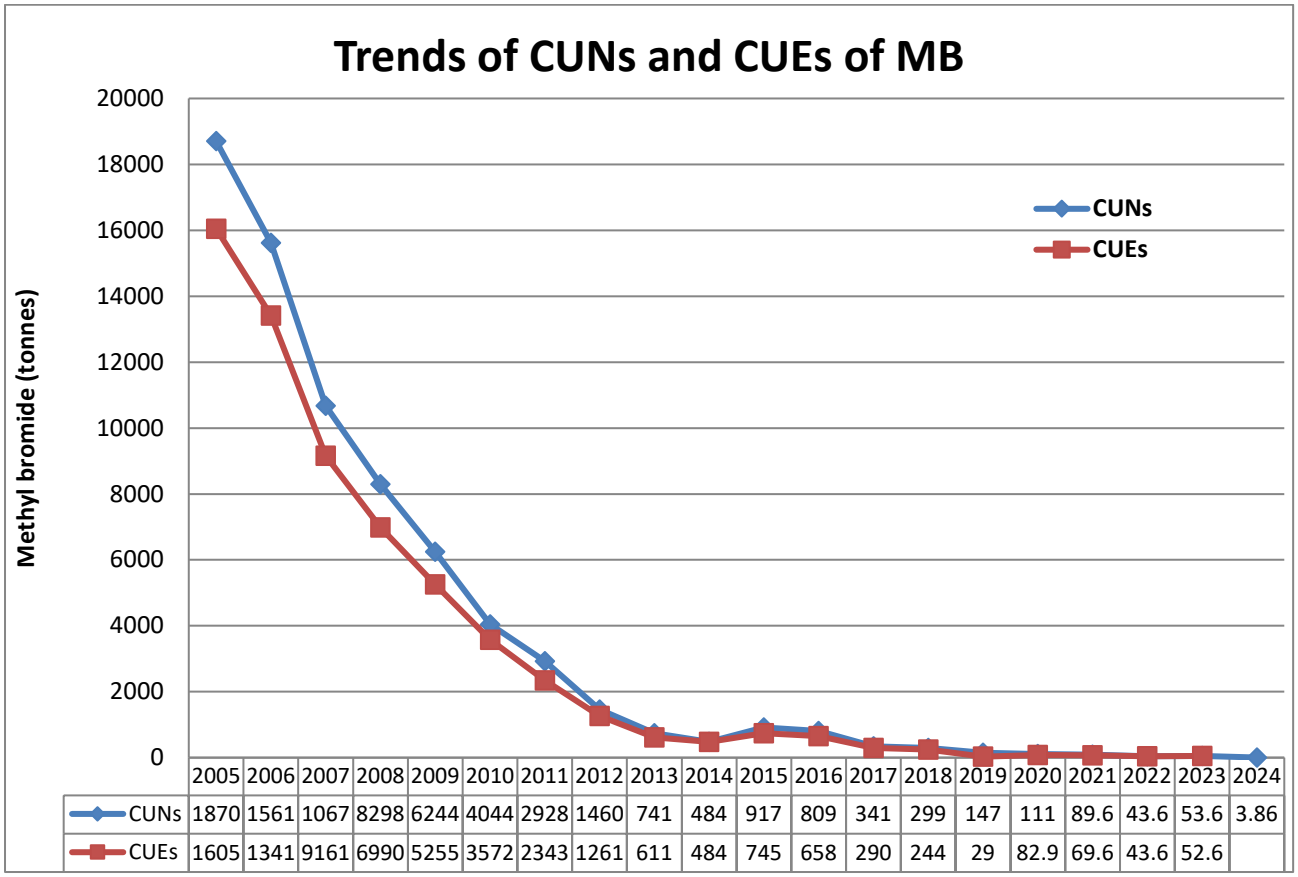
3.4 Trends in Methyl Bromide Use for CUEs since 2005

Decision XVII/9 requires TEAP to show trends in the phase-out of the critical uses of MB (Fig 1.1 to Fig 1.3, 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 2024 for all uses. Figure 1.2 shows the reduction trend for the remaining soil uses in both non-A5 parties i.e. strawberry runners in Canada and Australia and Figure 1.3 the reduction trends in structural use in RSA. 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 1.3. 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.

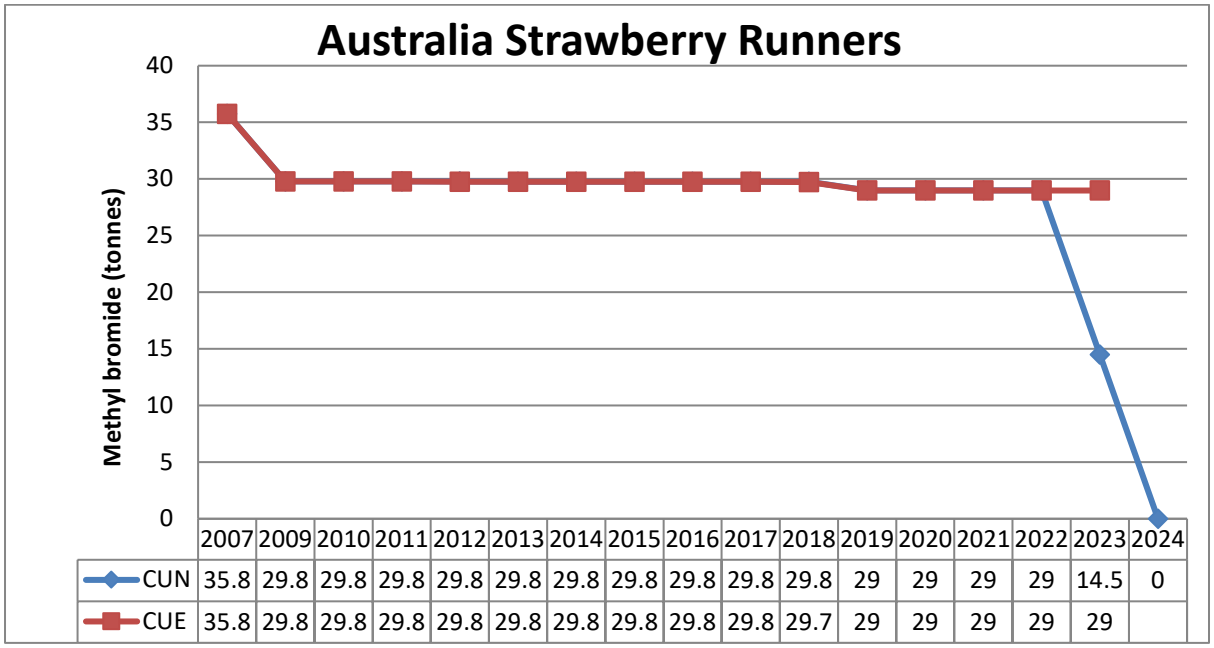
Figure 1.1 Amounts of MB nominated (CUN) and exempted (CUE) for uses in pre-plant soil and commodities sectors from 2005 to 2024 by non-A5 and A5 countries.

Note:In 2023 the parties (34th MOP) approved an additional 14.49 t for use by Australia in 2023.

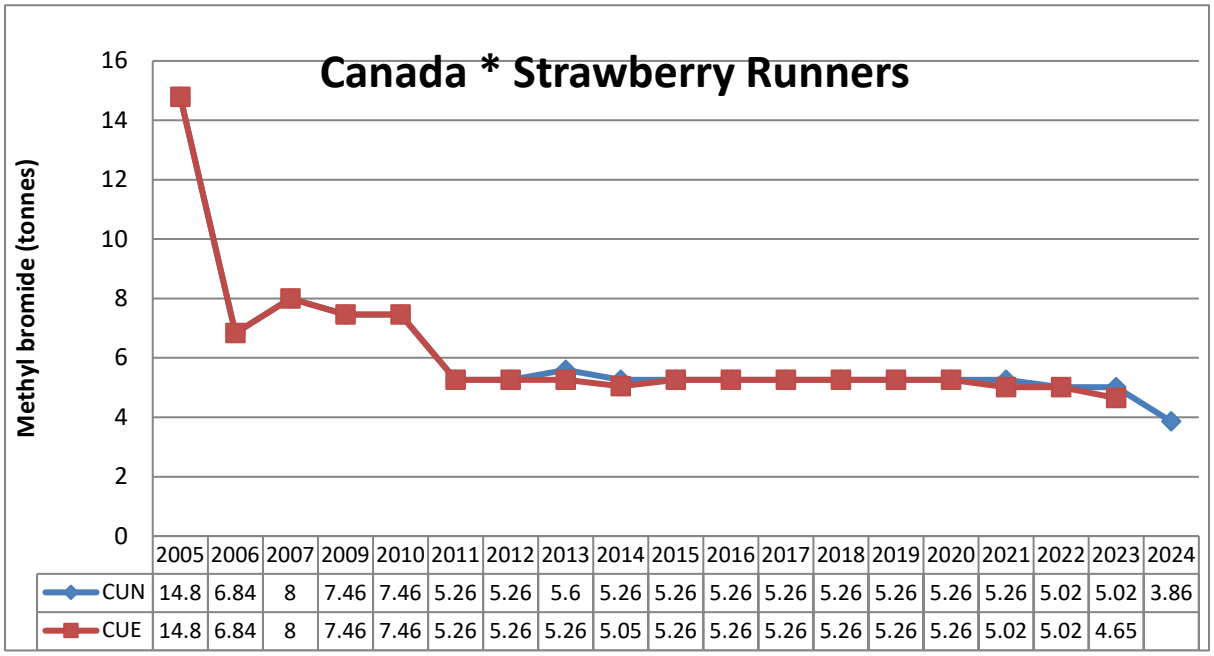


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CUNs	1870	1561	1067	8298	6244	4044	2928	1460	741	484	917	809	341	299	147	111	89.6	43.6	53.6	3.86
CUEs	1605	1341	9161	6990	5255	3572	2343	1261	611	484	745	658	290	244	29	82.9	69.6	43.6	52.6	

Figure 1.2 Amounts of MB nominated (CUN) and exempted (CUE) for uses in pre-plant soil sectors from 2005 to 2023 or 2024 by non-A5 countries: Australia and Canada respectively. Blue lines indicate the trend in MB nominated in the CUN and the red lines the amount of MB approved as a CUE by the parties



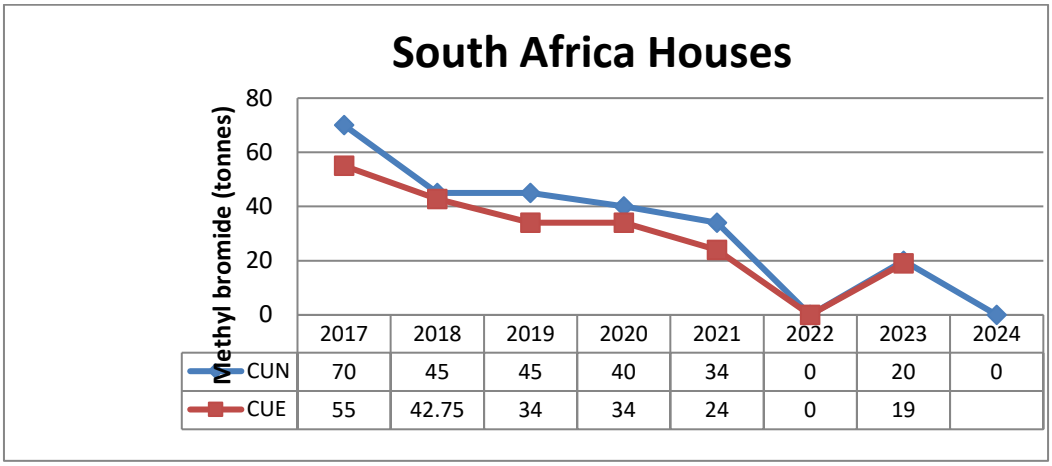
	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CUN	35.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29	29	29	29	14.5	0
CUE	35.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29	29	29	29	29	



	2005	2006	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
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	5.02	5.02	3.86
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	5.02	5.02	4.65	

* Prince Edward Island

Figure 1.3 Amounts of MB nominated (CUN) and exempted (CUE) for uses in sector from 2015 to 2023 by an A5 country: South Africa (RSA). The blue line indicates the trend in MB amounts initially nominated in the CUN and the red line the amount of MB approved as a CUE by the parties. Note: No CUN was submitted in 2021 for 2022 MB use.



	2017	2018	2019	2020	2021	2022	2023	2024
CUN	70	45	45	40	34	0	20	0
CUE	55	42.75	34	34	24	0	19	

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 2023 CUN process. The Disclosure of Interest declarations for 2023, updated in February 2023 can be found on the Ozone Secretariat website at: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.

3.6 Situation with MB Use in 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.

By end of 2020, 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 still 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 2021 and 2022 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 1200 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 MB 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, 2019 and 2020 as 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

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 1.3 Quantities of MB 'on hand' at the beginning and end of 2021, as reported by parties in 2022

Party	**Critical use exemption authorized by MOP for 2021**	**Quantity of MB as reported by parties (metric tonnes)**				
		Amount on hand at start of 2021	**Acquired for CUEs in 2021 (prod. +imports)**	**Amount available for use in 2021**	**Used for CUEs in 2021**	**Amount on hand at the end of 2021**
Australia	28.98	0	28.98	28.98	28.98	0
Canada	5.017	0	5.017	5.017	5.017	0
RSA	24.3	9.2	16.0	25.2	19.1	6.1

Table 1.2 Quantities of MB 'on hand' at the beginning and end of 2022, as reported by parties in 2023

Party	**Critical use exemption authorized by MOP for 2022**	**Quantity of MB as reported by parties (metric tonnes)**				
		Amount on hand at start of 2022	**Acquired for CUEs in 2022 (prod.+imports)**	**Amount available for use in 2022**	**Used for CUEs Exempted for 2022**	**Amount on hand at the end of 2022**
Canada	5.017		5.017	5.017	5.017	0

Table 1.4a Summary of nominations for critical use of MB (tonnes) sought by non A5 countries since 2005

Party		Quantity of MB Nominated																		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
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	14.49	14.49
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	5.017	5.017	0
EC	5754.361	4213.47	1239.873	245.00	0	0	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	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	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	0	0
Switzerland	8.700	7.000	0	0	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	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**	**33.997**	**19.507**	**[14.49]**

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)	2022 (32nd MOP)	2023 (33rd and 34th 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	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	5.017	5.017	4.650
EC	4392.812	3536.755	689.142	245.146	0	0	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	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	0	0	
New Zealand	50.000	42.000	18.234	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	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	0	0	
Total	**16050.09**	**13418.20**	**9160.714**	**6990.039**	**5254.838**	**3866.583**	**2343.024**	**1261.304**	**610.888**	**483.589**	**411.951**	**269.831**	**35.051**	**34.991**	**34.241**	**34.241**	**33.997**	**33.997**	**33.630**

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**	**2022**	**2023**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Argentina	245	177.0	120.3	120.7	71.5	35.70	20.33	9.65	0	134.3	129.25	102.94	76.70	41.31	20.62	11.31	9.65	0
China	120	114.0	99.75	92.977	0	0	0	0	0	114.0	99.75	92.977	87.24	0	0	0	0	0
Mexico	140	120.978	0	0	0	0	0	0	0	84.96	84.957	0	0	0	0	0	0	0
South Africa	-	81.6	83.0	50.0	41.5	41.5	35.0	0*	20	-	74.062	59.10	45.65	41.00	34.3	24.3	0	19.0
Total	**505**	**411.978**	**303.05**	**263.677**	**113.0**	**77.20**	**55.33**	**9.65**	**20.00**	**333.26**	**388.019**	**255.017**	**209.59**	**82.31**	**54.92**	**35.61**	**9.65**	**19.0**

4 CUN Process for the 2023 Round

4.1 Critical Use Nomination review process

MBTOC conducted its interim assessment meeting in Philadelphia, USA from the 13-17th March with some members attending via the internet. The meeting was held in accordance with the time schedule for the consideration of CUNs as required by Decision XVI/4 (see Annex 1). At the meeting considerable time was spent responding to Decision XXX1/2 on Banks of ODS and Decision XXXIV/10 on stocks and QPS uses.

MBTOC worked as a single committee and recommendations were discussed and signed off in plenary discussions and by consensus. All members fully participated in the decision-making process.

In assessing the CUNs submitted in 2023, as in previous rounds, MBTOC applied 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.

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 and no members needed to recuse.

5 Interim Evaluation of 2023 Critical Use Nominations for Methyl Bromide for Pre-plant Soil Use in 2024

5.1 Summary

Only one party requesting a CUN in 2023 for critical use exemption in 2024 sent information to the Ozone Secretariat around the January 24, 2023 deadline.

Information on CUN 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. No further information was requested from Canada prior to the interim assessment.

The CUN submitted from Canada for 2024 was for pre-plant soil use of MB and represented a 17% reduction over the amount approved by the parties at the 34th MOP for use in 2023. Although highlighting difficulties with the uptake of technical alternatives, Canada has made a policy decision and produced a step-down plan to reduce the nominated amounts over the next few seasons with the aim to phase out MB requests by 2026.

The justification for a CUN being submitted by Canada related to environmental conditions and regulatory restrictions which did not allow partial or full use of alternatives which have been successful for this sector in other countries, difficulties in the scale-up of substrate technologies and the economic cost of scale up of these technologies. 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. Table 1.8 provides 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.

Critical Use Nomination assessment

Table 1.4 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 1.4 Summary of the interim recommendations (in square brackets) for CUE's for pre-plant use of MB (tonnes) submitted in 2023 recommended for use in 2024

Country and Sector	Non-Article 5 Party Nomination (tonnes)	A5 Party Nomination (tonnes)	Interim Recommendation (tonnes)
1. Canada (2024)			
Strawberry runners	3.857	Nil	[3.857]
TOTAL	**3.857**	**Nil**	**[3.857]**

5.2 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 (Tables 1.8). MBTOC notes that although, all key fumigant alternatives are presently prevented from being used at PEI due to groundwater concerns, the party is urged to consider there use to speed u future phase out of MB if applicable.

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.

5.3 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.

5.3.1 Regulations impacting use of alternatives by country

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

5.3.2 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 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). Recent research in Korea reports high and hazardous exposure levels to MB in workers conducting chamber and tent fumigations, and this underlines the need for appropriate protective equipment (Jeong *et al.*, 2020). A further study, also conducted in the Korean port of Busan indicated that occupational exposure to MB can have negative effects on the health of workers, even when they do not show symptoms of toxicity (Park *et al*., 2020).

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**.**

5.4 Sustainable alternatives for pre-plant soil 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.

5.5 Standard presumptions used in assessment of preplant soil uses

The tables below (Tables 15 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 1.5 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 1.6 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

5.6 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 1.7).

Table 1.7 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; Holmes *et al*, 2020) 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 1.8 Interim recommendations for the CUN from a non A5 Party for pre-plant soil fumigation submitted in 2023 for use in 2024.

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[17]	CUE for 2022[18]	CUE for 2023[19]	CUN for 2024 and Interim Rec.
Canada	Strawberry runners	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	5.017	5.017	4.650	[3.857]

MBTOC interim recommendation for 2024:

MBTOC recommends the total amount nominated of 3.857 tonnes of MB for this use in 2024. This recommendation is based on the fact that the nomination of 3,857 kg for 2024 signals Canada's shift towards a policy-based approach to the phase-out of methyl bromide, in which the amount nominated is substantially less than the reductions the grower has demonstrated with the results of the indoor soilless research program. The amount nominated represents a 17% reduction over the amount approved for the nomination at the 34th MOP for 2023.

The party also stated that based on 2022 levels of production described further in the nomination, much of the nominated reduction will result from fumigating a smaller total acreage across all stages of production, while the grower continues work to optimize indoor operations and rapidly increase their capacity for indoor soilless production. Moving forward, it is Canada's intent to nominate approximately 2,850 kg of methyl bromide for the 2025 calendar year and to not submit a nomination for the 2026 calendar year, as the grower is requested to entirely phase-out the use of methyl bromide for G2 runner tip production by 2025, and ideally for the remainder of the operation, by 2026.

The party is to be commended for the phase-out strategy as presented above.

Nomination by the Party for 2024:

The nomination is for 3,857 kg of pure methyl bromide for the 2024 calendar year, which is the equivalent of 5,757 kg of Terr-O-Gas® (67:33). This represents a reduction of 17% (793kg) from the 4,650 kg of methyl bromide authorized by critical use exemption for 2023 and a 27% reduction (1,404 kg) from the quantity required to fumigate the entire acreage (5,261kg). This amount is needed to fumigate 19.26 hectares (47.65 acres).

The nominated amount is for strawberry runner production on 19.26 ha 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 certified propagation material.

Circumstances of the nomination by the Party:

Chloropicrin is registered for use in Canada and thus is used as a pre-plant fumigant for strawberry runners under certain conditions. However, the government of Prince Edward Island (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 PEI 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. Lalonde and Garron (2020) surveyed nine sites in Nova Scotia, three sites in PEI and one site in New Brunswick for groundwater contamination of various pesticides including chloropicrin. In all 13 sites, no chloropicrin was detected in groundwater including the three sites in PEI, despite chloropicrin use as part of the MB formulation (67:33). Therefore, MBTOC considers that if there is no contamination of the PEI ground water, chloropicrin could be used, if registered, as an alternative to MB. The strategy submitted by the party identified that chloropicrin (Pic) is being considered for use for outdoor

		production, however, this requires acceptance by the local PEI authorities. To facilitate this request, a permit was also being submitted to local authorities to test chloropicrin on a small area (2 ha) for outdoor field production. The experiments conducted 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 (405kg). 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). **MBTOC assessment for MB use in this sector in 2024:** 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; Wei ***et al.***, 2020). The Party has been evaluating soilless systems under outdoor and indoor conditions for over four years. The first two years of the outdoor studies were affected by unforeseeable, external factors such as drought, hail, and crows. Results from 2018 and 2019 showed promising results with good production. However, the harvest date showed delays of up to 3 weeks, which affected the market window for sales. To counter this delay, the Party constructed an experimental greenhouse in 2019 to allow testing G2 runner tip production under controlled conditions using the soilless system. In 2020, results showed tips/stock ratios that were above 20:1 for three of the four varieties tested. However, costs were double for indoor production compared to outdoor so a ratio of 40:1 is needed. MBTOC recognizes the need for time to scale up this technology but considers that the Party has had more than 20 years to develop it. MBTOC encourages the Party to look for other solutions that will maximize indoor production, such as through the use of fertigation with high nitrogen rates in combination with GA_3 (Mohamed ***et al.,*** 2018) to ultimately provide 100% production without having to entirely replace the acreage of outdoor production which is currently estimated to be 0.113 ha of indoor greenhouse space to match one outdoor hectare (i.e. 3.43 ha indoor to match the entire 12.14 ha outdoor area). The Party has begun these studies including increasing the density of mother plants in 2021 where the average indoor production of two varieties was 35.2 runner tips per mother plant (an increase from an average of 28.7 in 2020). MBTOC notes that the proposed adoption of indoor soilless culture by the Party is very small over the next few years and MBTOC considers the technology well advanced, and that adoption should be sped up to reduce the CUN further in the immediate years. According to the Party, due to the on-going pandemic and resulting higher costs of construction materials, expansion of the indoor soilless production facility could not be carried-out in 2022, as expected. It was anticipated that the Party would travel to other countries to view existing indoor production facilities for possible adoption to production in PEI. In addition, the supplier of Botanicoir has notified the Party that it anticipates expected delays of shipments due to the pandemic, which could limit the amount of production using Botanicoir. The applicant has indicated that now that COVID-19 restrictions have largely subsided, these envisioned activities are being resumed. MBTOC still considers that non-fumigant options could be further investigated and adapted for use in strawberry runner production. For example, anaerobic soil disinfestation (ASD) has been shown to be an economically feasible method to manage *Verticillium dahliae* in strawberry production (Mazzola ***et al.,*** 2018; Shennan ***et al.,*** 2018), and other pathogens, nematodes and weeds in other production systems (Di Gioia ***et al***., 2016; Shi ***et al***., 2019; Shrestha ***et al***., 2016). The Party has claimed that carbon sources for ASD are too expensive, but viable cost-effective alternatives that may be specific to PEI have not been thoroughly investigated. In addition, soil disinfestation with steam has been tested successfully in strawberry fruiting fields and found to be economically feasible (Fennimore and Goodhue, 2016). To expand steam disinfestation to strawberry runner production, a preliminary study by Fennimore and Kim (2020) showed that pest control and daughter plant production was similar for soils treated with steam and MB:Pic. 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 satisfied that studies have shown that chloropicrin (Pic), an effective alternative, can be used in PEI because of the absence of ground water contamination. MBTOC continues to be unclear as to why PEI allows the use of Pic in mixtures with MB and urges the party and regulators in PEI to use a consistent regulatory approach to all alternatives. Envisioned trials under special permit will contribute to clarify this issue. 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 fumigants including MB 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 and harvest is delayed by 3 weeks.

		MBTOC comments on economics provided in the CUN for MB use in 2024: In the past, the Party provided the cost of producing G1 foundation stock with the Haygrove high tunnel multi span soilless system with data from 2013 but found that adoption would affect no more than 4% of current methyl bromide use (405 kg); would require a significant change to production practices; and would increase costs significantly. This has now been supported by a partial budget analysis of the cost of growing G1 foundation stock under current practices ("business as usual") and under the Hargrove system. The latter, it is argued, is too expensive for the small potential reduction in the use of methyl bromide. As a result, the grower is no longer pursuing this option. In its application for 2022, the Party added an economic analysis for the alternative of soilless production in a greenhouse using "Botanicoir Precision Plus" growbags for G2 plants, providing a comprehensive partial budget. The Party argues that, if successful, this could result in a 45% reduction in the use of methyl bromide. In this regard, the data showed that, "based on 2020 levels of production and expenditures, the costs of indoor soilless production per plant ($0.13) are just under double the cost of outdoor soilless production per plant ($0.07), excluding costs associated with construction of the greenhouse". As there is no expectation that the 'new' growing system will produce higher quality G2 runner tips, the runners will not fetch a higher price in the market. The only way to recoup the higher cost, therefore, is to improve productivity – in this case, the number of plants that are propagated. This currently stands at 1:20, but this will have to increase to at least 1:40 given the increased costs. As these exclude the cost of the greenhouse(s), 1:40 is a conservative estimate. In the 2023 nomination, the grower has been able to increase the productivity of the G2 production system to a ratio of tips to stock of 1:35.2 and to reduce the cost to $0.10 under experimental conditions. This is still not sufficient to overcome the increased cost, hence the Party argued that more time was needed to explore further improvements in productivity. In the 2024 nomination the Party reports that the grower has been able to lower the cost of production per plant under the soilless system to $0.095 (compared to $0.07 in open field production) but has yet to calculate the capital cost associated with the construction and setup of the greenhouses. Based on the cost of the existing structures and the lower unit costs of larger structures, it is estimated that the capital costs can be recovered by 2031. **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 four 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, [17]MOP31, [18]MOP32, [19]MOP33, [20]MOP34

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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,

1. 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;

2. 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;

3. 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;

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

(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;

4. 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;

5. 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;

6. 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;

7. 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;

8. 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;

9. 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	43.490 (+Andalucia)									
Spain	Pepper	200.000	155.000	45.000										200.000	155.000	45.000									
Spain	Strawberry Fruit	556.000	499.290	80.000										556.000	499.290	0.0796									
Spain	Strawberry Runners	230.000	230.000	230.000	215.000									230.000	230.000	230.000									
UK	Cut flowers		7.560												6.050										
UK	Ornamental tree nursery	12.000	6.000											6.000	6.000										

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															