MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

UNEP

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

14 FEBRUARY 2004

CRITICAL USE NOMINATIONS – 2004 SUPPLEMENTARY REPORT

Montreal Protocol
On Substances that Deplete the Ozone Layer

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UNEP Technology and Economic Assessment Panel

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

Composition and layout of the report:
Jonathan Banks & Ian Porter

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14 FEBRUARY 2004 REPORT OF THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

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1 Report of the Technology and Economic Assessment Panel

The 15th Meeting of the Parties (MOP15) requested the Technology and Economic Assessment Panel (TEAP) and its Methyl Bromide Technical Options Committee (MBTOC) in Decision XV/54 to evaluate the methyl bromide Critical Use Nominations (CUNs) categorized as 'noted' in the October 2003 MBTOC report and to 'recommend,' 'not recommend' or list as 'unable to assess.' This report responds to that request by Parties. TEAP endorses the findings of the MBTOC, which are included in this report, and recommends the quantities and nominations for Critical Use Exemptions (CUEs) of methyl bromide listed below.

Table 1. Summary of recategorised 'noted' CUNs by tonnage (metric tonnes) and Party.

Party	Nominated	Recommended	Not Recommended or reduced by Party
Australia	150.0	95.8	54.2
Belgium	86.4	44.5	41.9
Canada	47.2	47.2	0
France	315	273	42
Greece	210	186	24
Italy	2490	1527	963
Spain	629	351	278
UK	52.4	52.4	0
USA	6533.6	5698.5	835.0
Totals	10513.6	8275.1	2238.5

Table 2. Summary of Total CUNs by Tonnage (metric tonnes) and Party
(Including those Recommended by TEAP/MBTOC in both October 2003 and February 2004)

	Nominated	Recommended	Not recommended or adjusted by Party	Withdrawn by Party	Unable to assess
Australia	205.05	144.7	60.35		
Belgium	89.77	46.97	41.87	0.93	
Canada	55.152	55.152	0		
France	565	407	65		93
Greece	350	186	24	140	
Israel	1100	0	0	1100	
Italy	2840	1877	963		
Japan	284	284	0		
Netherlands	1.2	0	1.2		
Portugal	200	50	0		150
Spain	1159	781	378		
UK	147.551	128.078	19.473		
USA	9920.986	8942.207	978.779		
Totals	16917	12901	2532	1241	243

- TEAP recommends that Parties consider the option of allowing methyl bromide for uses nominated for 2005 and 2006 CUEs but not approved by Parties, so long as the resulting emissions are offset through the collection and destruction of one kilogram of halon 1211 for each five kilograms of methyl bromide as elaborated below;
- TEAP recommends that Parties be allowed to use methyl bromide for CUNs approved by Parties for 2007 and beyond only if offset by destruction of a sufficient quantity of halons or CFCs to offset the ozone depleting potential of the methyl bromide. Approaches taken from previous Science Assessment Panel reports can provide a basis for choices of the appropriate exchange ratios for offsets in 2007 and beyond. TEAP can confirm that adequate quantities of surplus halons and CFCs are available beyond the quantities required for critical uses and the basic domestic needs of Article 5(1) countries.

TEAP recommends an accounting framework like that used for Essential Use Nominations which would list the quantity available from inventory and stockpile, the quantity allocated for CUE, and the quantity used, with a year-end balance. The Secretariat should remind Parties that, after 1 January 2005, in countries granted CUEs, available stockpiles of methyl bromide may be used only for Quarantine and Pre-Shipment (QPS), export to Article 5(1) countries, for feedstocks, and for uses granted CUEs. Under Decision IX/6, Parties must first use existing stocks of banked or recycled methyl bromide to satisfy the uses granted under CUEs, and can produce and/or import methyl bromide to the extent of the CUE not satisfied by the stocks of banked and recycled methyl bromide.

TEAP makes the following observations and suggestions for further action by Parties.

1.1 Chronology of First Methyl Bromide CUE Process

1997		
	September	Decision IX/6—Methyl Bromide Critical Use Exemptions
2001		
	October	Decision XIII/11—Procedures for CUE Application
2002		
	May	MBTOC Publishes Handbook to CUNs (Decision XIII/11)
2003		
	31 January	Deadline for Methyl Bromide CUNs for Decision at MOP 15
	15 February	Ozone Secretariat & TEAP/MBTOC Extended Deadline
	17-22 March	MBTOC Meeting, Cape Town South Africa
	30 April-2 May	Agricultural Economics Task Force Meeting, Manchester UK
	5-8 May	TEAP Meeting, Manchester, UK
	May	TEAP 2003 Report (Including MBTOC CUN Evaluation)
	7-11 July	23rd OEWG, Montreal Canada
	August	MBTOC Publishes Revised Handbook to CUNs
	10 September	Parties Submit Supplementary Information to Ozone Secretariat
	22-24 September	MBTOC Extraordinary Meeting, Brussels Belgium
	October	MBTOC Supplementary Report on CUNs
	10-14 November	MOP 15, Nairobi Kenya
2004		
	31 January	Deadline for additional information by Parties
	10-12 February	MBTOC Extraordinary Meeting, Long Beach California USA
	13-14 February	TEAP Select Extraordinary Meeting, Long Beach, Ca. USA
	28 February	Deadline for CUNs for 2005 for consideration at 2004 MOP 16
	17-21 March	MBTOC Meeting, Montreal Canada
	24-26 March	MOP Extraordinary Meeting, Montreal Canada

In March 2003, MBTOC made the first technical assessment and considered and analysed, to the extent possible, the specific circumstances of each nomination based on the available information provided by Parties in January and February 2003. Several CUNs were very general, covering a wide range of crops in one submission. In other cases, nominations did not specify exactly why or where methyl bromide use was considered essential, or did not provide data to substantiate the stated reasons. MBTOC evaluated those nominations with sufficient information and referred some nominations back to Parties for clarification or provision of additional information aiming to allow a full evaluation in advance of the OEWG. The OEWG considered the MBTOC evaluation of CUNs contained in the May 2003 TEAP report and requested TEAP and its MBTOC to update their report in advance of the 15th Meeting of Parties to allow consideration of additional information to be submitted by nominating Parties. The updated MBTOC evaluation was published in October 2003, with a large portion of CUNs classified by TEAP/MBTOC as "noted." The 15th MOP considered the TEAP/MBTOC report on October 2003 on the CUNs for 2005 and requested TEAP/MBTOC in Decision XV/54 to "evaluate the CUNs for methyl bromide that are currently categorized as 'noted' and re-categorize them as 'recommended' or 'not recommended' or 'unable to assess.'"

1.2 Benefit of the Doubt Granted to Parties in First CUN Assessments

TEAP and its MBTOC gave the benefit of the doubt to nominations and made extra efforts to obtain additional information to supplement the technical information presented in the nominations. MBTOC summarized the literature (in the form of simple metaanalysis), especially for reviewing alternatives for the major crops requesting CUEs, and solicited additional information from Parties to clarify whether the nomination satisfied the criteria of Decision IX/6. In recognition of the problems encountered in this inaugural process, TEAP and its MBTOC recommended CUEs more liberally than will be recommended in the future. TEAP and its MBTOC regret that its liberal first review may diminish the perception of fairness by Parties and their agricultural enterprises that worked hardest to achieve minimum nominations, only to see CUEs recommended to others for the same uses. TEAP and its MBTOC would welcome a request from Parties to report on equity and trade issues for nominations granted or proposed for CUEs.

The justification that insufficient time was available to implement technically and economically viable alternatives will be less valid in future years when enterprises and Parties will have better prepared for the introduction of new technical options leading to the final phaseout. TEAP and its MBTOC recommended use in 2005 for some circumstances where time is considered necessary to implement alternatives. In the future, it is likely that implementation and transition for newly registered and newly-available alternatives will be limited to 3 years.

In the future, TEAP and MBTOC will strictly evaluate nominations with the burden on the nominating Party to substantiate that the nomination satisfies the criteria of Decision IX/6.

TEAP and its MBTOC will work with Parties to simplify and focus future nominations to avoid the unnecessary duplication of materials already submitted, to assist Parties in providing necessary technical justification, and to guide Parties to the most environmentally acceptable alternatives and substitutes. MBTOC has made progress in defining standard technical options to reduce emissions as required by Decision IX/6 (e.g. by the use of VIF film or equivalent, specified dose rates, strip fumigation). Parties making nominations in the future will want to elaborate their phaseout plans, including economic incentive strategies, best management practices (BMPs), and government and industry collaboration on fast-tracking registration and implementation of new options.

Parties with enterprises currently dependent on methyl bromide are particularly requested to study how others have phased out methyl bromide in the same applications, particularly in Article 5(1) countries where agricultural experts have implemented unique integrated pest management options. This cooperation can be facilitated by projects undertaken by Implementing Agencies and other organizations.

1.3 Reasons for Nominations for Critical Use Exemptions

The nominations cited several categories of reasons for CUEs: 1) Absence of identified alternatives, 2) Identified alternatives not approved by regulatory authorities, 3) Approved alternatives not available for reasons such as lack of time to develop supply infrastructure, training in use of the alternative and adaptation of the process to local conditions. 4) Available alternatives not suitable for local conditions, 5) Longer time between fumigation and planting (plantback periods) with the use of some alternatives, causing disruption to cropping programs, 6) Available and suitable alternatives not economically viable, and 7) Economically viable and available alternatives not yet adopted due to procrastination, inconvenience, and other reasons.

1.4 The Concept of 'Economic Viability'

- Some of the CUE nominations are based on the contention that available alternatives to methyl bromide are not "economically viable." As TEAP noted in its *Progress Report* of May 2003, alternatives are economically viable even when they increase costs or inconvenience or change enterprise practices. Every other sector affected by the Protocol has absorbed cost increases and has faced the need to change technologies to accommodate the phaseout of ODS. "Economic viability" is not defined in the Decision IX/6. However, TEAP

determined that the US$ 24,000 per ODP-tonne average cost for phaseout of methyl bromide under the MLF is an appropriate reference value. A further substantive clarification of "economic viability" for purposes of the CUE Decision includes the following:

- Incremental cost for substitutes less than or equal to the methyl bromide cost per tonne for projects undertaken by the Multilateral Fund to eliminate methyl bromide in Article 5(1) countries;
- Incremental cost for substitutes less than or equal to the cost of capturing and destroying an equivalent amount of ODS at the appropriate exchange rate as an offset for the methyl bromide use;
- Incremental cost for substitutes comparable to the cost increases experienced by other sectors that have phased out ODS under the Protocol;
- Cost to methyl bromide users less than or equal to some percentage of total production cost, taking into account the substitutability of production factors and the fact that a substantial part of any cost increase for alternatives will be passed on to consumers who are the beneficiaries of ozone layer protection. In some circumstances, a switch in enterprise activity (e.g. changing cropping patterns) will be an economically viable alternative to the continued use of methyl bromide;
- CUEs should not be available to new applications of methyl bromide for enterprises that were already profitable (and hence were by definition economically viable) or for expansions of methyl bromide to operations where methyl bromide was not previously used.

No matter what concept of economic viability is adopted, the question of who bears the cost must be resolved separately. The additional costs can be borne by the users themselves (under the "polluter pays" principle), by the governments nominating the CUEs or by some combination of the two. Governments may wish to pay the costs on the principle that the burden should be spread over the entire population benefiting from protection of the ozone layer, and that these governments are already paying the incremental cost for Article 5(1) Parties to eliminate methyl bromide and therefore should be willing to assist their own farmers and other enterprises using methyl bromide.

TEAP clarifications of 'economic viability' will allow MBTOC to uniformly and objectively evaluate CUNs.

1.5 The Importance of Proactive Efforts to Phase Out Methyl Bromide

Decision IX/6, concerning methyl bromide CUEs, requires that the exemptions should be granted only if "it is demonstrated that an appropriate effort is being made to evaluate, commercialise, and secure national regulatory approval of alternatives and substitutes." Considering that the 2005 phaseout date was fixed in 1997, government and enterprises should have by now registered and implemented alternatives and should be redoubling their efforts to develop, register, and implement additional alternatives.

For CFCs, halons, and other ODSs, governments took many proactive steps to ensure on-schedule phase outs, including: programmes for assessing and facilitating the availability of alternatives, taxes on ODSs, financial support for alternatives, labelling, product prohibitions, compulsory recovery and recycling, public awareness and information campaigns, corporate and military leadership, and partnerships. Less methyl bromide would be required today if more proactive steps had been taken.

Parties may wish to consider that authorization of large quantities of CUEs will diminish the market incentives to adapt existing alternatives and substitutes and to commercialise new alternatives and substitutes. Failure to achieve global competition and economies of scale for alternatives could increase the cost to the Multilateral Fund of the methyl bromide phase out in Article 5(1) countries because the consumption of methyl bromide in these countries would continue to increase and alternatives would more slowly come down in incremental cost.

The nominations previously listed as noted but now recommended by MBTOC for 2005 cover a wide variety of crops and post-harvest uses in 9 countries (Australia, Belgium, Canada, France, Greece, Italy, Spain, United Kingdom and USA). Approved nominations may stimulate copycat nominations in the future even from those Parties that have already successfully adopted alternatives, may increase the quantities nominated.

Developing countries that are phasing out methyl bromide with assistance from the Multilateral Fund could abandon these efforts and demand similar exemptions for their own crops even in their intermediate phaseout stages, in the name of equity—particularly if they supply their crops to the same markets.

In addition, the lack of enforcement of the phaseout schedule creates uncertainty (and adds costs) for the affected enterprises.

2 An Option for Reducing the Adverse Environmental Impact of Methyl Bromide CUEs

Considerable quantities of ODS are stored in products and equipment and a significant part of this ODS could be collected and destroyed. Destruction of any quantity of ODS will advance the repair of the ozone layer. There is a particularly clear over-surplus of halon 1211 that is gradually being emitted because most countries do not provide incentives for destruction and because proper destruction is expensive while discharge can be accomplished without detection.

No Party has claimed any right to produce ODS in exchange for the amounts that are being destroyed, as allowed by the Montreal Protocol. There has been no need to take advantage of this Protocol provision because the ODS needed for essential uses is granted for Essential Use Exemption by the Meeting of the Parties. This situation provides no incentives to destroy ODS available for destruction while permitting Parties to seek exemptions to produce methyl bromide, thus increasing the adverse impact on the ozone layer in both ways.

One option is to decide to allow trade of methyl bromide CUEs for destruction of ODS in other groups.

2.1 Trading of ODS destruction credits for Methyl Bromide CUE[1]

The Montreal Protocol already allows Parties to increase the production of ODSs within each Group of each Annex of controlled substances within a given year to the extent of destruction of ODSs within the same Group. Parties have not needed to exercise this option under the Protocol because Parties have been granted Essential Use Exemptions for additional production for uses such as metered-dose inhalers (MDIs) and aerospace applications, where fresh and pure quantities are required and for halon 2402, where adequate quantities were not available. Because methyl bromide is the only substance in the group listed in Annex E, there is no other ODS that can be destroyed which would allow increased production of methyl bromide. However, there are large quantities of available ODSs in other Annexes that will

[1] TEAP members Stephen O. Andersen (TEAP Co-chair), Madhava Sarma (TEAP Senior Expert Advisor), and Gary Taylor (Co-Chair of the TEAP Halons Technical Options Committee) developed the proposal to offset methyl bromide emissions with the assistance of John Daniel, Stephen DeCanio (Co-Chair 2003 TEAP Agricultural Economics Task Force), Jim Schaub (MBTOC and 2003 TEAP Agricultural Economics Task Force), and Susan Solomon. TEAP approved the final draft.

likely be emitted resulting in unnecessary and avoidable depletion of the stratospheric ozone layer if not destroyed. One option is to allow production of methyl bromide for critical uses in exchange for the destruction of an amount of ODS that would result in a substantial net benefit to the ozone layer. This is a win-win proposition for the ozone layer and for the users of methyl bromide.

- TEAP recommends that Parties consider the option of allowing methyl bromide for uses nominated for 2005 and 2006 CUEs but not approved by Parties, so long as the resulting emissions are offset through the collection and destruction of one kilogram of halon 1211 for each five kilograms of methyl bromide as elaborated below;
- TEAP recommends that no such offset be required for CUEs granted by Parties in 2005 and 2006; and
- TEAP recommends that Parties be allowed to use methyl bromide for CUNs approved by Parties for 2007 and beyond only if offset by destruction of a sufficient quantity of halons or CFCs to offset the ozone depleting potential of the methyl bromide. Approaches taken from previous Science Assessment Panel reports can provide a basis for choices of the appropriate exchange ratios for offsets in 2007 and beyond. TEAP can confirm that adequate quantities of surplus halons and CFCs are available beyond the quantities required for critical uses and the basic domestic needs of Article 5(1) countries.
- Parties may also wish to consider allowing destruction credits to be carried forward for possible future essential and critical uses. Such a provision would be an incentive to collect and destroy all redundant ODS and could help eliminate the reluctance to retrofit existing applications that results from the current oversupply of ODSs.[2]

The TEAP realises that some Parties may require more methyl bromide for uses nominated for 2005 and 2006 but not approved by Parties than offset by the destruction of locally available halon 1211. Some other Parties may have more available halon 1211 than needed. One way of overcoming this problem is to allow trading of destruction credits between Parties.

Parties could decide on a system with the following features:

- An initial 5 to 1 rate of exchange between Methyl Bromide and halon 1211

[2] For further elaboration, see the 2002 Assessment Reports of the TEAP and its Halon Technical Options Committee (HTOC).

- Credit for destruction only if undertaken through Protocol-approved technologies
- Trading in destruction credits between Parties
- Offset methyl bromide use in 2005 and 2006 with destruction completed before 2009 (allowing time for soliciting, recovering, and destroying halon 1211 at existing facilities.
- Annual reporting and TEAP review

This offset methyl bromide with destruction of halon 1211 will further protect the stratospheric ozone layer:

- Increases long-term protection of the ozone layer (reduces global bromine ODS emissions).
- Retains the agreed methyl bromide phaseout schedule with a stringent offset.
- Encourages and rewards alternatives and substitutes to methyl bromide and reduces the number of CUEs and quantity of methyl bromide nominated for CUEs.
- Provides a new incentive for destruction of ODSs not necessary for critical or essential uses and for the basic domestic needs of Article 5(1) Parties.
- Allows two years more time to implement available alternatives for uses nominated for, but not granted, CUEs.

2.2 Details of the Proposal

The TEAP recommends an exchange of five kilograms methyl bromide for one kilogram of halon 1211. For the years 2005 and 2006 halon destruction only offsets the increased use in methyl bromide for uses not authorized a CUE; "not recommended" uses are about 10% of "recommended" uses for 2005. It can be anticipated that Parties will choose to only use methyl bromide for a small portion of the uses not authorized for CUEs, particularly because the cost of using methyl bromide will double under this option. The use of methyl bromide in 2005 and 2006 for uses not approved for CUEs by Parties is a safety valve if time is not available for affected enterprises to change to alternatives.

From 2007, the ODS destruction can offset the entire use of methyl bromide authorized by CUEs.[3]

The current US average halon 1211 price is US$45.00 per kilogram with a recent range in price of US$33 to US$55 per kilogram. The current average global cost of halon 1211 decanting and destruction is about US$5.50 with a recent range of US$4.40 to 6.60 per kilogram. The current price of methyl bromide is about US$10.00 with a recent range of $8.80 to $11.00 per kilogram. The total average cost to purchase and destroy halon 1211 is US$50.50 per kilogram. Thus, the new cost of methyl bromide for uses nominated for CUE for use in 2005 and 2006 would be about US$20.00 at the recommended 5 to 1 methyl bromide for halon 1211 exchange rate.

The calculation of the cost of collecting and destroying halon 1211 is as follows:

	US$/kilogram
Average price of halon 1211	45.00
Average cost of halon 1211 destruction	5.50
Total cost of halon 1211 plus destruction	50.50
Cost per kg methyl bromide (5 to 1 exchange)	10.00
Average price of methyl bromide	10.00
Cost to collect and destroy halon 1211	10.00
Total cost of methyl bromide w/destruction offset	20.00

[3] An offset of 5 kilograms methyl bromide per kilogram of halon 1211 destroyed increases the bromine impact on the stratospheric ozone layer for 7 years after atmospheric transport and thereafter substantially decrease the long-term impact on stratospheric ozone. However, the destruction of ODS to offset all CUEs 2007 and beyond will result in an increase in ozone protection in every future year, with the net benefit depending on the exchange rates selected by Parties for each ODS to be destroyed.

At the exchange rate of five kilograms methyl bromide per one kilogram halon 1211 and a total cost of US$50.50 per kilogram for halon collected and destroyed, the additional cost of methyl bromide for 2005 and 2006 would be approximately US$10.00/kilogram. The total cost of methyl bromide for uses nominated for CUE but not approved by Parties would therefore be US$20/kg.

The TEAP proposal to offset methyl bromide emissions with halon 1211 destruction would approximately double the methyl bromide price from the current level. With a doubling of the current methyl bromide price, alternatives and substitutes will often be less expensive than the continued use of methyl bromide.

Methyl bromide typically accounts for less than 5% of crop production costs and a smaller percent of the food products containing ingredients treated post-harvest with methyl bromide.

Thus, the 5 kilograms of methyl bromide to 1 kilogram of halon 1211 exchange rate provides an appropriate price incentive for adopting alternatives and substitutes to methyl bromide while allowing applicants not granted CUE the option of continuing use until in 2005 and 2006. The TEAP proposal provides adequate certainty to encourage the emergence of a market for collection of halon 1211 and envisions greater flexibility after 2007.

TEAP estimates that in 2002, 330,000 ODP-tonnes of halon 1211 were installed in fire fighting equipment. Currently, there are few economic incentives to collect and destroy ODS. Stringent regional and national regulations requiring owners to pay for ODS destruction have recovered only a small portion of estimated quantities and will have been counterproductive to ozone protection if owners choose to discharge the ODS to avoid the costs of destruction.

Halon 1301 is not considered for destruction to offset methyl bromide use in 2005 and 2006. It is particularly beneficial to collect and destroy halon 1211 contained in non-essential fire equipment, primarily portable fire extinguishers since it may be emitted otherwise. The new campaign will stimulate owners to sell their halon to recovery and destruction programs that, to date, have produced disappointing results due to a lack of economic incentives to help offset the cost of replacement equipment and halon destruction.

TEAP estimates that 350,000 to 400,000 ODP-tonnes of CFCs were contained in refrigeration equipment, that 450,000 ODP tonnes of halon 1301 is in inventory or installed in fire fighting equipment, and that 1.25 million ODP-tonnes of CFC-11 will be contained in foams in 2010. Part of these quantities could be destroyed in exchange for methyl bromide CUEs in 2007 and beyond. The Science Assessment Panel could be requested by the Parties to provide appropriate exchange ratios for the CFC destruction. TEAP could be requested by Parties to determine which

ODSs are available in quantities greater than necessary for critical uses including the basic domestic needs of Article 5(1) Parties.

2.2.1 Why Halon 1211?

Surplus halon 1211 is available—only a minor portion of global inventory and banked halon 1211 is required for future essential uses.

Destruction technology for halon 1211 is approved by the Montreal Protocol and available in many countries. Destruction facilities have accounting and auditing systems in place to certify the quantity and purity of halon 1211 offered for destruction and to verify the portion destroyed.

Transactions for obtaining methyl bromide for halon 1211 will be very simple: methyl bromide distributors and applicators will need a certificate of destruction for halon 1211 sold to uses nominated for CUEs but not approved by Parties. Distributors wishing to sell methyl bromide certified for such 2005 and 2006 uses can engage in the business of collecting and destroying halon 1211 or can purchase the certificates from existing enterprises that already collect halon 1211 or use and destruction. In addition, methyl bromide customers can choose to purchase their own certificates authorizing purchase and use.

2.3 Stratospheric Ozone and ODP Issues in selecting an exchange rate

The latest Scientific Assessment established the ODPs for methyl bromide at 0.38 and for halon 1211 at 6.0.

	SAP ODP[4]	Atmospheric Lifetime[5]
Methyl Bromide	0.38	0.7
Halon 1211	6.0	16.0
ODP Ratio (Halon 1211/MB ODPs)	15 to 1	

[4] WMO 2003, "Scientific Assessment of Ozone Depletion: 2002" World Meteorological Organization (WMO) Global Ozone Research and Monitoring Project—Report No. 47, March 2003, Jointed published by National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), United Nations Environmental Programme (UNEP), WMO, and the European Commission. From Table 1-5 page 1.30.

[5] WMO 2003. From Table 1-6 pages 1.32 to 1.33.

In 1992, Drs. Susan Solomon and Daniel L. Albritton calculated the time-dependent ozone depletion potentials and discussed the conceptual framework for understanding the relationship between short-term and long-term ODPs in the context of halocarbon policy.[6] They suggested that long-term ODPs, based on steady-state atmospheric impacts, are not appropriate for making shorter-term (decade-scale) forecasts. They developed time-dependent ODPs, using an empirical approach, to allow a scientific comparison of the substitution between ODS alternatives. They presented numerical examples of how the framework estimates the impact of choices among halocarbon emissions on the state of the ozone layer for the next decades and centuries. The 1994 the Scientific Assessment of Ozone Depletion built on this framework and presented a perspective on ODPs including a discussion of the complexity introduced by the Bromine/Chlorine interplay.[7]

TEAP consulted with Drs. Susan Solomon, and John Daniel in the scientific evaluation of the halon-1211/methyl bromide ozone effects and received updated estimates from these experts of the time-dependent ODPs based on the latest Scientific Assessment (2003). These time-dependent ODPs allow the annual comparison of the bromine impact on the ozone layer loading from both halon 1211 and methyl bromide. The data was also used to determine the future date when the reduced bromine impact from the destruction of a kilogram of halon 1211 would be greater than the bromine impact from the quantity of methyl bromide allowed in exchange.

2.4 Summary

The recommended interim environmental exchange rate of five kilograms of methyl bromide for one kilogram halon 1211 destroyed satisfies the following criteria:

1. Net environmental benefits to stratospheric ozone in 7 years with a substantial three-fold positive net benefit to the ozone layer thereafter,

2. Cost-effectiveness to methyl bromide users who may take advantage of this option, and

3. Economic incentives to encourage the implementation of alternatives and substitutes.

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[6] Susan Solomon and Daniel L. Albritton, "Time-dependent ozone depletion potentials for short- and long-term forecasts," *Nature*, Volume 357, 7 May 1992, pp. 33-37.

[7] Albritton, D. L., R. T. Watson, and P. J. Aucamp, Scientific Assessment of Ozone Depletion: 1994, World Meteorological Organization, Report Number 37, 1994.

3 Further evaluation of some CUNs for Methyl Bromide

3.1 MBTOC Evaluation of CUNs Designated as 'Noted'

3.1.1 Basis of Mandate

Under Article 2H of the Montreal Protocol the production and consumption (defined as production plus imports minus exports) of methyl bromide is to be phased out in Parties not operating under Article 5(1) of the Protocol by 1 January 2005 save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be critical uses. Decision IX/6 of the ninth Meeting of the Parties to the Protocol established criteria allowing Critical Use Exemptions (CUE) Decision IX/6 states that:

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.

TEAP assigned its Methyl Bromide Technical Options Committee (MBTOC) to assess the Critical Use Nominations for the year 2005 in the light of the Decision IX/6.

The report in fulfillment of Decision XI/6(2) relating to Critical Use Nominations (CUNs) submitted in 2003 was contained in the May 2003 TEAP Progress Report. At the 23rd Open-ended Working Group meeting, TEAP and MBTOC were requested to update their report and reevaluate the 2003 round of CUNs. A supplementary report was published in October 2003.

Decision XV/54 of the 15th Meeting of the Parties relates to one particular category of evaluation of CUNs - the 'noted category - in that report. Decision XV/54 reads:

Recognizing that Parties had difficulty in taking a decision on the appropriate amount of methyl bromide to use for critical uses,

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,

1. To invite Parties with nominations that are currently categorized as "noted" in the Technology and Economic Assessment Panel 2003 supplementary report to submit additional information in support of their nominations, using the comments by the Technology and Economic Assessment Panel/Methyl Bromide Technical Options Committee in the October 2003 supplementary report as a guide to the additional information required. The Methyl Bromide Technical Options Committee Co-Chairs will provide additional guidance to assist Parties concerning the information required if so requested. Parties are requested to submit additional information to the Ozone Secretariat by 31 January 2004;

2. To request the Methyl Bromide Technical Options Committee to convene a specialmeeting, which should be held in sufficient time to allow a report by the Technology and Economic Assessment Panel to be released to the Parties no later than 14 February 2004;

3. To request the Technology and Economic Assessment Panel to evaluate the critical-use nominations for methyl bromide that are currently categorized as "noted" and recategorise them as "recommended", "not recommended" or "unable to assess".

This report is in fulfillment of Decision XV/54 (3).

3.1.2 MBTOC and TEAP process for consideration of the 'noted' CUNs

The process of consideration of the 2003 round of CUNs by MBTOC and TEAP that resulted in the 'noted' category of evaluation is described in the October 2003 Supplementary Report of TEAP. A chronology of the process is given in Section 1.1 of this report.

There were 46 nominations placed in the 'noted' category in the TEAP report of October 2003. Some of these nominations were the result of disaggregation of CUNs that originally covered two or more different crops or situations. There were107 original CUNs after disaggregation.

Subsequent to the 15th Meeting of the Parties, through the auspices of the Ozone Secretariat, MBTOC sent questions to the 8 Parties that had submitted CUNs that were categorised as 'noted', requesting specific additional information and comments that might assist in recategorising these nominations into 'recommended', 'not recommended' or 'unable to assess', as required by Decision XV/54. Decision XV/54 also suggests that the Parties concerned may also submit supplementary information to assist the process of further evaluation by MBTOC and TEAP.

The supplemental information was received by agreed date (31 January 2004) and circulated to MBTOC for consideration.

MBTOC met on 10-12 February 2004 to conclude its evaluation of the CUNs in the 'noted' category. This report is based on the results of that meeting.

3.2 Origin of the 'noted' category

In the October 2003 TEAP Report CUNs were placed into four categories of evaluation based on criteria of technical and economic feasibility as instructed by Parties and elaborated in the CUE handbook:

- 'recommended' - information contained in the nomination or available to MBTOC (and consistent with the MBTOC Assessment reports) documents that the nominated use satisfies the criteria of 'critical' within the context of Decision IX/6.

- ‘noted’ - information contained in the nomination or available to MBTOC that, in general, indicated that alternatives have been identified for the nominated use, but the nominating Party stated there were constraints that precluded their use and/or provided that specific reasons why methyl bromide was critical for the particular use. This category includes methyl bromide uses with acknowledged alternatives that were considered by the nominating Party to be not economically feasible.

- ‘unable to recommend’ - MBTOC determined that there are technically and economically feasible alternatives available to the user for the nominated use.

- ‘unable to evaluate’ - information contained in the nomination or available to MBTOC was insufficient to evaluate the nomination according to the criteria of Decision IX/6.

The category of ‘noted’ was specifically created by MBTOC for the guidance of the Parties in situations where MBTOC was unable to verify statements in particular CUNs that the alternatives known to MBTOC were not applicable in the particular circumstances of the nomination. This is discussed further in Section 2 of the October 2003 TEAP report.

As a result of the MBTOC review, the evaluation of a substantial number of the CUNs reported in the May 2003 TEAP Progress Report was changed from ‘recommended’ to ‘noted’. The original ‘recommended’ evaluations sometimes included various qualifications. Changes were made not only to CUNs for which supplementary information was sought or volunteered, but also for some for which no further information was requested. These changes were made to improve consistency between evaluations.

3.3 Review of CUNs in the 'noted' category

Evaluations of all 'noted' CUNs were based on the original CUN together with supplementary information provided subsequent to 23rd OEWG and that provided in response to Decision XV/54.

3.3.1 Consistent treatment of nominations

In the review of CUNs in the noted category, MBTOC followed the general principles it had used in making the evaluations in the October 2003 TEAP report. In particular, as far as feasible in considering such a diverse range of nominations, MBTOC sought to consider the 'noted' nominations to the same level of substantiation as used for those not placed in the 'noted' category in this round of nominations.

3.3.2 Modification of nominations by the nominating Party

Several Parties reduced the tonnage requested in one or more of their nominations in correspondence arising from the further evaluations of the CUNs that were in the 'noted' category.

3.3.3 Limitations in the review of 'noted' CUNs and supplementary information

A number of CUNs, including supplementary information, contained sufficient information, detailed explanations, supporting technical material and detailed research data, enabling MBTOC to make a full assessment and recommendation on the basis of the technical and scientific data provided. Others contained insufficient information to allow MBTOC to make a full technical and economic evaluation of the nomination in the light of Decision IX/6. In categorising these nominations as instructed under Decision XV/54, MBTOC again had to defer to the expertise and good faith efforts of the nominating Party.

As previously, to make an evaluation, MBTOC needed, as a minimum:

- to be able to determine what use the nomination was for, i.e. the actual, specific situation or problem that requires methyl bromide and for which alternatives are not available;
- target pest species for which it is considered that alternatives are not available;
- the quantity of methyl bromide requested, including the specific quantity of MB or MB/Pic mixtures used and what assumptions were made to determine the amount of MB for which application was made;
- the dosage/application rates and frequency of application of MB or specified MB-containing mixture;
- area of land or volume of commodities or structure to be treated;
- measures intended to limit the use and emissions of MB from the proposed critical uses;
- how much, as a proportion of the total crop/commodity/structure, was to be treated with methyl bromide;
- reasons why alternatives could not be used in the specific circumstances of the nomination;
- data and references that technically validate the comparative performance of at least the best alternative(s) compared to methyl bromide for the specific reason that the CUN was submitted;
- evidence that trials (R and D) in the relevant or equivalent region had been conducted to evaluate alternatives for the specified CUN use;

- for alternatives considered technically but not economically feasible: the fixed and variable cost, the change in product yield and market price, and other factors relevant to cost effectiveness analysis; and
- estimates of the price elasticity for the products produced with methyl bromide;

3.3.4 Consideration of alternatives

In evaluating the CUNs for soil treatments, MBTOC again assumed that a technically feasible alternative method to MB would need to provide sufficient pest and weed control and continued production of the crop for which MB was used. Furthermore, that the crop would be produced to existing market standards.

For commodity and structural applications, it was assumed that the objectives of the MB treatment, e.g. meeting infestation standards in finished product from a mill, would be met by any process considered a technically feasible alternative to MB.

Furthermore, MBTOC relied on the definition of alternatives to MB used in its 2002 Assessment. This reads, in part:

Definition of an alternative

- MBTOC defined 'alternatives' as those non-chemical or chemical treatments and/or procedures that are technically feasible for controlling pests, thus avoiding or replacing the use of MB. 'Existing alternatives' are those in present or past use in some regions. 'Potential alternatives' are those in the process of investigation or development.
- MBTOC assumed that an alternative demonstrated in one region of the world would be technically applicable in another unless there were obvious constraints to the contrary e.g., a very different climate or pest complex.

3.3.5 Period of nominations

Some nominations originally requested CUEs for more than one year. The evaluations of the CUNs in the noted category follows that for the other CUNs in the October 2003 TEAP report, where a recommendation was made for one year, 2005, only. Reasons for this action are discussed in Section 1.2.5 of that report.

3.3.6 Suggested adjustments to nominated quantities.

Decision IX/6 states in part 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'. In its evaluations therefore, MBTOC assessed 'noted' CUNs where possible for appropriate MB application rates, deployment of MB reduction technologies, such as use of barrier films.

In the soils sector, some CUNs involve the use of MB apparently with polyethylene sheeting (tarping). This process is known to lead to high rates of emission of MB in the absence of other measures such as deep injection. MB use and emission rates can be reduced substantially through use of less pervious tarping, such as VIF (Virtually Impermeable Film) or equivalent sheets, allowing increased retention of MB, extended effective exposure periods, and reduced MB application rates compared with use of conventional sheeting.

In Europe, EU regulation EC 2037/2000 was adopted in June 2000 and mandated that from 2001 all MB soil treatments were to be conducted using VIF sheeting. VIF plastic sheets in France are defined as those with permeation rates of less than 0.2 g m^{-2} h^{-1} against pure MB. There are a number of producers of film to this standard. Whilst sheeting is available in the commonly used widths of 1.4 and 1.6 m for strip fumigation in Europe, widths up to 10 metres are also available for broadacre applications.

MBTOC considers the maximum MB application rate, on its own, of either 350 kg/ha (warm sandy soils) or 450 kg/ha (heavier cool soils), in conjunction with VIF or equivalent, combined with extended exposure periods, as effective in most circumstances when well applied. Quantities in 'noted' CUNs were recalculated to conform to these specifications, including use of VIF or equivalent, where dosage rates in the CUN were higher. In cases where use of high chloropicrin-containing mixtures (approximately MB:Pic/50:50) were feasible, dosage rates were scaled to 200 kg MB per Ha. Reductions were not made if the Party provided a substantive argument otherwise (e.g. unusually tolerant pests or regulatory requirements to use other rates).

The rates used by MBTOC were maximum 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.

Use of VIF or similar barrier films results in better retention of methyl bromide compared with polyethylene tarps. Appropriate worker safety and other protective measures need to be in place to avoid unexpected exposures. In some jurisdictions, use of VIF or equivalent films are restricted. Most of the problems with use of VIF described in the 2002 MBTOC Assessment Report have now been overcome. VIF are in routine use in several countries and are under evaluation elsewhere.

In commodities/structures it is feasible to reduce MB use and emissions by the use of improved sealing techniques, monitoring to ensure only the effective dose is used,

and longer exposure periods. However, MBTOC did not reduce MB tonnages in the 'noted' postharvest CUNs to take account of these factors, as it did not have adequate details of the use of MB in individual circumstances on which to base an assessment. In general the average dosage rates quoted in the CUNs, typically around 20 g m^{-3} for mills and similar structures, are reasonable.

3.3.7 Registration and regulatory restrictions

MBTOC recognised that registration and local regulations can be constraints on the availability of particular chemical alternatives to the end user, in the sense of Decision IX/6, and are thus grounds for recommending a CUE if no other suitable alternatives are available. Regulations used in this work are those current at 14 February 2004 or where there was a definite date set for their introduction. Fear of loss of an alternative was not, by itself, considered equivalent to nonavailability and grounds for a 'recommended' outcome.

Typically, in the case of chemicals, alternatives (and MB) must be registered (i.e. approved for use as pesticides) in the relevant country, often for a particular use. Registration status of key chemical alternatives varies from country to country, although some alternatives are widely registered. The differing registration status of two specific leading chemical alternatives,1,3-dichloropropene (1,3-D) and chloropicrin (Pic), accounts for some of the variation in MBTOC's evaluations in similar uses of MB between Parties.

In certain countries or states, regulatory restrictions such as buffer zones or township caps apply to some chemical fumigants. In cases where buffer zones are the same size for both MB and alternatives, the buffer zones are not relevant to the consideration of CUEs. However, in a few cases where buffer zones are larger for an alternative fumigant than for MB, MBTOC considers this to be a justified and necessary reason for allowing use of MB, provided that no other effective alternatives can be used in this situation. The same reasoning applies to township caps.

The recent registration of at least two new products, sulfuryl fluoride and trifloxysulfuron, in USA may offer this Party opportunity for MB replacement in some areas at present covered by CUNs. In recent trials, sulfuryl fluoride has been shown to be effective against key pests in commodities and structures and the herbicide, trifloxysulfuron, as part of a system for control of nutgrass in vegetable crops.

The successful registration of additional fumigants or fumigant-combinations, currently in the registration process in certain countries, would eliminate the need for a substantial proportion of CUNs. Given this, the Parties may wish to continue to

give full consideration to modalities that would expedite the registration of appropriate alternatives.

The recent registration of at least two new products, sulfuryl fluoride and trifloxysulfuron, in USA may offer this Party opportunity for MB replacement in some areas at present covered by CUNs. In recent trials, sulfuryl fluoride has been shown to be effective against key pests in commodities and structures and the herbicide, trifloxysulfuron, as part of a system for control of nutgrass in vegetable crops.

3.4 Outcome of review of 'noted' CUNs

MBTOC considered 47 ‘noted’ nominations from 9 countries (Australia, Belgium, Canada, France, Greece, Italy, Spain, United Kingdom and USA) to finalise recommendations for the 2003 Nomination Round of CUNs. A decision was made on all nominations in accordance with Decision XV/54, with 44 CUNs being recommended (8275.1 t) fully or in part, with 3 nominations (8.6t) not recommended. As a result of partial recommendation by MBTOC or reduction of their nomination by individual Parties, a further 2229.9 t was not recommended. The tonnage of methyl bromide was adjusted from that nominated in several of the CUNs. In most cases this was to bring the nomination into conformity with dosage rates considered appropriate by MBTOC and use of emission control technology (VIF or equivalent).

The outcome of the recategorisation of the 'noted' CUNs is summarised by Party in Table 3.

Detailed MBTOC evaluations of 'noted' CUNs classified according to 'recommended', 'not recommended' and 'unable to assess' according to Decision XV/54 are given in Annex I.

Table 3. Summary of recategorised 'noted' CUNs by tonnage and Party.

Party	Nominated	Recommended	Not Recommended or reduced by Party
Australia	150.0	95.8	54.2
Belgium	86.4	44.5	41.9
Canada	47.2	47.2	0
France	315	273	42
Greece	210	186	24
Italy	2490	1527	963
Spain	629	351	278
UK	52.4	52.4	0
USA	6533.6	5698.5	835.0
Totals	10513.6	8275.1	2238.5

Values rounded to one decimal place

3.5 Availability of methyl bromide alternatives

The results of this evaluation should not be taken as an indication that MBTOC concluded there were no alternatives available *in general* for, for example, strawberry fruit, tomato production or flour mills. There are, in fact, several effective alternatives, some of which are used widely in commercial practice, as noted in published MBTOC reports. Specific circumstances may render some of these alternatives unavailable in some places, for example, because a certain chemical is in the registration process in a certain country/state, or because an alternative is inappropriate in specific, limited circumstances.

The MBTOC Assessment report of 2002 provided many examples of effective alternatives that are in commercial use, in diverse climates and conditions. The report did not identify existing alternatives for a small proportion of MB use (excluding QPS). The soil/preplant uses for which MBTOC's 2002 Assessment

did not identify alternatives were: certain perennial crops, some other replant situations, production of certain propagation materials meeting legislated requirements for pest-free status, root rot of ginseng, and a soilborne virus in Japan. In the post-harvest sector, MBTOC did not identify existing alternatives for a small number of non-QPS uses. These were: disinfestation of fresh chestnuts, fresh walnuts for immediate sale, high moisture fresh dates, seed-borne nematodes in alfalfa and some seeds for planting, organophosphate-resistant mites in traditional cheese stores. MBTOC noted that in some mills and food processing facilities, it may be necessary to resort to occasional full-site treatments, such as with methyl bromide, in cases where there is a breakdown of control using IPM processes.

ANNEX I: Recategorisation of 'noted' Critical Use Nominations - detailed list.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Australia	CUN2003/001	Cut Flowers - field	40	18.4	MBTOC recommends that a reduced CUE of 18.4 tonnes be approved for this use. This is to allow time for scaleup to alternatives. MBTOC considers that several alternatives are technically suitable (e.g. Pic alone, 1,3-D/Pic and metham sodium and Pic used in combination, substrates, dependant on species). This allocation was reduced to take account use of VIF or equivalent and scaled to an average dosage rate of 450 kg per Ha . MBTOC is aware that VIF of appropriate width is available from a number of suppliers. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Australia	CUN2003/002	Cut flowers - protected	20	10.4	MBTOC recommends that a reduced CUE of 10.4 tonnes be approved for this use. There would appear to be scope for further reductions by adoption of MB/pic mixtures where appropriate as a transition strategy. This allocation was reduced to take account use of VIF or equivalent and scaled to an average dosage rate of 450 kg per Ha . MBTOC is aware that VIF of appropriate width is available from a number of suppliers. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Australia	CUN2003/005	Strawberry fruit - field	90	67	MBTOC recommends that a CUE of 67 tonnes be approved for this use. This recommendation is for the full amount nominated without requirement to use VIF in view of the Party's commitment not to nominate for further MB in 2006 for this use. MBTOC considers that several alternatives are technically suitable (Pic alone, 1,3-D/Pic, and metham sodium and Pic used in combination). MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Belgium	CUN2003/007h	Asparagus (planting material)	0.63	0.63	MBTOC recommends that a CUE of 0.63 tonnes be approved for this use. The MB requested is to be restricted to a small part of the total production with recalcitrant pest problems, not controllable by other means. The need for high plant health of planting material is recognised, and at present MB is appropriate for this specific use (cool conditions, high pathogen incidence). MBTOC notes that the Party will fully regulate the use of MB for CU post 2005 by implementation of a QA system based on predictive tests for pests and inoculum thresholds.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Belgium	CUN2003/007k	Chicory	0.6	0.18	MBTOC recommends a CUE of 0.18 tonnes be approved for this use. Methyl bromide is only applied for a small proportion of these specialised crops. Chloropicrin-containing mixtures are not available to the growers using greenhouses because of local regulations. The Party indicated that alternatives were already used where possible. MBTOC notes that the Party will fully regulate the use of MB for CU in 2005 by implementation of a QA system based on predictive tests for pests and inoculum thresholds. MBTOC acknowledges the reduction in the amount requested by the Party.
Belgium	CUN2003/007e	Cucurbits	0.61	0.61	MBTOC recommends that a CUE of 0.61 tonnes be approved to allow time for transition of alternatives, especially the use of substrates. There is an expectation that further nominations will not be necessary. This recommendation is to allow time for full grower transition.
Belgium	CUN2003/007n	Cut flowers excl. roses and chrysanthemum	6.11	4	MBTOC recommends a CUE of 4.0 tonnes be approved for this use. Chloropicrin-containing alternatives are not permitted under local regulations and other alternatives are not yet fully developed for the local situation. MBTOC notes that the Party will fully regulate the use of MB for CU in 2005 by implementation of a QA system based on predictive tests for pests and inoculum thresholds.
Belgium	CUN2003/007p	Cut flowers-chrysanthemum	1.8	1.12	MBTOC recommends a CUE of 1.12 tonnes be approved for this use. Though in use elsewhere in similar conditions, there are still economic and technical concerns with the use of the principal alternative, steam, in this specific situation and the short cycle of the crop inhibits use of substrates. Chloropicrin-containing alternatives are not permitted in protected culture by local regulations. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Belgium	CUN2003/007o	Cut flowers-roses	1.64	0	This nomination is not recommended by MBTOC. It is considered that there are adequate feasible alternatives to MB for this specific application, particularly use of substrates.
Belgium	CUN2003/007l	Leeks and onions - planting stock	1.22	0.66	MBTOC recommends that a CUE of 0.66 tonnes be approved for this use. The MB requested is to be restricted to a small part of the total production with recalcitrant pest problems, not controllable by other means. The need for high plant health of planting material is recognised, and at present MB is appropriate for this specific use (cool conditions, high pathogen incidence). MBTOC notes that the Party will fully regulate the use of MB for CU post 2005 by implementation of a QA system based on predictive tests for pests and inoculum thresholds.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Belgium	CUN2003/007a,b	Lettuce and endive - protected	42.25	25.19	MBTOC recommends a CUE of 25.19 tonnes be approved for these uses. Methyl bromide is only applied for a small proportion of these specialised crops. Chloropicrin-containing mixtures are not available to the growers using greenhouses because of local regulations. The Party indicated that alternatives were already used where possible. MBTOC notes that the Party will fully regulate the use of MB for CU in 2005 by implementation of a QA system based on predictive tests for pests and inoculum thresholds. MBTOC acknowledges the reduction in the amount requested by the Party.
Belgium	CUN2003/007q	Ornamental plants (in pots)	5.66	0	This nomination is not recommended by MBTOC. It is considered that there are adequate feasible alternatives to MB for this specific application. These include 1,3-D, dazomet and steam. The nomination was for unspecified problems that might occur.
Belgium	CUN2003/007d	Pepper, eggplant - protected	5.27	3.0	MBTOC recommends that a CUE of 3.0 tonnes be approved to allow time for transition of alternatives, especially the use of substrates. There is an expectation that further nominations will not be necessary. This recommendation is to allow time for full grower transition.
Belgium	CUN2003/007i	Strawberry runners	3.4	3.4	MBTOC recommends that a CUE of 3.4 tonnes be approved for this use. Strawberry runners must be produced to a high standard of plant hygiene. It is recognised that this is achieved at present, worldwide, typically through the use of MB and alternatives are not yet fully developed.
Belgium	CUN2003/007c	Tomatoes - protected	17.17	5.7	MBTOC recommends that a CUE of 5.7 tonnes be approved to allow time for transition of alternatives, especially the use of substrates. There is an expectation that further nominations will not be necessary. This recommendation is to allow time for full grower transition.
Canada	CUN2003/008	Pasta and Flour Mills	47.2	47.0	MBTOC recommends that a CUE of 47 tonnes be approved for this use. The nomination is for the treatment of high capacity, continuous operation mills and facilities. These mills represent less than half the Canadian mills in number, but over 90% of total capacity. Time is required to further develop and implement full-site treatment alternatives for this specific use.
France	CUN2003/010	Carrots	10	8	MBTOC recommends that a CUE of 8 tonnes be approved for this use. Carrots are not typically produced with the aid of methyl bromide. However the situation in this CUN appears unique, both in growing situation and critical pathogen. Some trials with potential alternatives have been carried out. The alternatives tested did not control a particular, important pest satisfactorily. MBTOC acknowledges the reduction by the Party of the amount initially nominated.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
France	CUN2003/018	Eggplant, pepper, tomato - protected and field	150	125	MBTOC recommends that a reduced CUE of 125 tonnes be approved for this use. MBTOC recognises that the applicant has identified technically feasible alternatives, but that these are not registered, and that other alternatives such as grafting may be applicable in at least some situations. Products containing chloropicrin are not currently registered in France, limiting the practical availability of alternatives. The CUN is based on a dosage rate of 600 kg MB per Ha, but although MBTOC considers 450 kg per Ha an adequate average dosage, local regulations restrict this to 500 kg per Ha. The quantity nominated has been reduced proportionally.
France	CUN2003/014	Forest nurseries	10	10	MBTOC recommends that a CUE of 10 tonnes be approved for these uses. The CUN covers production of ornamental trees and also certain inoculated forest seedlings and seedlings for truffle production. Proven alternatives for the latter two minor uses are not known to MBTOC. The nomination states that the available alternative process for woody ornamentals, containerisation, is not economically feasible in the particular circumstances, as it would render the industry uncompetitive with cheaper, imported stock.
France	CUN2003/012	Mills and Processors	55	40	MBTOC recommends that a CUE of 40 tonnes be approved for this use. MBTOC notes that technically feasible alternatives have been adopted in diverse types of mills and food processing facilities in France and other countries, but that time is required for full development and implementation of alternatives in these particular mills. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
France	CUN2003/020	Strawberry fruit - protected and open field	90	90	MBTOC recommends that a reduced CUE of 90 tonnes be approved for this use. MBTOC considers that, in general, several alternatives are technically suitable for strawberry fruit production. However, the lack of registration of Pic in France means that there is a reduced range of alternatives available compared to some other developed countries. France have accepted that 1,3-D/Pic is a feasible alternative, but it is not currently registered. The CUN is based on a dosage rate of 500 kg MB per Ha, but although MBTOC considers 450 kg per Ha an adequate dosage, local regulations restrict this to 500 kg per Ha. The quantity nominated has been reduced proportionally.
Greece	CUN2003/021	Cucurbits - protected	30	30	MBTOC recommends that a CUE of 30 tonnes be approved for this use. Further time is required to required to implement alternatives under Greek conditions. MBTOC considers that a number of alternatives are available (e.g. metham sodium, substrates, grafted plants) for the MB uses nominated.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Greece	CUN2003/021	Tomato - protected	180	156	MBTOC recommends that a reduced CUE of 156 tonnes be approved for this use. Alternatives are not yet fully developed or registered for the conditions of the nomination. The nominated quantity was reduced based on the use of the nominated rate of 300 kg per Ha on 520 Ha. The nomination states that more information on the use of an alternative, chloropicrin, will become available in 2004, allowing a better estimate at the end of 2004 of MB requirement for 2005.
Italy	CUN2003/023	Eggplant - protected	280	194	MBTOC recommends that a reduced CUE of 194 tonnes be approved for this use. MBTOC notes that EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. MBTOC acknowledges that MB/Pic mixtures and some suitable alternatives, particularly mixtures of alternatives (1,3-D/Pic), which are registered in many countries, are not registered. The nominated quantity was reduced based on the use of a rate of 350 kg per Ha. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Italy	CUN2003/024	Melon - protected	180	117	MBTOC recommends that a reduced CUE of 117 tonnes be approved for this use. MBTOC notes that EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. MBTOC acknowledges that MB/Pic mixtures and some suitable alternatives, particularly mixtures of alternatives (1,3-D/Pic), which are registered in many countries, are presently unavailable. MBTOC also considers that substrates are a suitable technical alternative, but that a change to substrate culture is difficult in the region because of water quality and availability. The nominated quantity was reduced based on the use of a rate of 350 kg per Ha. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Italy	CUN2003/026	Pepper - protected	220	124	MBTOC recommends that a reduced CUE of 124 tonnes be approved for this use. MBTOC notes that EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. MBTOC acknowledges that MB/Pic mixtures and some suitable alternatives, particularly mixtures of alternatives (e.g. 1,3-D/Pic), which are registered in several developed countries, are presently unavailable. MBTOC notes that recent registrations of new EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. MBTOC also considers that substrates are a suitable technical alternative, but that a change to substrate culture is difficult in the region because of water quality and availability. The nominated quantity was reduced based on the use of a rate of 350 kg per Ha. MBTOC acknowledges the reduction by the Party of the amount initially nominated.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Italy	CUN2003/027	Strawberry fruit - protected	510	391	MBTOC recommends that a reduced CUE of 391 tonnes be approved for this use. MBTOC notes that EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. MBTOC acknowledges that MB/Pic mixtures and suitable alternatives, particularly mixtures of alternatives (eg. 1,3-D/Pic), which are registered in several developed countries, are presently unavailable (not registered). The nominated quantity was reduced based on the use of a rate of 350 kg per Ha in southern Italy and 450 kg per Ha in northern Italy. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Italy	CUN2003/028	Tomato - protected	1300	700	MBTOC recommends that a reduced CUE of 700 tonnes be approved for this use. MBTOC notes that EC formulations of 1,3-D alone and Pic used alone are proving as effective as MB, but time is required for commercial scale up. Also separate (sequential) application of some treatments may give longer plantback times and higher costs. There are indications that dosage rates may further be reduced to 300 kg per Ha without compromising effectiveness. MBTOC acknowledges MB/Pic mixtures and some suitable alternatives, particularly mixtures of alternatives (1,3-D/Pic), which are registered in most countries, are presently unavailable and that a change to substrate culture is difficult in the region because of water quality. The nominated quantity was reduced based on the use of a rate of 350 kg per Ha. MBTOC acknowledges the reduction by the Party of the amount initially nominated.
Spain	CUN2003/033	Cut flowers (Andalusia) - protected	53	53	MBTOC recommends that a CUE of 53 tonnes be approved for these uses. Substrate culture of the main species in this CUN appear to be a good alternative for this use. MBTOC acknowledges the substantial reduction of MB use from historical levels and also reduction of emissions by adoption of MB/Pic mixtures and VIF films.
Spain	CUN2003/034	Cut flowers (Catalonia) - carnation, protected and open field	20	20	MBTOC recommends that a CUE of 20 tonnes be approved for these uses. Time is needed for transition to substrates and high chloropicrin-containing mixtures as alternatives. 1,3-D/pic, a potential alternative, is not registered for most flower species produced in this region. MBTOC acknowledges the substantial reduction of MB use from historical levels and also reduction of emissions by adoption of MB/Pic mixtures and VIF films.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
Spain	CUN2003/035	Strawberry fruit - protected	556	278	MBTOC recommends that a reduced CUE of 278 tonnes be approved for this use. In general, alternatives are available for this use, but there some residual technical issues in particular soil types. As MBTOC considers alternatives will be available for sandy soils, a reduction of 50% was made to allow for treatment of technical issues in heavier soil types and to allow for commercial scale up. The Party may wish to provide further information on this aspect if this estimate is not feasible. MBTOC considers that several alternatives are technically suitable and available in 2005 (Pic alone, 1,3-D/Pic, and metham sodium and Pic used in combination). MBTOC acknowledges the substantial reduction of MB use from historical levels and also reduction of emissions by adoption of MB/pic mixtures (50:50) and VIF films.
UK	CUN2003/037	Food storage (dry goods) - structure	1.1	1.1	MBTOC recommends that a CUE of 1.1 tonnes be approved for this use. Trials with alternative full site treatments have not been achieved to date to the required standard of pest control.
UK	CUN2003/038	Mills and Processors	30.75	30.75	MBTOC recommends that a CUE of 30.75 tonnes be approved for this use. Trials with alternative full site treatments have not been *successful to date to the required standard of pest control and have adversely affected machinery.
UK	CUN2003/044	Mills and Processors	16.38	16.38	MBTOC recommends that a CUE of 16.38 tonnes be approved for this use. Trials with alternative full site treatments (eg. heat) have not been successful to date to the required standard of pest control and have adversely affected machinery.
UK	CUN2003/037	Miscellaneous dry nuts, fruit, beans, cereals, seeds	2.4	2.4	MBTOC recommends that a CUE of 2.4 tonnes be approved for this use. This nomination applies to a diverse range of consumer packs of stored products, where the main alternative phosphine is not appropriate due to logistic constraints and alternatives not fully developed.
UK	CUN2003/041	Spices (structural / equipment)	1.728	1.728	MBTOC recommends that a CUE of 1.728 tonnes be approved for this use. Trials with alternative full site treatments have not been successful to date to the required standard of pest control and lack of effect on machinery.
UK	CUN2003/042	Stored spices	0.03	0.030	MBTOC recommends that a CUE of 30 kg be approved for this use.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
USA	CUN2003/057	Chrysanthemum cuttings - rose plants (nursery)	29.412	29.412	MBTOC recommends that a CUE of 22.9 tonnes be approved for rose nurseries and 6.5 tonnes for chrysanthemum propagation. For chrysanthemum propagation, time needed for implementation of recognised alternatives. There is a high plant health requirement for both products, requiring effective soil treatment. For rose plant nurseries, trials are in progress on alternative systems and some feasible alternatives are not currently registered. Substantially different production systems are in use in some other countries. Adoption of these systems would entail significant changes to both process and product.
USA	CUN2003/048	Dried fruit, beans & nuts	86.753	86.753	MBTOC recommends that a CUE of 86.753 tonnes be approved for this use. MBTOC notes that registration, and possibly logistical changes, will be required in order to enable implementation of alternatives for rapid disinfestation.
USA	CUN2003/052	Forest nursery seedlings	192.515	192.512	MBTOC recommends that a CUE of 192.512 tonnes be approved for this use. MBTOC recognises a number of alternatives for this use, but time is required to effect transition to these alternatives.
USA	CUN2003/051	Mills and Processors	536.328	483	MBTOC recommends that a reduced CUE of 483 tonnes be approved for this use. MBTOC notes that technically feasible alternatives have been adopted in diverse types of mills and food processing facilities in USA and other countries, but that time is required for full development and implementation of alternatives in these particular mills. This nomination was reduced by 10% to allow for implementation of alternative measures in mills at present subject to multiple fumigations with MB within a year.
USA	CUN2003/054	Nursery float trays for tobacco seedlings	1.323	0	This nomination is not recommended by MBTOC. MBTOC considers that there are adequate feasible and locally available alternatives for this use.
USA	CUN2003/048	Smokehouse Ham (building and product)	0.907	0.907	MBTOC recommends that a CUE of 0.907 tonnes be approved for this use. There were no technically feasible alternatives known to MBTOC for combined treatment of both the smokehouse (structure) and hams (foodstuff).
USA	CUN2003/059	Strawberry fruit - field	2468.873	1834	MBTOC recommends that a reduced CUE of 1834 tonnes be approved for this use. The application is based on the technical grounds that no alternatives were available for moderate to severe pest pressure for nutsedge in certain areas and that certain topographies and regulatory issues prevent the use of possible alternatives in several areas. The initial quantity nominated has been adjusted (footnote: (a)) to take into account areas where alternatives, principally 1,3-D/Pic, are feasible, and available and increased implementation of MB:pic/50:50 in areas where 1,3-D/Pic is not permitted by regulation. The nomination was based on the 1X township cap. and there is scope for further reduction if the 2X cap is allowed.

Party	CUN Number	Industry	Quantity (MT) in original CUN	Recommended quantity (MT) for 2005, including revisions by Party of original CUN.	Comment by MBTOC
USA	CUN2003/062	Tomato - field	2865.3	2865.3	MBTOC recommends that a CUE of 2865.3 tonnes be approved for this use, based on the technical grounds that no alternatives were available for moderate to severe pest pressure for several diseases, and root knot nematode and nutsedge in specific areas and that certain topographies and regulatory issues prevent the use of one possible alternative(1,3-D). MBTOC notes that several fumigant alternatives are providing effective control of pests (e.g. 1,3-D/Pic, Pic alone, and metham sodium and Pic used in combination) and that a number of herbicides (halosulfuron-methyl and trifloxysulfuron) are available to control nutsedge. It appears that a rapid transition to alternatives may be possible in more than half this nomination.
USA	CUN2003/063	Turfgrass	352.194	207	MBTOC recommends that a reduced CUE of 207 tonnes be approved for this use. In the particular circumstances of the nomination alternatives are not yet available. Alternatives for apparently similar uses are in use elsewhere. The nomination has been reduced to conform to an average rate of treatment of 300 kg MB per Ha with 67:33/MB:pic mixtures. There is scope for further reduction of rates with use of less permeable tarps.

(a) Calculated from Table 5 of the revised CUN for US strawberry fruit production for 2005, according to the formula ((A*b/c)*(d*e) + B + C)*f, where A is the qualifying hectares in column headed 0024, b is the % subject to regulatory impacts , c is the original % subject to key pest impacts, d is the average MB dosage rate, e is the estimated fractional adjustment (0.915) for change from 67:33 to 50:50 MB:pic, f is the multiplier for margin of error (1.0244), and B and C are the unadjusted tonnages for the other areas in the nomination.

TEAP Clarification and Revision of the 14 February 2004 TEAP/MBTOC Report And Minority View of One TEAP Member (attached below)

This clarification and revision responds to important feedback received from TEAP members after publication of the February TEAP/MBTOC report. TEAP members recommended revision in the text concerning the option to offset methyl bromide critical use exemptions (CUE) with halon destruction. TEAP withdraws the words 'recommends' and 'recommended' from the discussion of emission trading. TEAP emphasises that the elaborated example in the 14 February Report is only an illustration and should not have been considered a recommendation because there are more options that the Parties could consider. TEAP would welcome a request by Parties to rigorously develop proposals involving trading of destruction credits for continuing uses of ODSs that are considered by Parties to be critical or essential.

The Montreal Protocol Article 1, Paragraph 5, read with Article 7, permits Parties to produce an ODP-equivalent quantity of controlled substances to replace substances within the same group that are destroyed in the same year by approved technology. TEAP suggested that the Parties consider the option of additional flexibility to allow production of methyl bromide (which is a group with no other substances) when offset by destruction of other ODSs.

If Parties approve and pursue emissions trading to offset future use of ODSs, they will need to make a variety of policy choices including: which substances to trade, the exchange rates (the quantities of ODSs destroyed to be allowed to use one unit of methyl bromide or another controlled substance), whether to allow 'saving' and 'trading' of credits over time or between Parties, and whether there is a need for a pilot phase for implementation of the emissions trading.

For clarity in its presentation of technical and economic information relevant to policy, TEAP provided a specific illustration of how such trading could further protect the ozone layer and of the costs associated with each tonne of methyl bromide sought for critical use exemptions. TEAP also wishes to withdraw the words 'recommended' and 'recommends', used in this illustration. TEAP emphasises that it is given only as an elaborated example and that there are more options that the Parties could consider.

The example in the February TEAP/MBTOC report described a two year (2005 and 2006) pilot phase for nominated uses not approved for CUE by the MOP to allow each Party to establish the trading system and to begin the collection and destruction of halon 1211. It is, of course, for the Parties to decide on whether a pilot phase is necessary and, if necessary, what form it should take.

The TEAP illustration also assumed that one kilogram of destruction of halon 1211 will give credit for 5 kilograms of methyl bromide CUE. The following table gives, as a further illustration, estimates of the additional cost (due to the trading for destruction) for each kilogram of methyl bromide approved for CUE (the present price of methyl bromide is about US$10 per kilogram) as well as the impact on the ozone layer for different exchange rates such 1:1, 2:1 etc for these two substances. It is up to the Parties to choose and adjust, as necessary, the exchange rates and substances eligible for an approved offset scheme, if any.

The table is based on the time dependent ODPs of halon 1211 and methyl bromide prepared in collaboration with science assessment experts. The official ODP values given in the Annexes A and E of the Protocol for halon 1211 and methyl bromide are 3.0 and 0.6, respectively, even though the Science Assessment Panel (SAP) has revised the estimate of the ODP of halon 1211 from 3.0 to 6.0 and methyl bromide from 0.6 to 0.4.

Illustrative Table to show benefits to the ozone layer and the costs of collection and destruction if a trading scheme is adopted.

Exchange Rate (Kg MB per Kg Halon 1211)	After 2-year Transport to Stratosphere		Added Cost per Kg methyl bromide at US$50.50/kg for halon collection & destruction
	Long term net benefit to ozone	Years until stratosphere benefits	
1:1	15.0 to 1	Benefits each year	50.50
2:1	7.5 to 1	2	25.25
3:1	5.0 to 1	5	16.83
4:1	3.8 to 1	6	12.62
5:1	3.0 to 1	7	10.10
6:1	2.5 to 1	9	08.41
7:1	2.1 to 1	10	7.21
10:1	1.5 to 1	>15	5.05
15:1	No net benefit	>25	3.37

Of course, the price of both methyl bromide and halon 1211 may be higher or lower than the recent North American prices used in the TEAP example.

With no trading scheme at all, there are no benefits at any time since the emissions of the methyl bromide permitted as CUEs, will be an incremental impact on the stratospheric ozone layer. Unless destroyed, the surplus halon will eventually leak and damage the ozone layer.

At the request of Parties, TEAP can further elaborate the environmental and economic tradeoffs of various options, but it is for the Parties to decide on the policy. TEAP offers its complete cooperation in providing information and analysis, as deemed necessary by the Parties.

The TEAP requests the Parties to consider its report in the light of this clarification.

For further information please see:

UNEP, "Critical Use Nominations – 2004 Supplementary Report of the Technology and Economic Assessment Panel (TEAP)," 14 February 2004 (especially pp. 15-22).

UNEP, "Report of the Technology and Economic Assessment Panel (TEAP)," May 2003 (especially pp. 16-18 and 34-70: "Agricultural Economics Task Force Report").

UNEP, "2002 Report of the Methyl Bromide Technical Options Committee (MBTOC)–2002 Assessment," March 2003 (especially pp. 32-40).

UNEP, "2002 Report of the Technology and Economic Assessment Panel (TEAP)," March 2003 (especially p. 7: "The way forward" and pp. 13-15: "Collection, Reclamation and Storage Task Force").

UNEP, "Report of the TEAP Collection, Reclamation and Storage and Destruction Technologies Task Force," March 2003.

UNEP, "2002 Report of the Halons Technical Options Committee (HTOC)," March 2003 (especially p. 6 and pp. 53-61).

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Minority View of TEAP Member

The TEAP regrets to advise Parties that Mr. Gary Taylor (Chair of the Halons Technical Options Committee) is not satisfied with the Clarification and Revision submitted by the majority of TEAP members (above) and he has advised TEAP that he is resigning his position effective 30 June 2004.

Minority View Submitted to the TEAP by Mr. Gary Taylor

"Mr. Taylor disagrees with both the procedures followed in preparation and the content of the destruction credits section of the report. Mr. Taylor agrees with the concept of destruction credits as provided in the 2002 Assessment Report of the Halons Technical Options Committee and the 2002 Assessment Report of the TEAP. He is of the opinion that the destruction credits section of the 14 February TEAP/MBTOC Report is seriously flawed and that TEAP has grossly exceeded its mandate of providing analyses and technical information relevant to policy."

Date: 1 March 2004