MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

UNEP

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

SEPTEMBER 2006

EVALUATIONS OF 2006 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED MATTERS

FINAL REPORT

Montreal Protocol
On Substances that Deplete the Ozone Layer

Report of the
UNEP Technology and Economic Assessment Panel

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EVALUATIONS OF 2006 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED MATTERS

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Co-ordination:	**Methyl Bromide Technical Options Committee**
Composition of the report:	Ian Porter, Marta Pizano, Michelle Marcotte, Mohammed Besri
Layout of the report:	Meg Seki, Ozone Secretariat, UNEP
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Co-Chairs: Mohammed Besri (Morocco); Michelle Marcotte (Canada); Marta Pizano (Colombia); Ian Porter (Australia)

Members: Marten Barel (Netherlands); Jonathan Banks (Australia); Antonio Bello (Spain); Chris Bell (UK); Aocheng Cao (China); Peter Caulkins (USA); Fabio Chaverri (Costa Rica); Ricardo Deang (Philippines); Patrick Ducom (France); Abraham Gamliel (Israel); Darka Hamel (Croatia); Saad Hafez (USA); George Lazarovits (Canada); Nahum Marban Mendoza (Mexico); Carlos Medeiros (Brazil); Melanie Miller (Belgium); Andrea Minuto (Italy); Takashi Misumi (Japan); Kazufumi Nishi (Japan); David Okioga (Kenya); Christoph Reichmuth (Germany); Jordi Riudavets (Spain); Ariane Saade (Lebanon); John Sansone (USA); James Schaub (USA); Sally Schneider (USA); JL (Stappies) Staphorst (South Africa); Akio Tateya (Japan); Robert Taylor (UK); Alejandro Valeiro (Argentina); Ken Vick (USA); Nick Vink (South Africa); Jim Wells (USA); Chris Watson (UK)

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Glossary of Acronyms

1,3-D	1,3-dichloropropene
A5	Article 5(1) Party
CUE	Critical Use Exemption
CUN	Critical Use Nomination
EC	European Commission
EMOP	Extraordinary Meeting of the Parties
EPA	Environmental Protection Agency
EPPO	European Plant Protection Organisation
IPM	Integrated Pest Management
LPBF	Low Permeability Barrier Film
MB	Methyl bromide
MBTOC	Methyl Bromide Technical Options Committee
MITC	Methyl isothiocyanate
MOP	Meeting of the Parties
MS	Metham sodium
Pic	Chloropicrin
QPS	Quarantine and Pre-shipment
SF	Sulfuryl fluoride
TEAP	Technology and Economics Assessment Panel
US	United States of America
VIF	Virtually Impermeable Film

1. Scope of this report

This 2006 final report provides final evaluations of MBTOC/TEAP on CUNs submitted by Parties in 2006, in accordance with the timetable set out in the Annex I referred to by Decision XVI/4. The report also provides an updated summary of National Management Plans provided by seven parties showing the status of future MB critical use. MBTOC has provided MB consumption figures in the progress report in May 2006 and also provided tables and figures of trend lines in critical use exemptions in this report. This information is submitted in order to meet the requirements to review management strategies submitted by Parties pursuant to Decision Ex.I/4 (9d) and to report on the amount of methyl bromide nominated for critical use by the Parties as per Decision XVII/9 (10).

2. Critical Use Nominations for Methyl Bromide

2.1 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. However, the Parties agreed to a provision enabling exemptions for those uses of methyl bromide that qualify as critical. Parties established criteria, under Decision IX/6 of the Protocol, which all such uses need to meet in order to be granted an exemption. Refer to Annex 2 for a copy of Decision IX/6.

All reviews of CUNs made in 2006 are to be in accordance with the 'Annex I' referred to in Decision XVI/4. This annex also sets out the procedure and timetable for the annual review of critical use nominations. In addition to the criteria for the evaluation provided in Decision IX/6, the Parties have given further guidance for the review of CUNs in Annex 1 of 16 MOP meeting report. Inter alia, this requires that TEAP and MBTOC provide a clear description of why any part of a nomination is not recommended, including references to the relevant studies used as the basis for such a decision. Para. 32 emphasises that exemptions must fully comply with Decision IX/6 and other relevant decisions, and are intended to be limited to the levels needed for critical use exemptions. These are considered as temporary derogations from the phaseout of methyl bromide in that they are to apply only until there are technically and economically feasible alternatives that otherwise meet the criteria in Decision IX/6. The assessment by MBTOC should take a precise and transparent approach to the application of the criteria, having regard, especially, to paragraphs 4 and 20 of Annex I.

Paragraphs 4 and 20 read:

> *4. Although the burden of proof remains with the Party to justify a request for a critical-use exemption, MBTOC will provide in its report a clear explanation of its operation with respect to the process of making determinations for its recommendations, and clearly state the approach, assumptions and reasoning used in the evaluation of the critical-use nominations. When cuts or denials are proposed, the description should include citations and also indicate where alternatives are technically and economically feasible in circumstances similar to those in the nomination, as described in decision Ex.1/5, paragraph 8.*
>
> *20. In line with paragraph 4 above, in any case in which a Party makes a nomination which relies on the economic criteria of decision IX/6, MBTOC should, in its report, explicitly state the central basis for the Party's economic argument and explicitly explain how it addressed that factor, and, in cases in which MBTOC recommends a cut; MBTOC should also provide an explanation of its economic feasibility.*

2.2 Evaluations of CUNs – 2006 round for 2007 and 2008 exemptions

MBTOC has held two meetings in 2006 to assess the CUNs. Meetings were held 3-9 April 2006 in Dubrovnik, Croatia and 28 August - 2 September 2006 in Yokohama, Japan. These meetings were held as required by the time schedule for considerations of CUNs given in Annex I referred to in Decision XVI/4.

Fourteen Parties submitted 60 critical use nominations for 2007 and 30 nominations for 2008. These totalled 2557.106 and 7098.094 metric tonnes respectively. These Parties had submitted nominations in previous CUN rounds. The total number of nominations and nominating Parties has been reduced from the 2005 round. Four Parties that had CUEs in

previous years did not submit further nominations in the final round for 2007. During the final assessment in Yokohama, thirty six CUNs, which MBTOC was unable to assess in the first round, were reassessed. Nine CUNs were also reassessed at the request of the respective Party and one was withdrawn (Ireland Mills).

One Party, the United States, made arrangements to meet with MBTOC during the Yokohama meeting for discussions with regard to their CUNs, in accordance with paragraph 8 of Annex 1 referred to in Decision XVI/4. In addition, field trips in Japan were held with Japanese government scientists and industry representatives to assist MBTOC to improve its understanding of Japanese agricultural systems. MBTOC members present at the Open Ended Working Group also attended a field trip to improve understanding of issues concerning pest control in pasta manufacturing.

In paragraph 20 of Annex 1 referred to in Decision XVI/4, Parties, inter alia, specifically requested that, in cases where a nomination relies on the economic criteria of Decision IX/6, MBTOC's report should explicitly state the central basis for the Party's economic argument relating to CUNs. Table 9 provides this information for each CUN that relied on economic criteria.

MBTOC has sometimes suggested quantities of MB for 2007 or 2008 different from the amounts nominated. Grounds used for these changes are given in detail after the relevant CUNs in Table 9. The adjustments follow the standard presumptions given in Tables 1 and 2, unless indicated otherwise.

In general, CUNs resulted mainly from the following issues: regulatory restrictions on one or two specific alternatives, time required to transition to alternatives, including application issues, and economic issues. For the most part technical alternatives exist, but there is often less experience with alternatives than with methyl bromide. Lack of experience with alternatives has resulted in some application errors, and sometimes reluctance to adopt otherwise technically effective alternatives. Additionally, inadequate economic studies, in terms of number of studies, conduct of the studies and utility of results to pertinent industries has hampered decisions to adopt alternatives.

As in the previous round, MBTOC has been unable to identify alternatives, or has inadequate information for the following applications: fresh high-moisture dates, some seeds infested with nematodes, infested cheese in cheese stores, infested dry cure ham, and unmovable historical artefacts especially where fungi are of concern. The Parties are requested to consider focusing some research on these applications to adapt and, where required, register effective alternatives.

2.3 Disclosure of Interest

Further to the normal Disclosure of Interest required under the TEAP/TOC terms of reference, MBTOC members made an additional disclosure to the MBTOC Co-Chairs relating specifically to their level of national, regional or enterprise involvement for the 2006 CUN process. This was required to ensure that those with a high level of involvement and interest in developing a particular nomination did not bias the process of evaluation through participation in the detailed review. The Disclosure of Interest form is an internal MBTOC document. The DOI used in previous rounds was used for the 2006 round. As in previous rounds, some members withdrew from a particular CUN assessment or only provided technical advice on request for those nominations where a potential conflict of interest was declared.

2.4 MBTOC Process

A soil subcommittee in MBTOC considered the nominations relating to the use of MB for soil fumigation, while a post-harvest subcommittee considered the nominations relating to the use of MB for fumigation of commodities, structures and objects. Drafts arising from the subcommittees were considered in plenary. MBTOC, by consensus, was unable to assess one nomination (Australia rice 2008).

This report and decisions of the committee were by consensus, recognizing that different perspectives exist within the committee on certain aspects. In its final meeting, MBTOC reviewed 90 nominations and achieved full consensus on all but four of these nominations. The four nominations where consensus was not achieved were from the US and the lack of consensus was due to different views on the rate of adoption of alternatives. Four out of thirty one MBTOC members present decided to prepare a minority report on these CUNs. That report can be found in Section 2.7.2.

All nominations received consistent treatment, however specific circumstances of each nomination were taken into account. Assessments were independent of the size of the exemption requested.

In general, the most recent CUE approved by the Parties for a particular application was used as a benchmark for consideration of continuing nominations. In some instances, this benchmark differed from that used by the nominating Party. In 2008, changes to the format of US CUNs for soil uses, meant that MBTOC was required to use the 2008 figures as the basis for calculating recommendations.

2.5 Critical Use Nominations Review

In considering the CUNs submitted in 2006, MBTOC applied the standards contained in Annex I of 16MOP, and, where relevant the standard presumptions given below. The process was similar to that in 2005. In particular MBTOC sought to provide consistent treatment of CUNs within and between Parties while at the same time taking local circumstances into consideration for specific crops and situations, and to provide transparency in its processes and conclusions.

2.5.1 Consideration of alternatives

As in previous years, MBTOC used the guidance given in Annex I where 'alternatives' were defined as any practice or treatment that can be used in place of methyl bromide. 'Existing alternatives' are those alternatives in present or past use in some regions; and 'potential alternatives' are those alternatives in the process of investigation or development.

MBTOC also used information on the suitability of alternatives for a nomination by considering the commercial adoption of alternatives in regions nominated for CUNs. Also, adoption in regions with similar climatic zone and cropping practices was used as an indication of the feasibility (technical and economic) of an alternative in a similar region. For example, 1,3-dichloropropene/chloropicrin (1,3-D/Pic), metham sodium alone or in combination with Pic, dazomet, substrates and the use of resistant varieties and grafted plants (for solanaceous crops, melons and other cucurbits) have been adopted to replace MB for a range of crops in industries applying for CUNs and in many regions where MB was once used.

Rate of change in commercial adoption, partly as a result of rapidly changing regulation, challenges MBTOC's ability to make diligent recommendations in the use of alternatives for

post-harvest applications, especially when recommendations are considered for one or two years in the future. In post-harvest applications, where research is minimal, but commercial adoption trials are more common, MBTOC needs Parties and the affected industries to release the results of commercial trials, using group reporting methods when data is judged to be proprietary.

MBTOC has to be knowledgeable about regulatory advances, but in post-harvest applications domestic, import and export regulations all play a role that complicates adoption of alternatives. Several post-harvest CUNs indicate that if importing Parties were to set maximum residue levels for fluoride in foods, then the use of alternatives, for both food and structural applications by exporting countries, would improve. This year, as MBTOC was making its final recommendations, both CODEX and Germany published maximum residue levels for fluoride in several foods. Given the newness of these announcements, the impact of these publications on actual MB use for 2007 and 2008 was difficult to predict.

In evaluating the CUNs for soil treatments, MBTOC assumed that a technically feasible alternative to MB would need to provide sufficient pest and weed control for continued production of that crop to existing market standards. For commodity and structural applications, it was assumed that a technically feasible alternative would provide disinfestation to a level that met the objectives of a MB treatment, e.g. meeting infestation standards in finished product from a mill. Technically feasible alternatives do not necessarily provide superior pest control results than are achieved in practice by MB. Yet, a detailed understanding and agreement on the comparative effectiveness of key alternatives, in particular for structural pest control, is incomplete. Scientific and industry consensus has not been achieved since alternatives may work differently and agreement of necessary end points seems to be a difference of opinion.

MBTOC evaluation of CUNs relating to production of strawberries, tomatoes and some related crops was assisted by information provided by a large number of published studies on MB alternatives. Many of these studies had been subjected to a statistical analysis (refer Special Report TEAP May 2006, Porter *et al,* 2006). The published studies assisted in providing additional transparency to MBTOC evaluations, as requested by the Parties in Decision XI/4.

2.5.2 Period of nominations

CUNs in this report relate to CUEs sought for 2007 and 2008. No nominations in this particular round were submitted for years after 2008. One Party, Australia, submitted nominations for both 2007 and 2008, for cut flowers and rice.

2.5.3 Plans to develop, register and deploy alternatives

To qualify for a CUE, Decision IX/6 in part states that Parties must demonstrate 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 "…must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes…"

In many nominations in the 2006 round, as in previous rounds, plans to phase out methyl bromide and adopt alternatives were often not adequate to allow complete and fast transition. As with the 2004 and 2005 rounds, MBTOC did not use lack of effective phase-out plans as a basis to 'not recommend' a nomination.

Decision Ex. I/4 requires Parties that make "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". A summary of these plans is shown in Tables 6 and 7.

Several Parties did however, identify feasible alternatives and reduced their nominations to account for phase-in of these alternatives. In some instances, even though alternatives were considered effective by the Party and MBTOC, the reported phase in of these alternatives was considered low by MBTOC (less than 4-7 % adoption of the total nomination). In these instances, in its majority report, MBTOC used information on adoption rates used by other Parties to assess likely adoption whilst giving due consideration to the specific circumstances of the nomination. MBTOC did not reduce a Party's requested amount for phase-in of alternatives without technical and economic evaluation and suitable justification.

2.5.4 Standard presumptions used in assessment of nominated quantities.

The tables below (Tables 1, 2) provide statements of standard presumptions applied by MBTOC/TEAP in assessing this round of CUNs where continued methyl bromide use is sought. These standard presumptions were proposed in the MBTOC report of October 2005 and were presented to the Parties at the 17th MOP.

Presently, as reported by MBTOC in previous reports (UNEP/TEAP 2005a, b, c, 2006) the rates and practices adopted by MBTOC as standard presumptions for soils uses are, in general, conservative. For soil treatments, the dosage levels of methyl bromide given in these presumptions generally exceed that required to provide effective control of pathogens and weeds when also using emission control technologies in all but exceptional circumstances, particularly when used in conjunction with low gas permeability barrier films (LPBF), such as various VIF and metallised barrier films (eg. Canslit). In some specific circumstances, the dosage levels of methyl bromide given in these presumptions may not be sufficient to provide effective control of pathogens and weeds. A copy of the actual dosage rate of MB in MB/Pic formulations and those used as standard presumptions is shown in Table 1 and 3. MBTOC could not reach consensus on new maximum dosage rates for soil uses and thus will maintain the current presumptions.

As in the evaluations in previous years, MBTOC reduced quantities of MB in particular nominations to a standard rate per treated area or volume of commodity.

MBTOC's standard dosage rate for structural fumigation has become the industry standard. Therefore, MBTOC only occasionally needs to reduce quantities of MB recommended to bring planned commodity fumigation into line with MBTOC's standard presumptions for commodity treatment, which are consistent with EPPO standards.

MBTOC considers the maximum MB application rate for 98% MB to be either 350 kg/ha (warm sandy soils) or 450 kg/ha (heavier cool soils), in conjunction with low barrier permeability films (e.g., VIF or equivalent), combined with extended exposure periods, as effective in most circumstances when well applied. In cases where use of high chloropicrin-containing mixtures (approximately MB:Pic 67:33 or 50:50) were feasible, maximum dosage rates of 175 kg MB/ha where nutgrass is the key pest and 150 kg/ha for pathogens are regarded as reasonable and were used as the maximum standard presumptions unless there was a regulatory or technical reason indicated otherwise by the Party.

As a special case, MBTOC accepted a maximum rate of 200 kg/ha of MB (i.e. 20g /m2) for mixtures of MB/Pic for certified strawberry runner production in the absence of data that showed certification standards could be met in the circumstances of particular nominations. However, several Parties indicated that rates of 20g/m2 of MB or less (Table 4) of MB:Pic

50:50 were effective with barrier films for production of 'certified' strawberry runners and may be suitable for other propagative material.

Several Parties also indicated that 25g/m2 of 98:2 were effectively used in standard commercial application, and several Parties had regulations, which required higher rates of up to 50g/m2. In these situations, MBTOC has suggested to Parties that lower rates may be technically effective.

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

Table 1. Standard presumptions used in assessment of CUNs for the 2006 round – soil treatments.

	Comment	**CUN adjustment**	**Exceptions**
1. Dosage rates	Maximum guideline rates for MB:Pic 98:2 – 45 g/m^2 (cold, heavy soils) or 35 g/m^2 (sandy soils), both with barrier films (VIF or equivalent); for MB/Pic 67:33 - 15g or 17.5g MB/m^2 for pathogens and nutsedge respectively, under barrier films. All rates 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)	Nomination reduced proportionately to conform to barrier film use.	Where barrier film prohibited or restricted by legislative or regulatory reasons
3. MB/Pic Formulation: Pathogen 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 chloropicrin (Pic) is not registered
4. MB/Pic Formulation: Weeds/nutgrass 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 chloropicrin or chloropicrin-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 broadacre 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 or open field production of high health propagative material

Table 2 Standard presumptions used in assessment of CUNs – post-harvest treatments

	Comment	**CUN Adjustment**	**Exception**
Dosage rate - structural	20 g/m^3	Nominations using higher dosage rates were reduced proportionally	Where approved label rates require higher dosage rate or where substantiated by the Party
Dosage rate – commodities	EPPO standard for bulk commodities as given in MBTOC (1994, 1998)	Nominations using higher dosage rates were reduced proportionally	Where approved label rates require higher dosage rates or where substantiated by the Party

Table 3. Actual dosage rates applied during preplant fumigation when different rates and formulations of methyl bromide/chloropicrin mixtures are applied with and without barrier films. Rates of application reflect standard commercial applications rates.

Commercial application rates of 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*	*16.75*	*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 2006 (Table 4) show that a dosage of 10g/m^2 (eg. MB/Pic 50:50 at 200kg/ha with LP Barrier Films) is technically feasible for many situations and equivalent to the standard dosage of >20g/m^2 using standard films

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

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'. Decision Ex.II/1 also mentions emission minimization techniques, requesting Parties "…to ensure, wherever methyl bromide is authorized for critical-use exemptions, the use of emission minimization techniques such as virtually impermeable films, barrier film technologies, deep shank injection and/or other techniques that promote environmental protection, whenever technically and economically feasible."

Where possible in this round, MBTOC assessed CUNs for reductions in MB application rates and deployment of MB emission reduction technologies, such as use of low permeability barrier films, including VIFs or semipermeable films, or other appropriate sealing and

emission control techniques including deep injection of MB, use of formulations with a lower proportion of MB and/ or reduced frequency of application.

A large number of studies under field conditions in a number of regions (Table 4), together with the large scale adoption of low permeability barrier films in Europe (eg. VIF), support the use of these films as a means to reduce MB dosage rates. Controlled studies have also shown substantial reductions in MB emissions (Wang 1997, Yates 2004, Yates 1996 a,b). Research and development on low permeability barrier films has been summarised in the 1998 and 2002 MBTOC Assessment Reports (MBTOC 1998, 2002). Typically equivalent effectiveness is achieved with 25 –50% less methyl bromide dosage applied under LPBF compared with normal polyethylene containment films (See Table 3). Recent advancements in the cost and technical performance of barrier films, especially metallised polyethylene films have reduced cost and extended their suitability for use with methyl bromide and also some of the alternatives. Previous difficulties with sealing and gluing barrier films are no longer seen as a technical barrier to implementation of barrier films under most climatic conditions as new application technologies (ie. glues, polyethylene edges and perforated films) have solved earlier problems. MBTOC acknowledges that there is a need for growers to obtain confidence in new sealing methods and new films and that modifications to sealing techniques may be required in new areas where uptake of barrier films is expanding (eg., in the US).

The use of low permeability barrier films (VIF or equivalent) is compulsory in the 25 member countries of the European Union (EC Regulation 2037/2000). In other regions LPBF films are considered technically feasible except for the State of California in the US, however, which has a regulation which currently prevents implementation of VIF (California Code of Regulations Title 3 Section 6450(e)). This regulation resulted from concerns of possible worker exposure to MB when the film is removed or when seedlings are planted due to altered flux rates of MB.

In 2003, 2004 and 2005 (UNEP/TEAP 2003, 2004, 2005c, 2006), MBTOC/TEAP evaluations of CUNs used maximum allowable dosage rates for use with standard films and barrier films. Since then, high levels of success have been demonstrated in many countries at lower rates of methyl bromide with barrier films (Table 4). These presumptions were first reported in the October TEAP 2005 report and again in the TEAP Progress Report May 2006 CUN report. Studies show these standard presumptions for MB dosages (150-175 kg/ha) in MB/Pic formulations with barrier films as conservative. Dosage rates as low as 100 kg/ha of 30:70 or 50:50 MB/Pic have shown similar effectiveness to rates of 335 to 800 kg/ha using standard polyethylene (Table 4, Fig 1.). Since the first reports, further trials and commercial adoption of barrier films with MB/Pic 50:50 has occurred at rates of 200 kg/ha (<10g/m2 MB) using MB/Pic 50:50 or MB 33:67 (or 30:70) for open field crops.

To assist the adoption of lower dosage rates, researchers, extension specialists and fumigators need to continue to build grower confidence in the use of barrier films, and sealing methods to ensure maximum effectiveness of lower dose applications of MB. Practical permeabilities for barrier films are identified by suppliers and offer MB users a wider range of opportunities for lowering MB dosages.

In structures, it is feasible to reduce MB use and emissions through improved sealing techniques, with monitoring to ensure only the minimum effective dosage is used, and longer exposure periods. In post-harvest applications, improving gas tightness of the treatment facility has the effect of reducing methyl bromide use during that fumigation and possibly improving effectiveness, which can reduce fumigation frequency as well. Improving gas tightness in traditional structures has been reported to be difficult, costly and/or impossible. Reliable economic cost data is virtually unavailable, so this remains a difficult area for MBTOC and the Parties to rectify.

Several types of commodity fumigations take place in well-sealed structures. Due to local regulations a few companies have added methyl bromide recapture equipment to these sealed structures in order to minimize methyl bromide emissions. The amount of methyl bromide that can be recaptured will vary depending on the type of enclosure, gas tightness and the commodity being treated.

2.5.6 Adjustments for standard dosage rates using MB/Pic formulations

One key transitional strategy to reduce MB dosage has been the adoption of MB:Pic formulations with lower concentrations of methyl bromide (e.g. MB:Pic 50:50 or less). In open field crops, these formulations are considered to be equally as effective in controlling soilborne pathogens as formulations containing higher quantities of methyl bromide (e.g. 98:2, 67:33) (e. g. Porter et al 1997; Melgarejo et al 2000; Lopez-Aranda et al 2003, 2006; De Cal, 2005; De Cal, 2004a, b; Gilreath et al, 2005 a,b). Formulations containing high proportions of chloropicrin in mixtures with methyl bromide have been adopted widely by non-Article 5 countries to meet Montreal Protocol restrictions where such formulations are registered or otherwise permitted. Their use can be achieved with similar application machinery which allows co-injection of methyl bromide and chloropicrin or by use of premixed formulations. Consistent performance has been demonstrated with both LPBF (Table 4, Fig 1) and standard polyethylene films.

In commodities, methyl bromide dosage rates vary with commodity temperature and by commodity sorption rates. Accordingly, MBTOC uses the dosage rates published by the European Plant Protection Organization (EPPO) and found in annexes to the MBTOC Assessment Reports published in 1995, 1998 and 2002. Parties are encouraged to use the lowest possible dosage rate appropriate for the circumstances and as allowed by the label.

2.5.7 Use of canisters of MB

One Party submitting CUN's in this round, still uses canisters (i.e. small 500 to 750g canisters) for application of MB under thick polyethylene films. This practice is not considered as effective for pathogen control as use of MB/Pic mixtures and also leads to high emissions of methyl bromide if used without barrier films. If canisters are used it is important that proper techniques are followed to ensure maximum diffusion of MB under tarps to ensure consistent treatment of soils. Also it is important that reduced dosages of MB (less than 25g MB/m2) are used with barrier films and that films be kept in place as long as practical, up to 4 weeks, to reduce the chance of off gassing and worker exposure. Canisters have been eliminated in most countries (most recently in Greece and Chile) as they were considered dangerous. Canisters are used because they provide small land holders with an easy application method and the ability to apply targeted amounts of MB to small areas where injection machinery may be difficult to use in these circumstances. MBTOC notes that dazomet is an alternative that has been used successfully in many small scale areas where machinery use is difficult.

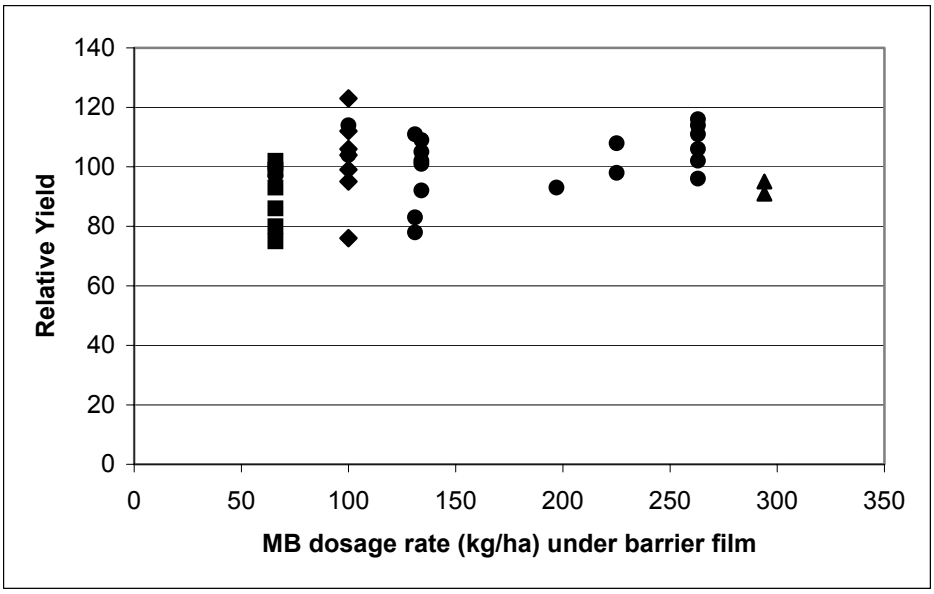


Figure 1. Relative yield of crops (strawberries, tomatoes, peppers, cantaloupes) grown under barrier films with different MB/Pic formulations compared to the standard commercial treatment using standard polyethylene from trials between 1998 and 2004 (▲MB/Pic 98:2; ● MB/Pic 67:33; ♦ MB/Pic 50:50; ■ MB/Pic 33:67). Data have been taken from Table 4.

Table 4. Relative effectiveness of MB/Pic formulations applied in combination with low permeability barrier films compared to the commercial standard MB/Pic formulation applied under standard low density polyethylene films.

Country	Region	Commodity	Brand or Type of Barrier Film	Untreated	Methyl Bromide/Chloropicrin Mixtures (Product rate per treated area)												Notes	Reference
					Std film		Barrier Film - Relative yield compared to standard polyethylene											
				Yield	MB/Pic Formuln.	Product Rate kg/ha	Not Spec 300	98:2 400	98:2 300	67:33 98	67:33 196	67:33 200	67:33 294	67:33 336	67:33 392	50:50 200	33:67 200		
MB Dosage rate (g/m2)								**392**	**294**	**66**	**131**	**134**	**197**	**225**	**263**	**100**	**66**		
Spain	Vinderos	Strawb. Runner	VIF - NotSpec	74	50:50	400											93	Fusarium, Phytophthora, Pythium, Rhizoctonia and Verticillium	De Cal et al 2004 a,b; De Cal 2005
	Navalmanzano			78	50:50	400											80		
Spain	Vinderos	Strawb. Runner	VIF - Not Spec	68	50:50	400										114	102	Fusarium, Cladosporium, Rhizoctonia	Melgarejo et al 2003
	Navalmanzano			34	50:50	400										76	75		
Spain	Avitorejo	Strawb. Fruit	VIF - Not Spec		50:50	400											97	2003 results	Lopez-Aranda et al 2003, 2006
	Malvinas				50:50	400											99		
Spain	Valencia	Strawb. Fruit	VIF - Not Spec	59	Not Spec	600	94											1998 Fusarium At 10cm & 30cm	Bartual et al 2002
				53	Not Spec	600	93											1999 results	
Spain	Avitorejo	Strawb. Fruit	VIF - Not Spec	80	67:33	400										112			Lopez-Aranda et al 2001a
	Tariquejo			54	67:33	400										106		Meloidogyne and weeds (unspec.)	
Spain	Moguer/Cartaya	Strawb. Runner	VIF - Not Spec		50:50	392										99		Inoculum not specified	Lopez-Aranda et al 2001b
Spain	Cabeza, Nav.	Strawb. Runner	VIF - Not Spec	74	67:33	400						105, 92						1998 Two sites	Melgarejo et al 2000
	Arevalo, Nav.			84	50:50	400										104, 104		1999 results, nurseries	
	Vinaderos, Nav.			49	50:50	400										95, 123		2000 results, nurseries	
Spain	Huelva	Strawb. Fruit	VIF - Not Spec	82	67:33	400						101						1997-1998 Inoc.unspecified	Lopez-Aranda et al 2000, 2006
				72	67:33	400						102						1998-1999 Inoc. Unspecified	
				68	67:33	400						109						1999-2000 Inoc. Unspecified	

Spain	Moncada	Strawb. Fruit	VIF - Not Spec	60	98:2	600			95									1998 No major pathogens but Fusarium buried 10cm&30cm.	Cebolla et al 1999
				54	98:2	600			91										
France	Douville	Strawb. Fruit	VIF - Not Spec	65	Not Spec	800		99										Inoculum not specified Phytophthora	Fritsch 1998
NZ	Havelock North	Strawb. Fruit	VIF - Not Spec	83	67:33	500								98				present	Horner 1999
USA	Florida	Pepper	VIF Plastopil	69	67:33	392					78							Nutgrass	Gilreath et al 2005 a,b
			VIF Plastopil	69	67:33	392				99								Present	
			VIF Vikase	69	67:33	392					83								
			VIF Vikase	69	67:33	392				86									
USA	Florida	Strawb Fruit, Cantaloupe	Barrier - Pliant, Metallised		98:2 67:33	Trials on 18 Commercial Farms between 2000-2004; no increase in disease or weeds when rates reduced up to 50% under VIF wrt. polyethylene												Nutgrass and pathogens present	Noling and Gilreath 2004
USA	California	Strawb. Fruit	VIF - Not Spec	72	67:33	336								108				Inoculum not specified	Ajwa et al 2004
				80	67:33	392									96				
USA	Florida	Tomato	VIF - Not Spec	31	67:33	392					111		93		114			Nutgrass and rootknot nematodes	Hamill et al 2004
USA	California	Strawb. Fruit	VIF - Not Spec	75	67:33	392									106				Ajwa et al 2003
				83	67:33	392									111			Watsonville, high pathogen pressure	
				65	67:33	392									102				
USA	Florida	Tomato	VIF - Not Spec		67:33	392	"No significant reduction in yield"												Noling et al 2001
USA	California	Strawb. Fruit	VIF - Not Spec	45	67:33	364									116				Duniway et al 1998
Unweighted averages (relative % yield)				66			94	99	93	93	99	102	**100**	103	108	104	91		

2.5.8 Rate of adoption of alternatives

MBTOC recognizes that time is needed to effect phase-in of alternatives and accepts this as a reasonable technical argument for lack of availability to the user *sensu* Decision IX/6.

Some CUNs in the 2006 round argued that time was required to allow the relevant industry to transition to available effective alternatives. Most CUNs showed a reduction in nominated quantity requested from that of the preceding year, reflecting progressive adoption of alternatives; while others had the same or similar quantities of MB nominated to the preceding CUNs. Some CUNs showed comparatively slow rates of adoption. In some cases, alternatives at varying stages of readiness for adoption, were identified in the CUN and, in others, they were identified by MBTOC. MBTOC reviewed the technical information on alternatives and the commercial adoption of alternatives by Parties previously using MB in similar sectors to those where CUNs had been sought (see Figure 4.) in order to make an assessment. In some cases, MBTOC made adjustments for adoption ratesof alternatives based on the specific circumstances of the nomination. In most instances the adoption rates varied between 10 and 25%. At the Yokohama meeting where evaluations of these CUNs were finalized, 4 MBTOC members (13% of those present) disagreed with the majority position given in Table 9 for US eggplant, peppers, tomatoes and the SE region for strawberry fruit. See section 2.7 for the minority statement on these CUNs.

MBTOC notes that data on the commercial adoption of alternatives for preplant soil use for similar sectors as those where consensus could not be reached shows that substantial adoption in many regions has occurred within 4 years or less.

MBTOC also notes that some countries achieved relatively fast adoption because regulations were imposed (eg. EC licensed MB amounts in 2006) and in others because growers voluntarily accepted alternatives and moved away from MB as they had concerns over the environment and human health. Also in several countries, CUNs were not sought for some of those sectors where consensus could not be reached. For instance, the tomato and vegetable crops (eg. peppers, cucurbits and eggplants) were previously large MB user crops in Australia and Spain and complete phase-out for these sectors was accompanied by uptake of a range of alternatives before 2005, and industries did not apply for a CUN. Italy has also reduced consumption by over 95% in 2007 (assisted recently by EC licensing) for tomatoes. Substantial reduction or complete phase out of MB has also occurred for strawberry fruit crops in Australia, France, Italy, Spain and the UK (Table 4). Phase out of MB by the end of 2006 has occurred in many countries. For tomatoes: Australia, Japan, New Zealand, Portugal, Spain, UK. For strawberry fruit: Belgium, Greece, Japan, Portugal. For peppers**:** Australia, Greece, Israel, Malta, New Zealand, UK. For eggplant**:** Belgium, Greece, Israel, Japan, New Zealand, Spain, UK.

In contrast to this, Israel has found transition more difficult in these sectors above mainly because of restrictions on the use of a key alternative, chloropicrin and MBTOC came to consensus on the slower adoption rates. Regulatory restrictions in the US have also restricted uptake of a key alternative, 1,3-D.

Phase-out has also occurred in other sectors previously using MB, eg. Australian open field cut flowers, UK cut flowers and ornamental trees and for all sectors previously seeking CUNs in Belgium, Malta and Portugal.

There is limited guidance from the Parties and data available on what is a reasonable rate of transition to existing and available alternatives, though para. 35 of Annex I referred to in Decision XVI/4 states that "in situations where MBTOC recommends a nomination on grounds that it is necessary to have a period for adoption of alternatives, the basis for

calculating the time period" is required to be "fully in the TEAP report and take fully into account the information provided by the nominating Party, the supplier, the distributor or the manufacturer. Relevant factors for such a calculation include the number of enterprises that need to transition, e.g., the number of fumigation and pest control companies, estimated training time assuming full effort, opportunities for importing alternative equipment and expertise if not available locally, and costs involved."

As most Parties did not provide all the information required under Annex 1 of Decision XIV/4, MBTOC used transition rates from other Parties to assist determination of suitable adoption rates in order to provide specific recommendations in this report. In discussion on adoption rates for uptake of alternative technologies in CUNs, MBTOC noted several examples. In the past, where several industries have been heavily reliant on MB, eg. strawberry fruit, tomatoes and vegetable crops (eg. several countries of the EC (e.g. Spain, Italy and Australia), almost complete adoption of alternative technologies (especially those requiring similar application technologies) has been achieved in a 3 to 4 year period. In some cases, these regions have similar climates and pests complexes to those requesting CUNs, but may have different production, marketing and regulatory systems. Improved guidance from the Parties, giving expected rates of adoption of alternatives following registration, would assist MBTOC in evaluation of CUNs in future. Rapid rates of adoption for various uses and alternatives have been considered by the European Commission as part of its National Management Plan submitted in 2006 (see Table 7). Adoption was achieved in periods of about 4 years, sometimes through the use of regulatory requirements or licensing measures that assisted final transition to alternatives.

2.5.9 Fulfilment of Decision IX/6

Decision XVI/2 directed MBTOC to indicate whether all CUNs fully met the requirements of Decision IX/6. When the requirements of Decision IX/6 1(a)(ii) were substantially met, MBTOC recommended the full amount of the request. Where some parts of a CUN did not meet Decision IX/6 1(a)(ii) MBTOC recommended a decreased amount, depending on its technical and economic evaluation. MBTOC reduced a nomination when a technical alternative was considered effective or, in a few cases, when the Party failed to show that it was not effective. In cases where Decision IX/6 1(a)(ii) was not satisfied to a substantial extent, MBTOC did not recommend the nomination. In this round of CUNs, as in previous rounds, MBTOC considered answers submitted by Parties in response to questions previously sent and given during bilateral meetings with Parties.

MBTOC's interpretation of fulfilment of Decision IX/6, in the aspect of evaluating alternatives, has become firmer as time has made more information about alternatives known to applicants and Parties. Decision IX/6 b (iii) requires,

> *(b) That production and consumption, if any, of methyl bromide for critical uses should be permitted only if: […]*
>
> > *(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;

As in past years, some CUN documents indicated that some applicants did not conduct research, evaluate the research of others for adaptation to their circumstance, and/or did not send documents showing their effort to conduct research and evaluate alternatives. In some cases, these were small-operator applicants, or where costs would have been prohibitive. In its evaluations, MBTOC has not required all applicants to conduct research where reasons for the nomination were similar to other crops or commodities, but did require technical justification where CUNs were based on specific issues for that crop or commodity. In some cases, MBTOC relied on its own knowledge to determine if alternatives would have been effective in the circumstances of the nomination.

As applicants and Parties have become more familiar with alternatives, MBTOC has become firmer in asking applicants and Parties to conduct research, evaluate research conducted by others in the circumstances of their nomination and submit the results of research or commercial trials to MBTOC. The information can take the form of research reports, trials in field or in commercial applications, consulting reports etc, but should be directly pertinent to the circumstances of that particular nomination. This further ensures that aspects of Decision IX/6 are met.

In other instances, MBTOC has observed that some applicants have conducted research and made efforts to adapt alternatives without success. There are some difficult challenges for some applicants. In some cases, MBTOC has used its knowledge and made suggestions to Parties about potentially more rewarding research in the hope that these avenues of investigation may assist Parties to evaluate and adopt suitable alternatives.

2.5.10 Sustainable Alternatives

In a large proportion of CUNs, the most currently appropriate alternatives are chemical fumigant alternatives, which themselves, like MB, have issues related to their long term suitability for use. In both the EC and US, MB and most other fumigants are involved in a rigorous review that could affect future regulations over their use for preplant soil fumigation. MBTOC has been informed that the US government has received a petition to stay (ie. remove regulatory approval) the pesticide tolerances for SF. Sulfuryl fluoride is a recently approved, important, methyl bromide alternative for several post-harvest applications. A stay or other action that removes the pesticide tolerance for SF would increase significantly pressure to revert to MB in structural and commodity fumigation.

MBTOC urges Parties to consider the long term sustainability of treatments adopted as alternatives to MB, to continue to adopt chemical and non-chemical alternatives for the short to medium term and to develop sustainable IPM or non-chemical approaches for the longer term. Decision IX/6 1(a)(ii) refers to alternatives that are 'acceptable from the standpoint of environment and health'. MBTOC has consistently interpreted this to mean alternatives that are registered or allowed by the relevant regulatory authorities in individual CUN regions.

2.5.11 Frequency of allowed MB use

In past and future CUN rounds, reductions in MB for both preplant soil and postharvest use could be achieved in some nominations, where effective alternatives were identified, by reducing the frequency of MB fumigations. In some countries, present regulations already restrict the frequency of use of MB (e.g. to every second year) on similar crops and circumstances to those nominated by other Parties. MBTOC suggests that in these and other instances MB may only be required every 2, 3 or 4 years and suggests that Parties further consider reductions where appropriate. Using alternating pest control measures may also help

provide or extend user confidence and experience in alternatives. New pest control measures may also be good agricultural practice, reducing risk of development of tolerance and providing control of a wider spectrum of pests.

2.5.12 Consideration of Stocks

MBTOC did not evaluate and/or did not take into account the use of stockpiles when making recommendations. However one criterion for granting a critical use under Decision IX/6 is that methyl bromide for the use "is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide" (para. 1 (b) (ii)).
MBTOC has not systematically collected data on level of stocks or stockpiles present in various countries and most Parties submitting CUNs did not specifically account for stocks. However most Parties have submitted MB Accounting Frameworks for 2005 to the Ozone Secretariat as required by Decision XVI/6.

A summary of the quantity of MB held 'in hand' at the end of 2005, as reported by several Parties, is summarised in Table 5. MBTOC has not adjusted nominations to take account of reported stocks; the Parties may wish to consider stocks as stated in Decision IX/6 1(b)(ii)

Table 5. Quantities of MB 'on hand' at the beginning and end of 2005, as reported by Parties under Decision XVI/6.

Party	Quantity of MB as reported by Parties (metric tonnes)			
	Amount on hand at start of 2005	**Quantity acquired for CUEs in 2005 (production + imports)**	**Quantity used for CUEs in 2005**	**Amount at the end of 2005#**
Australia	0.0	114.9	114.9	0.0
Canada		48.86		0.0
EC	216.2	2430.8	2530.0	116.5
Israel	16.358	1,072.35	1,088.708	0
Japan	0.0	546.8	546.8	0.0
New Zealand	6.9	40.5	44.58	2.8
USA(a)		7,613	7,170	443

(a) - Additional information on stocks as reported by US EPA website, September 2006: Methyl bromide inventory held by US companies: 2004 = 12,994 tonnes; 2005 = 9,974 tonnes

2.5.13 Use of MB for Research

Decision XVII/9(7), on critical uses authorised for 2006 and 2007, requested Parties to endeavour to use stocks, where available, to meet any demand for MB for research.
In Table 9, MBTOC has indicated separately the quantities recommended for research, for consideration by the Parties. A total of 15.571 tonnes were requested for this purpose in 10 CUNs in 2006.

2.6 Decisions Ex.I/4(9d) and Decision XVII/9(10)

Decision XVII/9(10) of the 17th MOP requests TEAP and its MBTOC to "report for 2005 and annually thereafter, for each agreed critical use category, the amount of methyl bromide nominated by a Party, the amount of the agreed critical use and either:

(a) The amount licensed, permitted or authorized; or
(b) The amount used

Decision Ex.I/4 requested MBTOC 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. At the twenty-sixth meeting of the Open-ended Group, an initial summarization of the national management strategies that were available to MBTOC at that time was presented. At the suggestion of MBTOC, the Parties agreed that MBTOC would provide an update to the Parties at their Eighteenth Meeting. The following sections address those tasks.

Decision Ex.I/4 (3) required the Parties making a critical-use nomination after 2005 to submit a national management strategy for the phase out of the critical use of MB. As requested by the Parties in decision Ex.I/4 (9d), TEAP through its MBTOC reviewed the management strategies to prepare a report to the twenty-sixth meeting of the Open-ended Working Group on the possible need for methyl bromide critical uses over the next few years.

All the seven relevant Parties have submitted their management strategies. One Party, the European Community, covers the strategy of its member states that have critical uses. A summary of the seven management strategies is given in Table 6 below.

Table 7 provides the estimated annual CUE quantities for the next few years, i.e. 2008-2010. Trends in nominated and exempted amounts of methyl bromide granted by the Parties contained in Table 7 have also been used to in the estimation of the future needs. MBTOC estimates that the CUE quantities will continue to decrease over the next few years, but information provided by Parties is not sufficient to predict amounts beyond this period. The estimated annual quantity of MB required for controlled uses in non A5 countries as CUEs is 6234 for 2008; 5920 for 2009 and 2010, however these amounts will be influenced by outcomes of the 18th MOP (Table 7).

Table 6. Summary of CUE trends and information provided in National Management Strategies for phase-out of critical-use exemptions

	CUE industry 2007/2008)	CUEs approved by MOP (tonnes)			CUNs (tonnes)		Expected or planned schedule for MB phase-out for Critical Uses	Constraints to Phase Out and progress with evaluation of alternatives
		2005	2006	2007	2007 (new)	2008		
Australia	Rice, strawberry, protected flowers	146.6	75.1	40.88	10.25	51.1	Reduce the imports of methyl bromide to zero by 2010 or earlier. CUE holders to identify and transition to alternatives before 2010. Turf growers and flourmills have been using stocks from before 2005 and have not requested CUEs so far.	Demonstrating technical and economic feasibility for VIF (LPBF) barrier films will require the Australian Industry to overcome some barriers that currently prevent widespread adoption. A national programme tested more than 20 alternatives. A number of non-fumigant treatments (bio-fumigants, steam, hot water and solarisation) have also been tested. Telone C 35, methyl iodide and ethanedintrile are considered to be the prospective in the short term. However all require further trials and/or registration. Telone C 35 (a 1,3- dichloropropene/ chloropicrin mixture) has been identified and registered for the fruit industry, but not yet for the strawberry runner industry.
Canada	Mills, strawberry runners	61.79	53.90	39.99	12.87	36.11	As fast as possible following transition strategy principles to phase-out. No figures provided.	Potential alternatives have been identified for the relevant industries. The government is committed to a priority review of the technology/substances identified and submitted (by the technology owner) as alternatives to methyl bromide. The Canadian National Millers Association (CNMA) has completed one collaborative project to evaluate alternatives with the support of AAFC and is currently managing a second two-year (2005-2006) initiative to assist companies and pest controls service providers in evaluating alternatives. Results of the evaluations will be published by CNMA by the first quarter of 2007.
European Community*	Chestnuts, mills, seeds, carrots, cucumbers, cutflowers and bulbs, eggplant, nurseries, orchard replant, pepper, strawberry (fruit and runners), tomato, dried fruit, processors, artefacts, melon, coffee and cocoa beans, herbs and	4392.812	3536.755	0	1280.09	0	Expected rates of adoption of alternatives are provided for the main categories of critical uses. Phase out is expected for most major uses within one year except for strawberry runners which is predicted at two years. The total CUE amounts actually used for each category of critical use are provided.	Information on the development and registration of alternatives is provided including possible 'constraints' (e.g. research, de-registration/continued availability of MB) and areas where efforts need to be made to ensure success in adoption and dissemination of alternatives (e.g. technology/information transfer , registration of alternatives and training). These factors have been taken into consideration in the estimation of the adoption rates in the critical use categories.

	CUE industry 2007/2008)	CUEs approved by MOP (tonnes)			CUNs (tonnes)		Expected or planned schedule for MB phase-out for Critical Uses	Constraints to Phase Out and progress with evaluation of alternatives
		2005	2006	2007	2007 (new)	2008		
	mushrooms, aircraft, cheese, spices, structures						Information on the EC directives on MB critical use nomination and use criteria are provided.	
Israel	Dates, flour mills, furniture, museums. Broomrape, cucumber, cutflowers fruit tree nurseries, melon, potato, strawberry fruit and runners, tomato	1089.306	880.295	0	1147.112	-	The situations and the CUE phase-out strategy for each critical use category are provided together with estimated year for the adoption of the alternatives.	The constraints that exist in adopting alternatives in some of the sectors is explained for many sectors, including for those where the adoption of alternatives is particularly difficult (e.g. strawberry fruit and nurseries)
Japan	Chestnuts, cucumber, ginger, pepper, melons, watermelons	748	741.4	636.172	0	589.6	Will ensure the reduction of critical uses nomination successively. No figures provided NMS to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible. Difficult to suggest standard reduction level in general.	Experimental research plan for the development of pest control for crop diseases and virus (in e.g. peppers); development of alternative technologies ongoing. Prospective alternatives (tests done): 1. methyl iodide fumigation and storage under low temperature and high humidity to control chestnut weevil 2. control of melon necrotic spot virus (MNSV) with the use of resistant stock - demonstration field test on the efficacy 3. green pepper resistant variety with L4 gene against pepper tobamovirus.
New Zealand	Strawberry fruit, strawberry runners	50	42	0	30.50	-	Government has determined that 2007 will be the last nominations that will be supported for the critical use of methyl bromide by the strawberry industry.	The most likely alternative is Telone C35. It is recognised there are ongoing difficulties with the effectiveness of this product, especially in sub-optimal weather conditions. Current research into alternatives will not be completed until September 2007.
USA	Dried commodities, mills and processors, ham, cucurbits, eggplant, forest seedlings, nurseries, orchard replant, ornamentals, peppers, strawberry fruit, strawberry nurseries, tomatoes, turfgrass, sweet potato	9552.879	8081.753	6749.060	0	6415.153	Manage CUEs in accordance with the policies, procedures and regulations that are in place to address the elements in Ex.I/4(3) (i.e. avoid increases except under unforeseen circumstances; encourage use of alternatives; provide information on the potential market penetration of alternatives; promote emissions reductions measures; provide a description of phase-in of feasible alternatives)	Sector-by-sector description of the status of alternatives is provided.

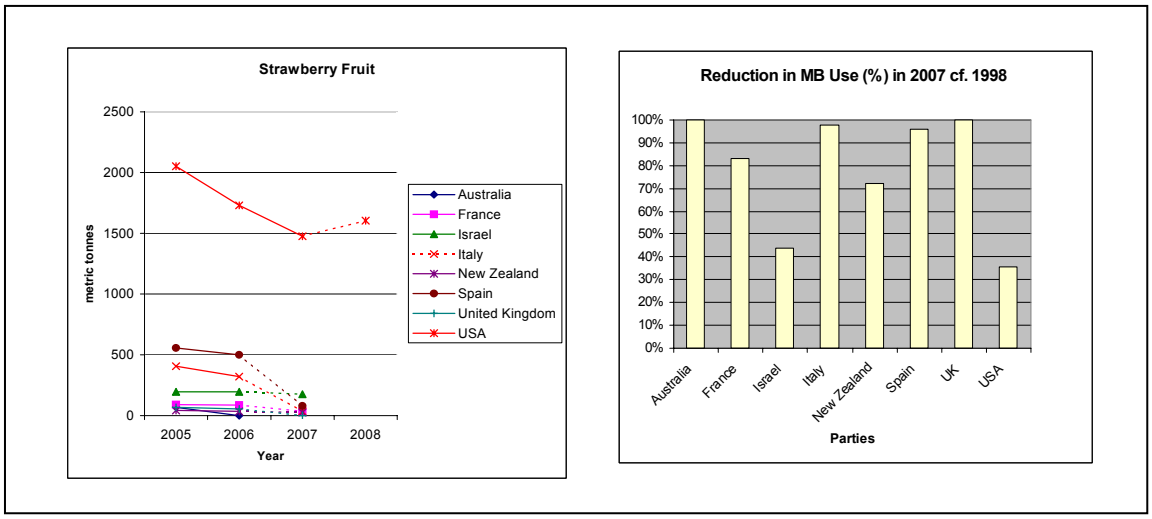
* Member states of the European Community (EC) requesting CUEs for 2007 include France, Greece, Ireland, Italy, Netherlands, Poland, Spain, and the United Kingdom. Other EC members states that have requested CUNs after 2005 include – Belgium, Germany, Latvia, Malta, and Portugal.

Table 7. Summary of estimated trends in Future Need for Methyl Bromide in Non A5 countries as determined from the Critical Use Exemptions and estimations from information provided in the National Management Plans in 2006 (Figures are in metric tonnes) as required in Decision Ex 1/4(9d). CUE's recommended by MBTOC for 2007 and 2008 have been included.

Party	Quantities approved or recommended by MBTOC				Estimated Future Need for MB as Indicated in CUE's and National Management Plans		
	2005 (1ExMOP and 16MOP)	2006 (16MOP+ 2ExMOP+ 17MOP)	2007 (17MOP + MBTOC recom for MOP18)	2008 (MBTOC recom for MOP18)	2008	2009	2010
Australia	146.600	75.100	[46.728]	[39.25]	[39]	{39}	{39}
Canada	61.792	53.897	46.745	[42.241]	[42.241]	{42}	42
European Community	4392.812	3536.755	[689.142]	NA	{320}	0	0
Israel	1089.306	880.295	[933.315]	NA	{1050}	{1050}	{1050}
Japan	748.000	741.400	636.172	[443.775]	[443.775]	{443}	{443}
New Zealand	50.000	42.000	[6.234]	NA	{6}	{6}	{6}
USA	9552.879	8081.753	6749.06	[4339.41]	[4339.41]	[4339]	{4339}
TOTALS	**16050.089**	**13418.200**	**[9098.348]**	**[4852.176]**	**[6234]**	**{5920}**	**{5920}**

NA - No CUN application yet. [ ] - Depenedent on 18th MOP outcome. { } - Estimated amounts only which are not reduced for stocks/inventory available

Figure 4. Amounts of MB exempted for CUE/CUN (figure on left)and relative reduction in nominated amounts for CUNs by Party (figures on the right) for preplant soil uses in industries from 2005 to 2008. Solid lines indicate trends in CUE methyl bromide. Dashed lines indicate quantity of methyl bromide nominated by the Party in 2006 for either 2007 or 2008.



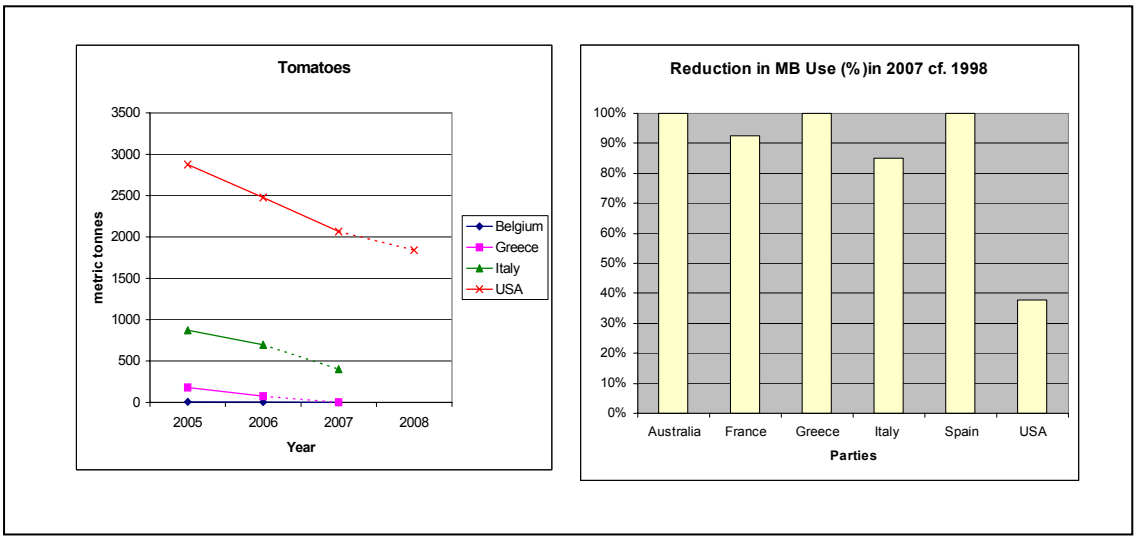
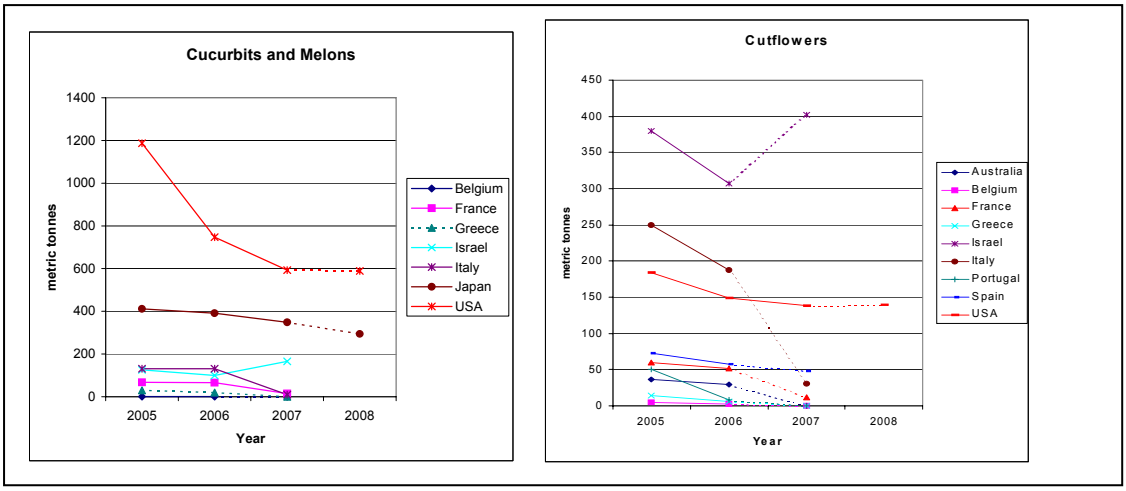


Figure 4 (Cont.). Amounts of MB exempted for CUE/CUN for preplant soil uses in industries from 2005 to 2008. Solid lines indicate trends in CUE methyl bromide. Dashed lines indicate quantity of methyl bromide nominated (CUN) by the Party in 2006 for either 2007 or 2008.



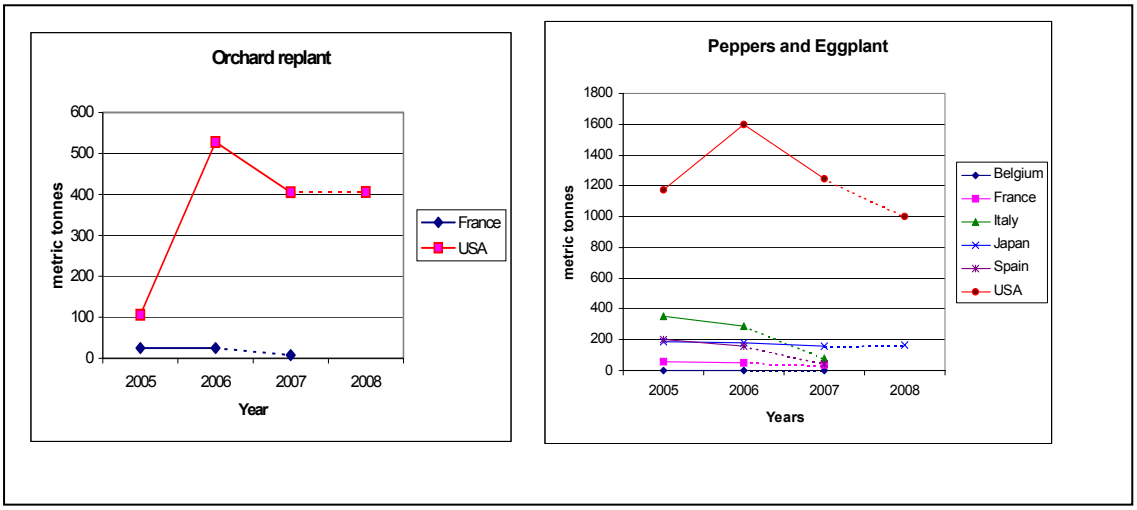


Figure 5. Amounts of MB exempted for CUE uses in mills and food processing facilities from 2005 to 2008. Solid lines indicate trend in CUE methyl bromide. Dashed lines indicate quantity of methyl bromide nominated by the party in either 2007 or 2008.

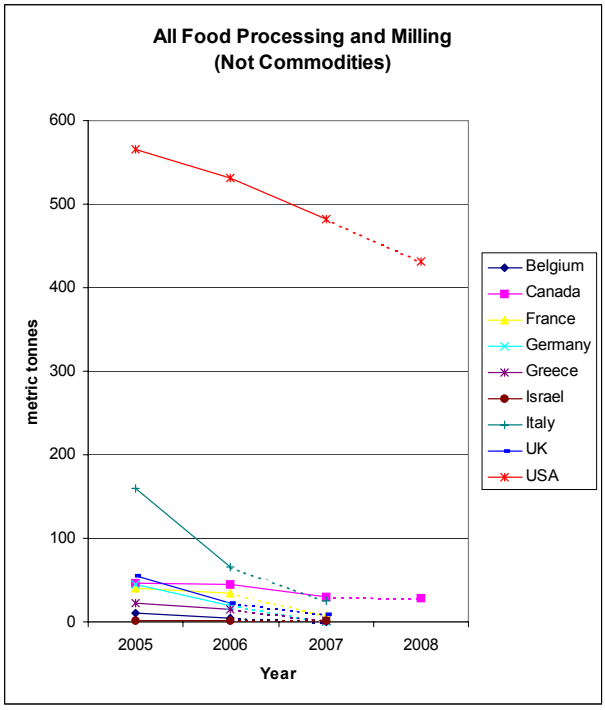


Table 8. List of nominated (2005 – 2008 in part) and exempted (2005 – 2007 in part) amounts of methyl bromide granted by Parties under the CUN/CUE process. (Note: A breakdown of CUN and CUE amounts by commodity is given in ANNEX IV)

Party	FINAL NOMINATIONS SUBMITTED BY THE PARTIES				QUANTITIES APPROVED BY THE PARTIES (agreed critical use categories)			
	Total Nomination 2005	**Total Nomination 2006**	**Total Nomination For 2007**	**Nomination for 2008 made in 2006**	**2005 (1ExMOP and 16MOP)**	**2006 (16MOP+ 2ExMOP+ 17MOP)**	**2007 (17MOP + MBTOC recom for MOP18)**	**2008 (MBTOC recom for MOP18)**
Australia	206.95	81.25	52.145	51.100	146.6	75.1	[46.728]	[39.25]
Canada	61.992	53.897	46.745	42.241	61.792	53.897	[46.745]	[42.241]
European Community[1]	5754.361	4213.47	1239.873	0	4392.812	3536.755	[689.142]	NA
Israel	1117.156	1081.506	1236.517	0	1089.306	880.295	[933.315	
Japan	748	738.7	651.7	589.600	748	741.4	636.172	[443.775]
New Zealand	53.085	53.085	32.573		50	42	[6.234]	NA
Switzerland	8.7	7	0	0	8.7	7	0	NA
USA	10753.997	9386.229	7417.999	6415.153	9552.879	8081.753	6749.06	[4339.41]
TOTALS	**18704.24**	**15615.135**	**10677.552**	**[7098.094]**	**16050.089**	**13418.200**	**[9107.396]**	**[4864.676]**

NA – Not available yet; [ ] Final amounts not yet known

1 Members of the European Community having CUNs/CUEs in 2005 – 2007 include: Belgium, France, Germany, Greece, Ireland, Italy, Latvia, Malta, Netherlands, Poland, Portugal, Spain, and the United Kingdom.

2.7 Final Evaluations of CUNs submitted in 2006 for 2007 or 2008.

2.7.1 Details of evaluations

MBTOC/TEAP assessed the 90 CUNs and recommended 47 in the interim report in May, with 36 placed in the 'unable to assess' category. 11 CUNs were not recommended.

During its second meeting in Yokohama at the end of August, MBTOC/TEAP reassessed 35 CUNs that had been placed in the 'unable to assess' category (one CUN was withdrawn). Nine CUNs were reassessed at the request of the Parties (Australia, Japan, Italy and the US) and one CUN was withdrawn (Ireland mills). Four CUNs were not recommended.

In 2006, a total amount of 6498.765 tonnes of MB has been recommended, 1634.089 tonnes for 2007 and 4864.676 tonnes for 2008. A total of 858.590 tonnes were not recommended for 2007 and 2226.661 tonnes for 2008 for a total of 3085.251 tonnes of MB not recommended in this round of CUNs.

Table 9 includes all evaluations of CUNs made in the final report on the 2006 round of nominations. The evaluations given in Table 9 are by consensus of MBTOC, with exceptions for the evaluations relating to CUNs from the US for 2008 for eggplant, peppers, tomatoes and the SE region for strawberry fruit.

2.7.2 Minority statement

TEAP Comment:

Under the Technology and Economic Assessment Panel (TEAP) Terms of Reference, reports are developed by consensus and must reflect any minority views appropriately.

In almost twenty years of reports by TEAP, TOCs, and Temporary Subsidiary Bodies (TSBs), there have been fewer than five minority statements. However, two of these previous minority statements involved issues related to methyl bromide.

This MBTOC report includes the third such minority statement regarding methyl bromide critical use exemption recommendations submitted by four experts from one country who asked that their names not be listed.

After consultation with the MBTOC Co-Chairs, the TEAP Co-Chairs honoured this request for anonymity, with reservation. On this matter, TEAP seeks guidance of the Parties on whether future minority statements, if any, can be submitted anonymously.

Stephen O. Andersen, Lambert Kuijpers and Jose Pons, TEAP Co-Chairs

In a show of hands at the Yokohama meeting where evaluations of these CUNs were finalised, 4 MBTOC members (13% of those present) disagreed with the majority position given in Table 9 to CUNs from the US for 2008 for eggplant, peppers, tomatoes and the SE region for strawberry fruit.

The minority provided the following statement:

"MBTOC did not reach consensus on nominations from the United States for tomato, pepper, eggplant, and strawberry fruit in the SouthEast. Among the MBTOC members present, 13% identified themselves as in agreement with a minority position, while the remaining 87%

either agreed with the majority position or did not indicate a position. This minority of members finds that in deciding MBTOC's recommendation for these US CUNs MBTOC did not fully consider the specific circumstances of these four nominations.

The minority position is that MBTOC should defer to transition times submitted by Parties and not impose different transition times. In the case of the CUNs for US tomatoes, peppers, eggplant and strawberry fruit in the South East Region, the Party has provided data on the amount of production that currently relies on methyl bromide which can transition to technically and economically feasible alternatives over time and provides a transition rate, either as an annual rate or as a multi-year timeline. We believe MBTOC should show deference to that information, unless MBTOC can document evidence supporting a different transition rate in the specific circumstances of the nomination. In these cases, the minority did not believe the evidence submitted was valid in the circumstances of these nominations.

The majority has recommended reducing the four nominations named above based on a 25% transition rate citing experience in Spain, Italy, and Australia, despite information from the Party which contained specific transition information, different from 25% in 2008. We note that although transition experiences in Spain, Italy, and Australia are cited as the basis for MBTOC's decision, Italy submitted nominations for 2007 for eggplant, pepper, strawberry, tomato, and melon and Spain submitted nominations for pepper and strawberry for 2007.

Furthermore, the majority do not make clear that the transition rate in some other countries cannot be attributed entirely to commercial acceptance of methyl bromide alternatives, but rather to regulatory regimes that limited the availability of methyl bromide. Thus, the proposed transition rate of 25 percent in 2008 for the four commodities in the United States does not consider the specific circumstances existing in the United States. Other Parties have been able to impose regulatory or licensing limits on use of methyl bromide, decreasing methyl bromide allocations to less than critical uses granted under the Montreal Protocol. In the United States, domestic regulation allocates methyl bromide in accordance with the quantity of methyl bromide approved by the Parties for critical uses, unless local regulatory and industry circumstances allow for more transition to alternatives. Within the limits of the amounts approved under the Montreal Protocol, and within the limitation of domestic regulatory approval of alternatives, technical and economic feasibility determines transition to alternatives, using research, education and extension efforts as a basis.

The minority holds that unless MBTOC has compelling evidence fully applicable to the circumstances of the nominations, MBTOC should rely on the Party's determination of feasible transition timelines. The minority finds the cited experiences in Australia, Italy, and Spain are not sufficiently convincing and that the specific circumstances of the four US nominations were not fully considered."

Table 9. Final evaluations of CUNs submitted in 2006 for 2007 or 2008

Country	Industry	Quantity approved for 2005 (1ExMOP and 16MOP)	Quantity approved for 2006 (16MOP+ 2ExMOP+ 17MOP)	Quantity approved for 2007 (MOP17)	Quantity nominated for 2007 (additional or new)	Quantity nominated for 2008	MBTOC recommendation for 2007	MBTOC recommendation for 2008	MBTOC comments	MBTOC comments on economics
Australia	cutflowers - bulbs - protected	7.000	7.000	none	6.170	6.150	3.598	3.5	MBTOC recommends a reduced amount of 3.598 tonnes for this CUN for 2007 and 3.5 tonnes for 2008. The CUN states that MB is required to control soilborne fungi and weeds affecting a variety of cut flowers and bulbs grown under cover. The nominated amount has been reduced to adjust to MBTOC's standard presumptions of 35 g/m2 MB with use/emission control technologies. The Party has conducted research showing that this dosage rate is effective under LPBF and commercial adoption of this material is underway (Mann *et al*, 2005).The CUN states that although some flower types are already being produced in substrates, this technology is not economically feasible in certain cases (lilies, iris). Steam is not feasible due to sloping terrain and techniques like plate steaming are not available. 1,3-D+ Pic and MB formulations with higher chloropicrin content cannot be used in closed greenhouses. Plantback times with other fumigants may be too long but trials are underway to solve this constraint. The Party has also identified that MI is an effective alternative to MB, but is not yet registered (Mann et al, 2005).	CUN states that transition to soil-less culture has occurred for some crops where profits are not compromised, but for lilies, iris, etc. soil-less culture using currently available substrates is not considered to be economically feasible. No economic data on alternatives given

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Australia	Rice	6.150	6.150	5.130	4.075		2.250		MBTOC recommends 2.25 tonnes as a supplemental amount of methyl bromide for 2007. This is about 44.4% of the nominated amount of 4.075 tonnes requested by the Party. The Parties have already granted 5.13 tonnes of MB for 2007. If the Parties grant this supplemental recommended amount, Australia will receive 7.38 tonnes of MB for 2007 in total. With its supplemental request of 4.075 added to the amount already granted by the Parties (5.13 tonnes), the Party requested a 50% increase in MB for 2007 (a total of 9.205 tonnes) over 2006 levels (6.15 tonnes), for a crop that is expected to be roughly 20% larger than in 2006. The Party requested the supplemental amount for the expected high harvest and a resulting higher non-QPS volume of rice requiring fumigation for 2007. Although the relationship between requirements for non-QPS fumigation in years of high and low harvest is said to be not linear, and therefore MBTOC may not have understood the justification, MBTOC only recommends a 20% increase over 2006 levels, consistent with the 20% increase in expected harvest. (Non-QPS rice is defined as rice for consumption in Australia and New Zealand.) In reviewing this CUN, MBTOC has been unable to reconcile an apparent difference in statistics. Although the CUN has indicated non-QPS rice (essentially domestic consumption), will be approximately 260,000 tonnes in 2007, according to other government references (Australia Commodity Statistics, 2005), domestic consumption does not seem likely to be that high. MBTOC has no consumption statistics for 2006, but in 2005 domestic consumption (table rice including imports and excluding processing) was 156,000 tonnes. Over the previous 5 years, domestic consumption changed little and was not correlated with size of harvest. Domestic consumption grew at about 4 tonnes per year over that period of time. In considering the CUN and taking note of these other government statistics, MBTOC decided its recommendation of 2.25 tonnes supplemental for 2007 based on the CUN documents. However, if the domestic consumption is indeed only about 160,000 tonnes, the Government of Australia may wish to consider licensing only 1 tonne	CUN states that Australian rice growers will consider investing in infrastructure and facilities to fumigate rice after it has been milled but before it has been packaged (intermediate rice); or fumigate inside packs (packaging review project). Current estimates suggest that the cost of an intermediate storage system would be in the region of $20,000,000; with alteration of packaging in the region of $2,000,000 to $3,000,000 per site plus a doubling in packaging costs per unit.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									of the supplemental amount recommended by MBTOC. Then, the total MB used in 2007 would be the same amount granted by the Parties in 2006 (6.15 tonnes) for essentially the same requirement of non-QPS fumigated rice. Additionally, MBTOC is concerned that the Party has not achieved any transition to alternatives since phase out, in spite of availability of effective treatments in other countries. These treatments, however, require investment that the Party has indicated it can not afford because they have experienced several years of poor harvest.	
Australia	Rice					9.200		U	MBTOC is unable to assess this nomination for 2008. Since the 2008 rice harvest will occur in April 2008, and treatment would not be required until after rice drying, milling and packaging, there is time for the Party to re-nominate for this use in 2007 if methyl bromide is still critically needed. Information is requested from the Party that can not be delivered at the time of MBTOC's 2006 meeting. Additionally, MBTOC is not convinced at this time of the critical need, for MB for post-milling fumigation within the confines of Decision IX/6. MBTOC is concerned that the applicant may be requesting MB as contingency against possible complaints because its pre-processing fumigations are ineffective and because its packaging methods allow re-infestation. Specifically, (1) MBTOC needs to resolve the difference in domestic consumption requirements since this is the volume of non-QPS rice that is fumigated. (2) Improvements in facilities would allow phosphine to be used to effectively fumigate paddy rice with the effect that surviving *Sitophilus* eggs would be virtually nil. Doing so would require investment however, and to minimize costs the applicant may wish to investigate plastic bubble and tunnel systems in use for grain fumigation in other countries and if these are not considered affordable, report economic data to MBTOC. (3) If phosphine fumigations were properly conducted in sealed structures only a maximum of 1% of the remaining *Sitophilus* eggs would be expected to survive milling (depending on the percentage of milling) (Lucas and Riudavets, 2000; Ducom-Gallerne and Vinghes, 2001). Research submitted with the CUN indicates that ethyl formate added to sealed rice packs	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									is effective to control those surviving *Sitophilus* eggs. MBTOC requests data substantiating why this process (proper phosphine fumigations and ethyl formate in packages) can not be implemented since it seems it could resolve any potential problem of *Sitophilus* eggs remaining after milling. (4) MBTOC's assessment is that the applicant needs to implement non MB protection methods and packaging procedures that prevent post-packaging insect infestation. The applicant is requested to give a detailed economic justification if these packaging improvements can not be made. Please explain why the applicant does not use insect-proof packaging since that would prevent post-process insect infestation. Consumer complaints after rice packages are fumigated indicate that methyl bromide is an inappropriate tool to prevent post-packaging infestation. Post-packaging insect contamination possibly occurs because the applicant punches holes in the packaging material. The packaging method used by the applicant brings into question the justification for using methyl bromide. (5) The applicant is encouraged to develop a transition plan based on effective use of alternative procedures and other control methods that will ensure decreased reliance on methyl bromide.	
Australia	Strawberry runners	35.750	37.500	35.750		35.750		35.750	MBTOC recommends that 35.75 tonnes of MB be approved for this use in 2008. The party's request exceeds MBTOC's standard presumption of 20 g/m2 of MB which is considered effective for production of 'high health' strawberry runners using LPBF and other emission control technologies (UNEP/TEAP October 2005); however, rates of use that conform with MBTOC's standard presumption are not currently registered and therefore cannot be used commercially to treat soils. The CUN states that MB is required to meet certification standards. A key alternative, 1,3-D/Pic, is used in a portion of the runner industry but uptake is limited by phytotoxicity due to the heavy and wet soil conditions during fumigation. The CUN provided recent data from a specific local trial indicated that phytotoxicity in runners resulted in a doubling of the time required before planting compared to MB. Although 1,3-D/Pic is an effective alternative to MB in strawberry runner production, at this time the	CUN states data are not yet available to enable an economic evaluation of alternatives.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									effects of this alternative on the number of runner plants produced and the costs of additional weed control measures required are considered prohibitive. The CUN states that plug plants are a technically feasible alternative but that the costs associated with this technology are too high. The party is currently examining the efficacy of 30:70 mixtures of MB:PIC to reduce this rate. MBTOC considers glues and technologies are available to implement LPBF films. The Party notes that two currently unregistered alternatives appear promising, methyl idodide and ethane dinitrile (Mann et al, 2005; Mattner et al, 2003). The Party is requested in future nominations to demonstrate that alternatives do not achieve the pathogen and pest tolerance levels to meet certification requirements	
Canada	Mills	47 (included mills and pasta)	34.774	30.167 (included mills only)	none	28.650		28.650	MBTOC recommends 28.650 tonnes for 2008 for this use. This amount represents a 20% reduction over the CUE for 2006, and a further 5% reduction for 2008 over 2007 CUE. The Party continues to conduct field trials of various alternatives adapting heat, phosphine and sulfuryl fluoride. Sulfuryl fluoride currently has registration that only allows experimental trials. The Party has indicated it will reassess the quantity of MB permitted for use should circumstances of the nomination change. If new fumigants become commercially registered, and if efficacy is proven under the Canadian circumstances, and/or if further trials with heat (alone or in combination with other insecticidal treatments) allow further adoption, it should be possible to reduce the amount of methyl bromide allowed.	CUN provided no economic data. CUN based on technical feasibility reasons.
Canada	Pasta	(see Canada mills)	10.457	none	6.757			6.757	MBTOC recommends 6.757 tonnes for this use in 2007. This corresponds to a reduction of more than 35% over the amount granted by the Parties in 2005. MBTOC notes that sulfuryl fluoride is registered only for empty facilities and it is not feasible to empty pasta facilities completely of finished product. Furthermore there is currently no MRL for fluoride residue for foods in Canada. While heat is an alternative to disinfest production areas of facilities, it can not be used for facilities containing finished product. MBTOC notes industry efforts to increase use of IPM such as cleaning and structural improvements to reduce	CUN states that Sulfuryl fluoride is the most promising alternative but its efficacy and cost have not been evaluated as SF was only recently conditionally approved. CUN also states that the cost of heat treatment is at least twice the cost of methyl bromide. This cost increased to three or four times when the cost of monitoring is included.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									the level of insect infestations. Implementing elements of IPM such as obtaining a pest audit followed by pest monitoring should improve information to manage pests better with non-MB treatments or reduce frequency of MB fumigation. These alternatives may result in reduced requirements for MB in subsequent years. MBTOC further notes that it should be possible to use heat in the production area and asks the applicant to investigate the feasibility of separating the production part of the facility from the finished product storage area to facilitate adoption of this alternative. MBTOC agrees with the applicant that certain structural features of facilities need improvement to prevent infestations and encourages industry to investigate structural changes that minimize insect harbourages to reduce need for whole-structure fumigation. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives used in other countries and why these alternatives are not applicable in the circumstances of Canada. Specifically, (1) effectiveness of improvements in IPM, including a pest audit, cleaning, facility improvements, monitoring and inspection, (2) facility heat treatments, and (3) sulfuryl fluoride when applicable.	
Canada	Strawberry runners (Ontario)	none	none	none		6.129		6.129	MBTOC recommends that 6.129 tonnes of MB be approved for this use in 2008. The Party's request exceeds MBTOC's standard presumption of 20 g/m2 of MB which is considered effective for production of 'high health' strawberry runners using LPBF films and other emission control technologies (UNEP/TEAP October 2005); however, formulations that conform with MBTOC's standard presumption are not currently registered in Canada and therefore cannot be used commercially to treat soils. The CUN states that MB is required to meet certification standards. Trials show that still lower rates are effective. The Party requests MB for the first 2 years of their 3-year production cycle. In the 3rd year the Party uses fish emulsion, compost with kelp seaweed and folic humic acid to suppress soil pathogens and accelerate good biology in the plants. The Party states that due to the very cool weather 1,3-D + PIC has a vastly reduced effectiveness	CUN argues that although the cost of MBr vs. biological ingredients is comparable, labour costs are some 10% higher for weed control.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									compared to MB. Currently only the 67:33 MB:PIC mixture formulation is registered.	
Canada	Strawberry runners (PEI)	6.840	6.840	7.995		7.462		7.462	MBTOC recommends that 7.462 tonnes of MB be approved for this use in 2008. The Party's request exceeds MBTOC's standard presumption of 20 g/m2 of MB which is considered effective for production of 'high health' strawberry runners using LPBF films and other emission control technologies (UNEP/TEAP October 2005); however, formulations that conform with MBTOC's standard presumption are not currently registered in Canada and therefore cannot be used commercially to treat soils. The CUN states that MB is required to meet certification standards. The Party has attempted to replace MB with 1,3-D, but 1,3-D was banned in January 2003 due to groundwater contamination. The Party has initiated trials to determine the feasibility of organic production. Currently only the 67:33 MB:PIC mixture formulation is registered in Canada. Chloropicrin 100 has recently been provisionally registered in Canada, but the Party has not yet had the opportunity to fully evaluate this alternative.	CUN provided no economic data. CUN based on technical feasibility reasons.
France	Chestnuts	2.000	2.000	none	1.800		1.800		MBTOC recommends 1.800 tonnes for this use in 2007. The CUN relates particularly to fresh market chestnuts, which impacts the technical availability of alternative treatments, compared for chestnuts used for processing. Although the Party has conducted research trials on many potential alternatives, there are no registered alternatives that do not harm the quality and marketability of fresh market chestnuts. Unlike other nuts which are durable commodities, chestnuts are a high moisture, semi-perishable food. They are harvested one day, fumigated overnight and sold to consumers the next day or very soon after. Chestnuts in France are subject to pests that requires a longer treatment time than are fresh market chestnuts in some other countries (*Cydia splendana* (Hubner) and *Curculio elephas* (Gyllenhal)). The immediate marketing channel allows the Party to use a low dosage consistent with the need to only kill some life stages. The Party has conducted successful preliminary efficacy tests with ethyl formate, a treatment that may allow an organic certification, but registration and	CUN states that disinfestation by water immersion takes two weeks, hence sellers lose this time in the peak market window. Furthermore, soaking costs 60 times the cost of MBr. Moreover, quality is poorer; hence they will get lower prices.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									adoption of maximum residue levels has not yet been completed.	
France	Mills	40.000	35.000	none	8.000		8.000		MBTOC recommends 8 tonnes for France mills in 2007. Sulfuryl fluoride was very recently registered for this application (March 2006). Although a rapid adoption rate has been proposed, some time is needed to efficiently transition to alternatives. Given the relatively low amount of MB requested by the Party, in the face of numerous mills that will require pest control, the Party might need to consider allocation strategies that reserve MB for those mills whose size, layout and design, age and/or location make transition most difficult. MBTOC's knowledge of sulfuryl fluoride and heat treatments indicate that more time is required to develop effective strategies to treat the larger, more complex mills in locations with cooler temperatures because sometimes a combination treatment is required.	CUN states that the cost of SF is 2.5 x that of MBr, leading to significant loss in benefit.
France	Seeds	0.135	0.135	none	0.100		0.096		MBTOC recommends 0.096 tonnes for this use in 2007. This amount is for 0.024 tonnes against nematodes for alfalfa seeds and 0.072 tonnes against bruchids insects in beans and peas. In correspondence in August 2006, the Party submitted these newly nominated MB volumes, a slight decrease over the original nomination. MBTOC knows of no effective treatment to control nematodes in seeds. For bruchid control in seeds, the Party justifies the requirement for methyl bromide as a business logistics issue. The seed company maintains that its customers require such fast delivery of seeds that only MB, and in fact only MB at the high dosage rates needed for 4 and 2 hr vacuum treatment, will satisfy their business needs. PH3 is registered and effective and in use in other countries. However, PH3 requires several days for treatment against bruchids. For the future, the Party is encouraged to test fast methods of heat treatment, which may be effective and fast against bruchids while maintaining germination, or to transition to phosphine or inert atmospheres. Additionally, MBTOC will want information identifying the particular seed nematode involved and substantiating that nematodes can be present in clean seeds.	CUN states that pesticides, which they argue are partially technically feasible and registered, costs up to 7x as much as MBr to apply. CUN also argues a loss of market opportunity, but lacks data to quantify this.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
France	Carrots	8.000	8.000	none	5.000		1.400		MBTOC recommends a reduced amount 1.4 tonnes for this use in 2007. This is for treating 4 Ha at 350 kg per ha with use/ emission reduction technologies according to MBTOCs standard presumptions at a dosage of 350 kg/ha. MBTOC notes some contradictions between the CUN and answers submitted by the Party to MBTOC's questions particularly in relation to the treated area. Carrots are grown worldwide without MB; however, the EC has recognized the exceptional circumstances for this crop and disease complex involving various soil borne pathogens (*Fusarium solani, R.violacea, Pythium, Heterodera*) and weeds. 1,3 D+ Pic is not registered in France and dazomet is efficient only under certain climatic conditions.	The CUN is based on lack of proven technically feasible alternative rather than demonstrated lack of economic feasibility.
France	Cucumbers	60.000	60.000	none	15.000		12.500		MBTOC recommends a reduced amount of 12.5 tonnes of MB for this use in 2007. The calculation of the nomination is based on the standard presumption of 175 kg per Ha under LPBF using use/emission reduction technologies. The nomination is for 35 ha of production area. Although this rate is higher than the standard pathogen control rate of 150 kg/ha, *Phomopsis sclelotioides* is particularly difficult to control and requires the higher rate usually applied for nutsedge control. Limited alternatives are available in France, as chloropicrin or mixtures of this material with other chemicals are not registered. A large proportion of cucumber production is already in soilless culture (75%), but adoption of this alternative in the remaining cropping area is considered uneconomic by the Party. It is anticipated that registration of chloropicrin, use of grafted plants to improve disease control and expansion of soilless culture will further reduce the need for methyl bromide in the near future (Fritsch, 2002). The amount of methyl bromide recommended is a 97% reduction in use of MB since 1997.	CUN states that although the cost of chemical alternatives is lower, yield losses result in lower net revenue (by 15 to 30% depending on source). The loss in net revenue for soilless cultivation (greenhouses) is slightly less
France	Cut flowers and bulbs	60.000	52.000	none	12.000		9.600		MBTOC recommends 9.6 t for this use in 2007. The party reduced the Member State's request, but provided no information on whether these reductions were due to reductions in rate, changes in formulation, uptake of barrier films or transition to alternatives. The party has averaged a transition reduction in the amount of MB nominated of 20% per year over the 2005 to 2006 interval. In light of available information about	CUN states that solarization carries high economic risk because the loss in revenue from the second crop is larger than the cost saving from fumigation, that steam disinfestation costs more than 15000 € per ha, and that adoption of soil-less

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									alternatives, MBTOC adjusted the recommended amount to account for 20% adoption of alternatives in 2008. MBTOC did not adjust the rate to MBTOC's standard presumptions due to France's regulation setting a minimum rate of 50 g/m2. The nomination is for soilborne fungi, nematodes and weeds affecting different kinds of flowers grown in open fields and under cover. The party has indicated that steam, crop rotation between growers, substrates (for rose, gerbera), metam sodium, and solarisation (for anemone, ranunculus) could be adopted on some CUN areas. MBTOC considers that alternatives for some situations include metham sodium applied by improved methods, metham+ short period of solarisation, metham+1,3-D (Sachs et al. 2002; Runia and Molendijk, 2006; Barel, 2004; Navas-Becerra et al. 2002; Reuven et al. 2002; Gullino, 2003). Substrates are commercially available for crops such as rose, gerbera, carnation, gypsophila, alstroemeria, anemone, anthurium, tulip, freesia, lilies and narcissus (Drakes et al. 2001; Savvas and Passam, 2002; Savvas, 2004; Tognoni and Pardossi, 2000; Tribulato and Noto, 2001; Minuto et al. 2002; Kipp et al. 2000). The party says substates are too expensive, however low-cost substrates are commercially available for some of these flower crops (Mutitu et al. 2006; Calderón, 2001; UNIDO, 2004). If future nominations are submitted, clarification on rates, formulations, emission reduction strategies, and adoption rates of alternatives, including economic analyses, will be required for MBTOC to be able to evaluate the nomination. An application for registration of chloropicrin was submitted in 2005. MBTOC notes that efforts are being made by that the party to amend the regulation no. AGRG 0000311 V to permit lower doses of MB and register lower formulations of MB, especially 50:50. This is considered important as flower growing regions still using MB in the world use much lower rates of MB.	cultivation requires high capital costs. CUN states that with ranunculus the net revenue for solarization is higher than for MB, while for lilies of the valley metham sodium has lower net revenue than MB

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
France	Eggplant	125 (eggplant pepper and tomato)	22.000	none	33,25 including tomato		0 NR		MBTOC does not recommend this CUN. The CUN is for soilborne pathogens affecting eggplants particularly Verticillium dahliae, for which different alternatives are technically and economically feasible: Steam is widely used to control *V.dahliae* and other pathogens in some European countries and can even be used in the 17 ha heavily infested soils that make part of this nomination. Very good root stocks resistant to *V.dahliae* are now available (KNVFFr) and eggplant grafting is widely used in many countries with similar climate and cropping systems (Spotti, 2004). Registration of chloropicrin is expected for 2006 and soon thereafter of mixtures of this material with other chemicals, such as 1,3D+Pic. These alternatives, combined with grafting will provide excellent control options for the nominated areas (Loumakis, 2004; Spotti, 2004; Tognoni *et al,* 2004; Kah, 2005). 3% (15 ha) of the eggplant area is now in soil less culture and this technique can be expanded at least partially in the nominated area (Spotti, 2004; Tognoni *et al*, 2004; Leoni *et al,*2004).	CUN argues that the cost of steam treatment is too high. CUN states that although the cost of chemical alternatives is lower, yield losses result in lower (20 to 35%) net revenue. The loss in net revenue for soilless cultivation (greenhouses) is even higher. CUN also argues that the current cost of investment in relation to the average product price makes it economically infeasible to increase the soilless surface area.
France	Forest nurseries	10.000	10.000	none	1.500		1.500		MBTOC recommends 1.5 tonnes for this use in 2007. MBTOC recognizes that propagative material requires a very high level of soilborne pest and pathogen control in order to avoid widespread distribution of pests and pathogens. Registration of chloropicrin is expected for 2006 and soon thereafter of mixtures of this material with other chemicals, such as 1,3D+Pic but these are not yet available. Substrates are considered uneconomical at 2.5 times the cost of traditional production in soil but no economic analysis has been provided. Dazomet is not sufficiently effective to provide a plant quality comparable to methyl bromide (using methyl bromide, return can be enhanced 50% relative to MITC treated plants due to size, shape, and diameter of trees).	CUN argues that the cost of steam treatment is too high, as is the cost of hand weeding and container cultivation. CUN concludes that alternatives are uneconomic as a result of lower net revenue, and that the need for MBr disinfection will grow in the next 2-5 years with the expected rapid development of micorrhized Douglas pine and oak production.
France	Orchard & raspberry nurseries	5.000	5.000	none	2.000		2.000		MBTOC recommends 2 tonnes for this CUN for 2007. The CUN states that MB is used only in 4% of the production area where populations of nematode and soil fungi, especially Phytophthora, are high. The CUN is for the same quantity licensed for 2006. MBTOC recognises that propagative material requires a very high level of soilborne pest and pathogen control in order to avoid widespread distribution of pests and	CUN states that alternatives result in a decline of 20-40% in net revenue for apples and raspberries respectively but sanitary quality is not guaranteed.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									pathogens into the fruiting fields. Registration of chloropicrin is expected in 2006 but this alternative is not yet commercially available. Dazomet is an effective alternative for areas where fungal populations are low to moderate, but is significantly less effective when disease pressure is high, particularly when Phythophthora is present. 1,3 D is being used in instances when nematodes are the key pest. The Party provides results of new studies with dazomet, 1,3 D and combinations of these two chemicals . MBTOC further encourages the Party to provide more detailed information, if nominations are made in future, on pathogen levels on plants (pathogen tolerance) for those pathogens subject to certification requirements as well as comparative measures of plant vigour. The rate of methyl bromide allowed by regulation is 50 g/m2. MBTOC notes that efforts are being made by that the Party to amend the regulation no. AGRG 0000311 V to permit lower doses of MB and register lower formulations of MB, especially 50:50.	
France	Orchard replant	25.000	25.000		7.500		7.000		MBTOC recommends a reduced amount of 7.0 tonnes for this CUN for 2007. The CUN is for controlling the orchard replant complex. MBTOC recognises that there may be regulatory restrictions on the minimum dosage allowed in France, but bases its recommendation on the use of 35g/m2 on bed treatment which constitutes 50% of the treated area. This dosage conforms to MBTOC's standard presumption of 350 k/ha of 98:2. Although a number of possible alternatives exist for controlling replant problems, these are based on combinations of chloropicrin with other chemicals and this material is not yet registered in France. MBTOC notes that a large area (80%) is not treated with MB; 18% of such area is presently subjected to crop rotation, treated with Dazomet or otherwise subjected to agronomic practices that help reduce pathogen incidence. The main constraint to the adoption of alternatives is the inability to clearly identify the causal agents of replant disease. The Party is encouraged to extend the use of soil testing to confirm the necessity for MB fumigation.	CUN states that alternatives result in a decline of 10-20% in net revenue.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
France	Pepper	(see eggplant)	27.500	none	6.000		6.000		MBTOC recommends a CUE of 6.0 tonnes for this use in 2007. The CUN is for control of *Phytophthora capsici.* Chloropicrin, a suitable alternative, is expected to become registered in 2006 but is not yet available. Although MBTOC's standard presumptions include a dosage rate of 35 g/m2 of MB 98:2, registered doses are higher in France, where 60 g/m2 are required for *P. capsici*, 50 g/m2 for other soilborne pests and 40 g/m2 for nematodes. Presently, different alternatives are technically and economically feasible for this use: Steam is widely used to control *P.capsici* and other pathogens in some European countries (Barel, 2004) and its use could be expanded in the 25 ha of heavily infested soils reported in the CUN. Grafting is also an alternative although MBTOC recognises that its use in peppers is not yet widespread. Registration of chloropicrin should provide further options of control, when used alone or in combination with other chemicals or with grafting Spotti, 2004). 3% (15 ha) of the pepper area is now in soil less culture and this technique can be expanded at least partially in the nominated area. MBTOC notes that efforts are being made by that the Party to amend the regulation no. AGRG 0000311 V to permit lower doses of MB and register lower formulations of MB, especially 50:50.	CUN argues that the cost of steam treatment is too high. CUN concludes that cultivation with existing chemical alternatives will cause a decrease of the revenue of 15 to 30%. Soil-less culture gives higher net revenue, but given the high capital investment required, the total area in soil-less culture is only 20 ha in France. Moreover, these data do not take into account the drastic increase of steel and energy prices that makes soilless culture much less attractive.
France	Strawberry fruit - protected and open field	90.000	86.000	none	34.000		0 NR		MBTOC does not recommend this nomination. The nomination requests MB mainly for soil-grown strawberries that carry "terroir" labels, such as Perigord. The party states that substrates have been adopted on more than 300 ha but cannot be used for "terroir" areas because the standards require production in soil. MBTOC requested more details about the standards but did not receive this information. MBTOC considers that several alternatives are available in France and that they provide yields similar to MB, for example metam applied by rotating-spading equipment, combinations of 1,3-D, metam, dazomet, LPBF and resistant varieties (Fritsch and Rabasse, 2000; Pommier, 1999; Haglund, 1999; Sydorovych, 2004: Ferguson, 2001; Lopez-Aranda 2003; Porter 2004; Runia and Molendijk 2006; Rabasse, 2003; studies in Special Report: TEAP May 2006). MS applied by drip irrigation was registered in 2005 and	CUN states that a net revenue of 12 000 euros (farmers earn net revenue of around 20 000 euros per hectare on 1.5 ha farms) is equivalent to the guaranteed minimum wage. Net revenues lower than this means there is an advantage to being unemployed. Given that the cultivation of strawberries without fumigation and with existing chemical alternatives decreases net revenues by some 50%, this will cause serious social disruption in poorer regions. While net revenues for soilless culture are only 8% lower, the investment is not acceptable for older farmers,

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									adopted on about 100 ha that year.	where more than 40% of the farmers are older than 50. However, CUN states that metam sodium has a lower cost, hence even if it results in a commercial yield that is 36% lower, it will be possible to use after registration.
France	Strawberry runners	40.000	40.000		28.000		28.000		MBTOC recommends a CUE of 28 tonnes. The Party states that MB is required to meet the certification standards for strawberry runners. Metham sodium is used in areas of low disease pressure and MB/Pic (98:2) is used on the remaining 80% of land every second year - ie 60 ha. MBTOC acknowledges that the Party has a reduced range of alternatives available because chloropicrin is not registered. The Party's research and testing program indicates several potentially feasible alternatives are being considered, ie. 1,3-D + PIC combination [awaiting the registration of PIC], DMDS [registration not likely before 2009] and methyl iodide [awaiting outcome in the US]. MBTOC notes that efforts are being made by that the Party to amend the regulation no. AGRG 0000311 V to permit lower doses of MB and register lower formulations of MB, especially 50:50. This is considered important as other strawberry runner growing regions in the world use much lower rates of MB. The Party is requested in future nominations to demonstrate that alternatives do not achieve the pathogen and pest tolerance levels to meet certification requirements.	CUN argues (based on trials) that although costs of alternatives such as metam sodium are lower than MBr, alternatives could result in negative net revenue. In addition, certification is not guaranteed.
France	Tomatoes		48.400		included in eggplant above		0 NR		MBTOC does not recommend this CUN. MB is no longer used for tomatoes in most European countries (Besri, 2004; Garcia-Alvarez *et al*, 2004; Tello, 2002). According to the CUN, soil disinfestation with MB is the option for controlling corky root, particularly in view of the fact that chloropicrin is not yet registered. Although MBTOC's standard presumptions include a dosage rate of 35 g/m2 of MB 98:2, registered doses are higher in France, where 60 g/m2 are required for *P. capsici*, 50 g/m2 for other soilborne pests, 50 g/m2 and 40 g/m2 for nematodes. Presently, different alternatives are technically and economically feasible for this use: Steam is widely used to control *P.capsici* and other	CUN argues that the cost of steam treatment is too high, while high grafting increases the cost of the plant. CUN states that a net revenue of 12 000 euros (farmers earn net revenue of around 20 000 euros per hectare on 1.5 ha farms) is equivalent to the guaranteed minimum wage. Net revenues lower than this means there is an advantage to being unemployed. Given that the cultivation of tomatoes

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									pathogens in some European countries (Barel, 2004) and its use could be expanded in the 50 ha of heavily infested soils reported in the CUN. Grafting is already widely used in France (30 % of the tomatoes grown are grafted, De Miguel, 2004; Besri, 2003; Spotti, 2004), even though resistance to corky root is not always robust, and registration of chloropicrin and Pic mixtures in combination with grafting will further expand the scope of efficient alternatives available. Forty per cent of fresh tomatoes (1200 Ha) are presently produced in soil less culture and this alternative may be further expanded (Besri, 2003; Spotti, 2004; Tognoni *et al,* 2004; Leoni *et al, 2004)*.	without fumigation and with existing chemical alternatives decreases net revenues by some 30 to 50%, this will cause serious social disruption. While net revenues for soilless culture are only 8% lower, the investment costs are high.
Greece	Dried Fruit	4.280	3.081	none	0.900		0.45		MBTOC recommends 0.450 tonnes for this use in 2007. This is a 50% reduction over the amount nominated by the Party. The Party has achieved a consistent downward trend in methyl bromide use for dried fruit. In March 2006 and in its interim CUN report, MBTOC requested information from the Party to enable detailed review of the CUN, but as of its final meeting of 2006, no information was received. In previous years for CUNs for dried fruit for Greece and for dried fruit in other countries, MBTOC has recognized a need for a relatively small amount of methyl bromide when rapid fumigation before marketing is urgent. Lacking the requested information from the Party on volume of product needing rapid fumigation, MBTOC was only able to justify 0.450 tonnes.	No economic data given
Greece	Mills & Processors	23.000	15.445	none	1.340		1.340		MBTOC recommends a CUE of 1.34 tonnes for this use for 2007. The Party's MB use for this application has shown a steep decline since 2005. The applicant does not give details of the alternatives currently proposed for use. MBTOC advises the Party that the standard dosage rate for mill treatment is 20 g/m^3. MBTOC would wish to encourage the consideration of heat disinfestation and IPM as a means to further the replacement of MB. (Dosland et al, 2006). Given the relatively low amount of MB requested by the Party, in the face of the 20 mills that will require pest control, the Party might need to consider allocation strategies that reserve MB for those mills whose size, layout and design, age and/or location make transition most difficult.	CUN states that carbon dioxide cannot be used because of costs, while both boiling and cold treatment require the installation of boilers along with peripherals in every fumigation facility.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Ireland	Mills	none	0.888	none	0.611		0.000		MBTOC did not assess this nomination as it was withdrawn at the request of the Party.	CUN notes sulfuryl fluoride will be at least 2.5 times the cost of methyl bromide, while no accurate cost of heat treatment is available. There are also losses from additional downtime when alternatives are used.
Israel	Dates	3.444	2.755	none	2.200		2.200		MBTOC recommends 2.2 tonnes for 2007 for this use. The Party has continued its 20% decrease for 2 years. The Party has recently made excellent advancements in research and commercial adaptation of heat treatment under difficult circumstances in remote packing houses. The remaining MB is needed to allow time to transition the most difficult regions with techniques developed in Israel.	CUN recognises a new technology using heat to disinfest and control date pests. CUN says that although a cost-benefit analysis has yet to be made, the initial capital expenses were reasonable taking advantage of existing drying facilities and a dryer adapted for heat disinfestation treatment. Furthermore, energy costs are incorporated within the existing costs of drying. Although the technology still could benefit from further fine-tuning, the final results are satisfactory.
Israel	Flour mills	2.140	1.490	none	1.490		1.040		MBTOC recommends 1.04 tonnes of methyl bromide for mills in 2007. This represents a 30 % decrease of the originally nominated amount, as revised by the Party. Millers are starting or improving existing pest management programs within the concept of "Integrated Pest Management" (IPM). The applicant indicates the use of heat disinfestation will be developed according to the usual standards. Millers are planning a step-wise phase-out of methyl bromide which will be completed in 2008.	CUN provides no economic analysis.
Israel	Furniture	1.442	0.000	none	1.442		0 NR		MBTOC does not recommend this use. The CUN does not justify the use of MB for wood when numerous alternatives such as CO2, N2 and vacuum treatments can be used for this purpose . The applicant has provided no research data on effectiveness or economics of alternatives and supplied no information to show that alternatives are not registered.	CUN provides no economic analysis.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Israel	Museums	none	none	none	0.600		0 NR		MBTOC does not recommend this use. Alternatives such as CO_2, N_2, vacuum, cold are all technically effective for moveable artefacts. (Navarro, 2006). The Party may wish to resubmit this nomination with clear indication proposing only immovable objects, items contaminated with fungi or entire libraries with infested books, or if the Party has a clear justification that shows why technically effective alternatives are not suitable in their circumstances. In which case, the Party may provide information that the CUN fully meets the requirements of Decision IX/6 and provide the volume of product to be treated, the dosage rate and the conditions of treatment.	CUN provides no economic analysis.
Israel	Broomrape	none	none	none	250.000		250.000		MBTOC recommends 250 tonnes of MB for this use for 2007. The CUN is for broomrape eradication and land rehabilitation of 1000 ha in the Upper Galilee and the Golan Heights. A total of 5700 ha is highly infested with this weed, making it impossible to produce tomatoes in these regions. The recommended CUN is based on a dosage of 250 kg/ha of 98:2 MB with use/ emission reduction technologies. Chloropicrin or MB formulations with higher proportion of Pic are not registered in Israel. MB will be used only once in each region and it is expected to bring the weed parasite population below the damage threshold allowing for other alternatives to be adopted. In addition, the Party expects that in 2007-2008, some alternatives and combinations such as 1,3-D/Pic, sequential application of 1,3-D+ metham sodium and resistant varieties will become registered or available. The Party has also identified other alternatives to control low infestations of Orobanche (e.g. Sulfosulfuron, solarization).	CUN states that broomrape infestation is aggravated by the phase out of MB, as registered alternatives do not prevent area-wide infestation with the parasitic weed. The same is true for agrotechnical means, long-term fallow cropping and biological control which in practice and in economic terms do not cope with the long-term vitality of broomrape seeds and their gradual germination mechanism. CUN also states that prospects for the registration of *Imazapic* are low and the manufacturer, having doubts about the cost-effectiveness of its registration, might refrain from its further development. Further, soil solarization, usually applied on intensive vegetable crops, is too expensive and delicate for extensive outdoor crops.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Israel	Cucumber	none	none	none	25.000		25.000		MBTOC recommends 25.0 tonnes of MB for this CUN for 2007. The CUN states that cucumbers are grown in open ended polyhouses in 3 cropping cycles per annum in the proximity of the residential houses of cooperative family and private family farms. 70% of the need for MB is concentrated in one village, where the growers specialized for years in the cultivation of indoor cucumbers for the domestic market. The need for MB could be considered as a niche request and was not submitted previously since most of the crop's pathogen control problems were resolved satisfactorily at the commercial level. For two out of the three cropping cycles, solutions were found despite the monoculture production pattern which reflects the specialization of the growers but narrow rotations enhances the pressure from soil-borne pathogens. The two additional reasons for the submission of the request for MB are the appearance of *F. oxysporum f. sp. radicis cucumerinum* for which MB is the recommended control means and there are buffer zone limitations on the use of the MS+1,3-D mixtures. The pathogen is highly virulent and the infestation level particularly high in the affected location and it could devastate entire greenhouses in a short period of time. Furthermore, low soil temperatures prevailing in the fumigation season of December-January constraint the adoption of MB alternatives. The nominated amount is based on a dosage of 250 kg/ha of 98:2 MB in conjunction with use/ emission reduction technologies. Chloropicrin or MB formulations with a higher proportion of Pic are not registered. The Party states that trials on alternatives are proceeding.	CUN states that the costs of grafted seedlings are a limiting factor because the technology in cucumbers is in its infancy. Furthermore, the CUN states that Basamid is not economically feasible due to its high prices and its low efficacy in the winter when prevailing soil temperatures are too low for its safe use.
Israel	cutflowers - bulbs - protected	303.000	240.000	none	321.330		220.185		MBTOC recommends a reduced amount of 220.185 tonnes for this use in 2007. MBTOC does not recommend use of 5 t of MB for fumigating substrates. MBTOC has adjusted the amount for Ghaza to conform to the standard presumptions for dosage rate of 35 g/m2 of 98:2 with adoption of LPBF. MBTOC has also adjusted the nominated amount to account for 25% adoption of alternatives in 2007. The requested amount of MB is higher than the 2005 nomination due to new flower types being grown and needing fumigated soils. Lack of registration of key alternatives and chloropicrin mixtures for many flower types is the	CUN provides partial budgets for MB and the next best alternatives. The net revenue for the next best alternatives is negative in all cases. CUN also states that soil steaming is not cost effective at a cost of $\$0.88/m^2$, and solarisation is not cost effective taking into account the time spent on mulching: 6-8 weeks, the cost of the plastic, fencing, irrigation system and

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									major factor affecting substitution of MB at this time.	water for soil wetting.
Israel	Cutflowers - open field	77.000	67.000	none	80.755		74.540		MBTOC recommends a reduced amount of 74.54 tonnes of MB for this use in 2007. The nomination request is higher than that of the previous year due to expansion of the cropping area grown with flowers, particularly proteas (300+ new Ha) and some geophytes (30 new Ha). Lack of registration of key alternatives on flowers, which are available for other crops in Israel, such as 1,3-D+Pic, dazomet and metham sodium, are the major constraints affecting substitution of MB at this time. MB formulations with higher chloropicrin content are also not registered. Solarisation and metham sodium (registered at this time only in gladioli) and soil-less substrates have been identified by the Party as feasible alternatives for a proportion of this nomination (71 Ha out of 400 Ha) and a 25% transition rate has been applied to this proportion for adoption of these alternatives in 2007. MBTOC encourages the Party to continue efforts to register alternatives, particularly mixtures with chloropicrin, and promote their further adoption.	CUN provides partial budgets for MB and the next best alternatives. The net revenue for treatment with Basamid is higher than with MB, but this product is not registered. The use of metham sodium on solidago results in a 60% decline in net revenue, while alternatives for lizianthus result in negative net revenue.
Israel	Fruit tree nurseries	50.000	45.000	none	10.000		7.500		MBTOC recommends 7.5 t for this use in 2007. MBTOC recognizes that propagative material requires a very high level of soilborne pest and pathogen control in order to avoid widespread distribution of pests and pathogens into the fruiting fields. The Party adjusted their requested amount using a 25g/m2 rate of 98:2 which is below the MBTOC standard. The Party adjusted their nomination to omit the amount originally nominated for treatment of substrates. The Party will reach approximately 65% adoption of potted production of tree seedlings by 2007.	CUN states that economic assessment is not feasible in this case since the effect of MB or its alternatives impacts the quality of the produced seedlings. The quantitative aspect is not recorded and is not significant economically. The quality of the seedlings is the raison d'etre of the whole industry and a zero tolerance level is imposed on it for bacterial galls and symptoms of nematodes.
Israel	Melon - protected and field	125.650	99.400	none	140.000		99.500		MBTOC recommends a reduced amount of 99.5 tonnes for a CUN for this use in 2007. *Monosporascus cannonballus* is the key pathogen affecting winter production of melons in the Arava Valley. *Fusarium oxysporum f.sp. melonis* and root-knot nematodes, mainly *M. javanica are also affecting crops.* MBTOC notes that MB has been fully replaced with alternatives for fall production of melons in the same region: 1,3-D, metham sodium, dazomet, solarisation, formaldehyde+MS, and 1,3-D+Pic in the southern	CUN provides partial budgets for the next best alternatives. The net revenue for the next best alternatives is negative.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									Arava. The long plant back time of these fumigants during the winter and the lack of appropriate climatic conditions for solarisation make these options unfeasible in the winter. The nominated quantity has been calculated based on a dosage of 25 g/m2 in conjunction with use/ emission reduction technologies. In the absence of alternatives proving ineffective, the Party, if possible, is urged to consider registration of MB formulations with a higher content of chloropicrin, (eg. 50:50, 30:70) to allow further reduction of MB in the future.	
Israel	Potato	239.000	165.000	none	137.500		137.500		MBTOC recommends 137.5 tonnes of MB for this use for 2007. There are 15,000 Ha of potatoes grown in Israel and alternatives to MB have been implemented for management of key pests and pathogens for all regions. The applicant identified that such alternatives do not work in 550 ha in highly populated areas where winter production occurs, infestations are high and regulatory constraints are in place for feasible alternatives such as 1,3D+ Pic (61:35). This product is prohibited near residential areas in 15% of the potato acreage in this region. The CUN further indicates that mechanical injection machines are being developed for the application of metham sodium and formaldehyde, which will help decrease the environmental contamination caused by these two chemicals making them toxicologically acceptable for the specific conditions of the densely populated Sharon region. It is anticpated these alternatives will be implemented soon. In the absence of complete uptake of these alternatives, the Party, if possible, is urged to seek registration of MB formulations with higher content of chloropicrin in order to further reduce MB use.	CUN shows that the net revenue using MB is negative, while for the next best alternative it is positive. CUN states that the registered alternatives carry environmental and economic costs. CUN also states that potatoes cannot be cultivated under soil-less culture or with plug plants, as once planted in infested soils would lose their advantage and end up with high economic losses. CUN states that Telopic is more cost effective in the Sharon than in the Negev; that Telon II-94%, Cadusafos and Fenamiphos is cost effective, and that Bionem/Bio-safe is used only in organic farming and is not cost effective for mainstream production.
Israel	Strawberry runners	35.000	35.000	none	28.000		28.000		MBTOC recommends 28 tonnes for strawberry runners in 2007 [80 ha x 350 kg/ha]. The CUN states that 1,3-D + Pic has been the leading alternative, but that further adoption is limited by the required 250 m buffer which significantly limits its use in the 2 primary strawberry growing regions – Sharon and the Ghaza Strip. The CUN states that the introduction of Macrophomina phaseolina in 2004 threatens strawberry runner growing areas. MBTOC has used its standard presumption for 98:2 formulation of 35 g/m2 with LPBF (eg.VIF). In order to comply with Decision	CUN shows that the net revenue using MB is lower than for the alternatives. CUN states that the registered alternatives carry environmental and economic costs. CUN also states that soilless cultures are a possibility, but not before 2010 due to the high costs of the technology.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									IX/6, the Party is requested to demonstrate results from trials, and to demonstrate that alternatives do not achieve the pathogen and pest tolerance levels to meet certification requirements if future nominations are submitted..	
Israel	Strawberry fruit	196.000	196.000	none	148.200		65.100		MBTOC recommends a reduced amount of 65.1 tonnes for this use in 2007. The CUN states that 1,3-D/Pic is effective and used on part of the crop but further adoption is limited by buffer zones in two strawberry production regions. The party has not quantified the impact of buffer zones. MBTOC considers that alternatives such as dazomet + barrier film and dazomet + short solarisation are available and effective for the major pests affecting strawberry fruit in Israel and provide yields about 92 - 108% of yields obtained with MB (Ausher, 2004; Lopez-Aranda 2001, 2003, 2004; Pietr, 2002; IR-4 2000; Yücel, 2002; TEAP 2006b). The CUN's economic assessment indicated that dazomet and 1,3-D/pic provided net revenues 70% and 53% higher than MB at 2005 prices. Soilless systems are used, but the party states that further uptake is limited by cost. MBTOC encouages the applicants to continue adopting low-cost substrate systems which have been adopted by family farms in similar circumstances in other regions (Sonneveld, 2004; Lieten, 2004), as well as other alternatives identified above. MBTOC considers that the transition will also be assisted by reducing infection in nursery runner production, improved cultural practices to reduce pathogen pressure, and greater use of available resistant varieties. MBTOC considers that this sector could achieve full adoption of alternatives in the coming year.	Party provided an enterprise budget comparing strawberry fruit production in soilless system compared to in soil production and concludes that despite higher yields in substrates, higher production costs prevent expansion of soilless production.
Israel	tomato	none	none	none	90.000		22.750		MBTOC recommends a reduced amount of 22.750 tonnes for this use in 2007. The reduction is based on adjusting the application rate to conform to MBTOC's standard presumptions of 35g of MB/m^2 in combination with use/ emission reduction technologies. The nomination is for the eradication of the newly introduced soilborne fungus *Verticillum dahliae*, race 2. The CUN states that this request is only for one year and no further requests are expected in the future.	CUN provides no economic analysis.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Italy	Artifacts	5.225	5.225	none	5.000		5.000		MBTOC recommends 5 tonnes in 2007 for control of pests and fungi in historical buildings and immovable building components, but only under the current procedures whereby MB treatment is used following the recommendation by government conservation officials. Other EU member states use SF for some of these purposes, but SF is not registered in Italy for use on historical buildings and artefacts. Pests of historical buildings are both insects and fungi, but MBTOC does not know of a technically effective alternative treatment for control of fungi in historical buildings and components. Italy is encouraged to continue its research program to test the suitability of modified atmospheres and approve alternative treatments such as sulfuryl fluoride which would control insect pests. Additionally, treatment of wood boring insects in building components could be achieved by tarped spot fumigation with carbon dioxide or nitrogen, a method which still allows use of the building (Unger et al, 1992) .	No economic data given
Italy	Mills and processors	160.000	65.000	none	25.000		25.000		MBTOC recommends 25 tonnes for this use in 2007. The recommended amount corresponds to more than 50% reduction compared to 2006 MB use. Italy registered SF in 2004, but relatively few fumigators have been fully trained to date. Italy is also working to adapt heat treatments to mills but few heat treatments have been conducted. Italy believes it will complete this transition and methyl bromide will be phased out in 2008.	CUN notes that the cost of treatment with sulfuryl fluoride is higher.
Italy	Cut flowers, bulbs - protected	250.000	187.000	none	30.000		30.000		MBTOC recommends 30 tonnes of MB for this CUN as requested. The Party has rapidly and significantly reduced the requested amounts over the last three years (from 250t in 2005, to 187 t in 2006), and is transitioning to alternatives. MBTOC also recognises efforts made by the Party in reducing dosages of MB to conform to MBTOC standard presumptions including use/ emission reduction technologies and in obtaining registration of key alternatives such as chloropicrin. The CUN states that substrates are not feasible because water supply is insufficient and open substrate systems cause unacceptable contamination of soils. However, in many parts of the world simple and relatively inexpensive systems are in place, by which water can be re-circulated and cleaned, thus avoiding these two	CUN argues that farms are too small for rotation to be economically viable. CUN provides some data on the cost of alternatives, all of which are lower cost than MB, except for steam and soilless production.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									problems (Savvas and Passan, 2002; Savvas, 2003; Pizano, 2005). The Party is encouraged to further evaluate the acceptability of such systems.	
Italy	Eggplant - protected	194.000	156.000	none	15.000		0 NR		MBTOC does not recommend this CUN for 2007. MBTOC recognises the effort made by the Party in reducing the nomination from 96 T in 2005 to 15 T requested for 2007 however effective alternatives exist. The CUN states that eggplant production is mostly concentrated in Southern Italy where local soil and climatic conditions make simultaneous infestations of fungi, weeds and nematodes very common. Key fungal pathogens are *Verticillium wilt, Fusarium* spp., *Sclerotium rolfsii, Rhizoctonia solani, Phytophthora* spp, for which different alternatives are economically and technically feasible. Chloropicrin is registered in Italy and sequential application with 1,3-D is now possible and effective (Loumakis, 2004). Grafting on resistant root stock is now a well validated and adopted technology and many nurseries in Italy now produce grafted eggplant plants (Spotti, 2004; Kah, 2005). Substrates are also widely used and prove technically and economically feasible in many regions with similar climates and also in the nominated area (Spotti, 2004; Tognoni *et al*, 2004; Leoni *et al*, 2004).	CUN provides some data on the cost of alternatives, most of which are lower than MB, but produce lower yields. CUN also mentions the high cost of steam, soilless production and grafted plants.
Italy	Melon - protected	131.000	131.000	none	10.000		10.000		MBTOC recommends 10 tonnes of MB for this use in 2007. The key pests are *Fusarium solani, Fusarium oxysporum f.sp. melonis, Monosporascus cannonballus, Sclerotinia sclerotiorum, Meloidogyne* spp. and *Verticillium* spp. Use of sequential application of 1,3 D and Pic has allowed significant reduction from previous CUN applications of 112 t to 38 t and further to the current amount of 10 t. The rapid transition of a large proportion of growers to alternatives is recognised, and it is anticipated that there will not be a future nomination from this Party for this crop.	CUN provides some data on the cost of alternatives, most of which are lower than MB, but produce lower yields. CUN also mentions the high cost of steam, soilless production and grafted plants.
Italy	Pepper - protected	160.000	130.000	none	67.000		67.000		MBTOC recommends an amount of 67 tonnes of MB for this CUN. The CUN states the nomination is restricted to areas where alternatives are not available because of economic and technical reasons. Alternatives however, are considered to exist (Loumakis, 2004; Tognoni, *et al,* 2004; Spotti, 2004), however further time is required for transition. Pepper production is mostly concentrated in Southern Italy	CUN provides some data on the cost of alternatives, most of which are lower than MB, but produce lower yields. CUN also mentions the high cost of steam, soilless production and grafted plants.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									where, due to local soil and climatic conditions, the occurrence of high level of infestation of fungi and nematodes is very common. Chloropicrin has recently been registered in Italy allowing for sequential applications with other products, but mixtures with other chemicals are not yet registered. Grafting is a technically feasible alternative (Spotti, 2004) but has only been recently introduced and further time is needed to expand its uptake. Other feasible alternatives include steaming and soil less culture.	
Italy	Strawberry fruit	407.000	320.000		35.000		0 NR		MBTOC does not recommend this nomination. The nomination is based primarily on the short time for which newly registered alternatives have been available. MB is applied every 2 or 3 years. However, 1,3-D EC and Pic EC were registered in 2001 and 2002 respectively and have been adopted on large areas in Italy; 1,3-D traditional formulations and metam were used from earlier years. Several of the alternatives used in Italy provide yields that are statistically similar to MB, such as 1,3-D and Pic (sequentially-applied), metam+ pic, metam drip application, and pic + VIF (Spotti, 2004; Ajwa et al., 2002, 2003, 2004; Haar et al.,2001; Nelson et al., 2001a,b; Fritsch and Rabasse, 2000). The recent annual adoption rate for fumigants in strawberry fruit in Italy is 630 – 650 ha/year (EC, 2006), while the CUN is for 120 ha. There appear to be no different or specific circumstances that prevent use of the alternatives in the remaining area of MB use.	CUN provides some data on the cost of alternatives, most of which are lower than MB, but produce lower yields. CUN also mentions the high cost of steam and soilless production.
Italy	Strawberry runners	120.000	120.000		35.000		35.000		MBTOC recommends an amount of 35 tonnes for this use for 2007. The CUN states that MB is required to meet certification of 100% pathogen-free strawberry runners and this is not technically feasible with the currently registered alternatives. Trials to reduce the dosage of MB:PIC (e.g. 50:50] have been carried out, but only the 98:2 formulation is currently registered. The Party is requested in future nominations to demonstrate that alternatives do not achieve the pathogen and pest tolerance levels to meet certification requirements. Also, in the absence of effective alternatives the Party if possible is urged to consider registration of lower MB formulations/doses to reduce MB dosage rate.	CUN provides some data on the cost of alternatives, all of which are lower cost than MB, except for steam.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Italy	Tomatoes - protected	871.000	697.000	none	418.000		80.000		MBTOC recommends 80t of MB for this use. This is a transition amount for one year for the particular circumstances of Southern Italy (tomato yellow leaf curl virus, soils etc). The critical area is approximately 6% of the cropping area. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives and why alternatives are not applicable in the circumstances of Italy. The Party recognises that alternatives are available for the control of tomato soil borne pathogens. The remaining area is approximately 6% of the total cropping area and the key pests are fungal diseases (Verticillium, Fusarium., Sclerotium Sclerotinia, Phytophthora spp). Pic and 1,3 D are registered as single chemicals. The former a good alternative for the control of soilborne pathogenic fungi and if nematodes are present, sequential application with 1,3-D is now possible and effective (Minuto 2003; Spotti, 2004; Loumakis, 2004). Very good resistant varieties and root stocks to some key pathogens are now available and grafting on resistant root stock is now a well validated and adopted technology. Presently, many nurseries in Italy produce grafted tomato plants (Besri, 2003, Spotti, 2004; De Miguel, 2004a, b). Substrates are also widely used and proven technically and economically feasible in many regions with similar climates and even the nominated area (Besri, 2003; Spotti, 2004; Leoni et al, 2004; Tognoni et al, 2004). Combined alternatives e.g. grafting + chemicals, grafting + solarisation and others can also be used (Loumakis, 2004; Spotti, 2004, Togoni et al 2004).	CUN provides some data on the cost of alternatives, most of which are lower than MB, but produce lower yields. CUN also mentions the high cost of steam, soilless production and grafted plants.
Japan	Chestnuts	7.100	6.800	6.500		6.300		6.300	MBTOC recommends 6.3 tonnes for this use in 2008. The CUN relates particularly to fresh market chestnuts, which impacts the technical availability of alternative treatments, compared for chestnuts used for processing. Although the Party has conducted research trials on many potential alternatives, there are no registered alternatives that do not harm the quality and marketability of fresh market chestnuts. Unlike other nuts which are durable commodities, chestnuts are a high moisture, semi-perishable food. In Japan, they are harvested one day, fumigated on-farm in small lots and	CUN provides no economic analysis.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									moved to marketing channels through short term storage facilities. The pest of concern and the requirement to kill eggs and larvae due to short storage before marketing has impacted the dosage rate and treatment time for this product. The Party has conducted satisfactory efficacy tests with iodomethane but the necessary registration has not yet been completed.	
Japan	Cucumber	88.300	88.800	72.400		68.600		51.450	MBTOC recommends a reduced CUE of 51.450 tonnes of MB for this use in 2008. The nomination has been reduced from 68.6 tonnes by 25% based on reductions of rates under barrier films (e.g. 25g/m2 for 98:2 with LPBF) and increased uptake of alternatives. These include increased use of substrates as an alternative. The nomination is based on the stated need to control a specific virus, KGMMV, of cucumbers. This virus is transmitted by mechanical inoculation; grafting and contact between plants and by seeds, and can survive in crop debris for several years. The problem exists because of continuous cropping with cucumbers. The disease is managed in all other countries in the world without MB by using techniques such as crop rotation, crop sanitation and pathogen free seeds. MBTOC visited the production sites and recognises the unique farming system used for cucumbers in Japan which has been in place for many years. However, in many countries cucumbers production has already shifted to substrates in greenhouse conditions and has become the most widely used technique for eliminating a wide array of soilborne plant pathogens. Cheap and simple systems (buckets, bags, etc.) are available for this kind of production and are used in many developing countries, and by small growers in Italy, Turkey, Hungary, Greece and others (Leoni & Ledda, 2004; Budai, 2002; Savvas and Passam 2002; Akkaya & Ozkan, 2004; Engindeniz, 2004). Substrate production, when implemented correctly can produce higher yields than MB (MBTOC, 2002; Batchelor 2000, 2002; Savvas and Passam 2002). Large numbers of growers can be trained to use substrates systems in a short period of time as experienced in many MLF projects (UNEP/TEAP, 2004). A high rate of adoption of this technology for cucumbers production is reported in various countries (EC, 2006). MBTOC views that	The Party reports that substrate production systems are not economically feasible.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									expanding simple substrates-based systems is feasible in the specific Japanese circumstances. Different substrates are available and widely used in tomato and strawberry production in Japan already. MBTOC observed that such substrates are now being tested in Japan for the crops that are affected by the virus diseases for which MB is currently used. However, even in substrates there is a critical need for a high degree of sanitation and for the use of pathogen free transplants. Japanese greenhouse growers are already using electronic controlled fertilization systems for delivering nutrients with their irrigation water that allows for exact delivery of mineral elements required by the crops. No references regarding the argued possible occurrence of physiological damage were provided by the Party, and MBTOC does not acknowledge this could be a problem.	
Japan	Ginger (field)	119.400	119.400	109.701		112.100		84.075	MBTOC recommends a reduced amount of 84.075 t for this use in 2008. The submission was reduced based on the use of 25 g/m2 dose under LPBF with improved application. Also, it is anticipated that expanded use of alternatives like dazomet will occur. The growers indicate that they can use this every other year. The nomination is for control of Pythium spp. (Pythium ultimum var. ultimum, Pythium zingiberium) in ginger fields using MB (98:2) applied from small cans. Some MBTOC members made a field visit to Japanese open field ginger production sites in August 2006 and recognized the difficulties that growers have in adopting some alternatives. The growers however, indicate that they are using dazomet and it is an effective alternative to MB and it is also less expensive. The limitation with dazomet occurs when climatic conditions such as wet and cold weather limit its application. This results in long periods of phytotoxicity and subsequently, unacceptable plant back times and reduced crop yields. Chloropicrin is registered in Japan but the Party states that the plant back time for chloropicrin is 40 days which could disrupt crop scheduling and result in delays in planting and lower yields compared to MB treatment. In addition, the proximity of residential areas limits the use of chloropicrin in some areas. The CUN states that metalaxyl does not control Pythium efficiently as	Party reports that delays in planting with alternatives result in significant decline in gross receipts and net revenues.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									resistant strains to this fungicide have been reported. However the party states that metalaxyl combined with dazomet is highly effective for managing Pythium diseases. This needs to be investigated in more detail. The CUN does not indicate that cultural practices such as soil drainage, sowing date, organic amendments (Smith et al 1988) or fungicides specific to Oomycetes, such as phosphonates, have been tested. There also appears to be scope for further reduction in MB amount by adoption of MB/Pic mixtures in flat areas where mechanization can be used. Reduced emission technologies, such as LPBF films, are now being used and should allow for much reduced dosage rates (e.g. 25g/m2 for 98:2 with LBPF). This nomination has been submitted several times with no change in production and cultural practices to minimize disease although seed sanitation is being improved. The submission was reduced based on the use of 25 g/m2 dose under LPBF with improved application and the expanded of alternatives like dazomet. The growers indicate that they can use this every other year. Metam sodium can be applied under some circumstances (reduced disease pressures, and certain weather conditions) if drip irrigation is adopted. MBTOC acknowledges that drip systems are being used in other crops in Japan and indicates that this technology could be available for ginger production. In addition implementing drip would help wash away remnants of dazomet and thereby reduce plant back time. The reductions are based on lower rates of MB under LBPF (25 g /m2), improved methods of application of fumigants and greater use of dazomet.	
Japan	Ginger (protected)	22.900	22.900	14.471		14.800		11.100	MBTOC recommends a reduced amount of 11.1 tonnes for this use in 2008. The reductions are based on lower rates of MB under LBPF (25 g /m2), improved methods of application of fumigants and greater use of dazomet. The nomination is for control of Pythium spp. (Pythium ultimum var. ultimum, Pythium zingiberium) in protected ginger fields using MB (98:2) applied from small cans. MBTOC members made visits to Japanese open field ginger production sites as well greenhouse production sites in August 2006 and recognized the difficulties that growers have in adopting some alternatives. Growers of ginger in open	The Party reports substantial loss of marketable yields with alternatives. Analysis of impact of planting delays in cropping systems of ginger with pepper or cucumber shows missed market windows that lowers income.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									fields are using dazomet when climatic conditions allow and this is an effective alternative to MB and also less expensive. The limitation with dazomet occurs when climatic conditions such as wet and cold weather limit its application. However, under protected production conditions, dazomet should be able to be applied much more frequently as moisture and temperature can be controlled. This would make plant back times more reasonable. MBTOC therefore considers that protected ginger can implement the use of dazomet much more quickly. The CUN states that metalaxyl does not control Pythium efficiently as resistant strains to this fungicide have been reported. However the Party states that metalaxyl combined with dazomet is highly effective for managing Pythium diseases. This needs to be investigated in more detail. The CUN does not indicate that cultural practices such as soil drainage, sowing date, organic amendments (Smith et al 1988) or fungicides specific to Oomycetes, such as phosphonates, have been tested. Reduced emission technologies such as LPBF films are now being used and should allow for much reduced dosage rates (e.g.25g m2 for 98:2 with LPBF). This nomination has been submitted several times with no change in production and cultural practices to minimize disease although seed sanitation is being improved. The growers indicate that they can use dazomet every other year. Metam Sodium can be applied under some circumstances (reduced disease pressures, and certain weather conditions) if drip irrigation is adopted. Drip systems were being used in pepper production indicating that this technology is available in Japan. In addition implementing drip would help activate dazomet and thereby reduce plant back time.	
Japan	Melon	194.100	203.900	182.200		182.200		136.650	MBTOC recommends a reduced amount of 136.65 tonnes of MB for this in 2008. The nomination is reduced from 162.3 tonnes to conform to reductions in rates under barrier films (25g with LPBF with 98:2), the increased use of substrates as an alternative. The nomination is based on the stated need to control a particular virus of melons. This virus is transmitted by mechanical inoculation; grafting and contact between plants and by seeds, and can survive in crop debris for	The Party reports that substrate production systems are not economically feasible.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									several years. The problem exists because of continuous cropping with melon. The disease is managed in all other countries in the world without MB by using techniques such as crop rotation, crop sanitation and pathogen free seeds. MBTOC visited the production sites and recognises the unique farming system used for melon in Japan which has been in place for many years. However, in many countries melon production has already shifted to substrates in greenhouse conditions and has become the most widely used technique for eliminating a wide array of soilborne plant pathogens. Cheap and simple systems (buckets, bags, etc.) are available for this kind of production and are used in many developing countries, and by small growers in Italy, Turkey, Hungary, Greece and others (Leoni & Ledda, 2004; Budai, 2002; Savvas and Passam 2002; Akkaya & Ozkan, 2004; Engindeniz, 2004). Substrate production, when implemented correctly can produce higher yields than MB (MBTOC, 2002; Batchelor 2000, 2002; Savvas and Passam 2002). Large numbers of growers can be trained to use substrates systems in a short period of time as experienced in many MLF projects (UNEP/TEAP, 2004). A high rate of adoption of this technology for cucumbers production is reported in various countries (EC, 2006). MBTOC views that expanding simple substrates-based systems is feasible in the specific Japanese circumstances. Different substrates are available and widely used in tomato and strawberry production in Japan already. MBTOC observed that such substrates are now being tested in Japan for the crops that are affected by the virus diseases for which MB is currently used. However, even in substrates there is a critical need for a high degree of sanitation and for the use of pathogen free transplants. Japanese greenhouse growers are already using electronic controlled fertilization systems for delivering nutrients with their irrigation water that allows for exact delivery of mineral elements required by the crops. No references regarding the argued possible occurrence of physiological damage were provided by the Party, and MBTOC does not acknowledge this could be a problem.	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
Japan	Pepper (green & hot)	187.200	190.700	156.700		162.300		121.725	MBTOC recommends a reduced amount of 121.725 tonnes of MB for this use in 2008. This represents a reduction of 25% from the requested amount 162.3 tonnes. The nomination is based on the stated need to control a particular virus of peppers. This virus is transmitted by mechanical inoculation; grafting and contact between plants and by seeds, and can survive in crop debris for several years. The problem exists because of continuous cropping with pepper. The disease is managed in all other countries in the world without MB by using techniques such as crop rotation, crop sanitation and pathogen free seeds. MBTOC visited the production sites and recognises the unique farming system used for pepper in Japan which has been in place for many years. However, in many countries pepper production has already shifted to substrates in greenhouse conditions and has become the most widely used technique for eliminating a wide array of soilborne plant pathogens. Cheap and simple systems (buckets, bags, etc.) are available for this kind of production and are used in many developing countries, and by small growers in Italy, Turkey, Hungary, Greece and others (Leoni & Ledda, 2004; Savvas and Passam 2002; Akkaya & Ozkan, 2004; Engindeniz, 2004). Substrate production, when implemented correctly can produce higher yields than MB (MBTOC, 2002; Batchelor 2000, 2002; Savvas and Passam 2002). Large numbers of growers can be trained to use substrates systems in a short period of time as experienced in many MLF projects (UNEP/TEAP, 2004). A high rate of adoption of this technology for cucumbers production is reported in various countries (EC, 2006). MBTOC views that expanding simple substrates-based systems is feasible in the specific Japanese circumstances. Different substrates are available and widely used in tomato and strawberry production in Japan already. MBTOC observed that such substrates are now being tested in Japan for the crops that are affected by the virus diseases for which MB is currently used. However, even in substrates there is a critical need for a high degree of sanitation and for the use of pathogen free transplants. Japanese greenhouse growers are already using electronic controlled fertilization systems for	The Party reports that substrate production systems are not economically feasible.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									delivering nutrients with their irrigation water that allows for exact delivery of mineral elements required by the crops. No references regarding the argued possible occurrence of physiological damage were provided by the Party, and MBTOC does not acknowledge this could be a problem. The nomination is reduced by 25% based on reductions of rates under barrier films (25g with LPBF with 98:2) and the increased use of substrates as an alternative.	
Japan	Watermelon	129.000	98.900	94.200		43.300		32.475	MBTOC recommends a reduced amount of 32.475 tonnes of MB for this use in 2008. This represents a reduction of 25% from the requested amount 43.3 tonnes. The nomination is based on the stated need to control a particular virus of watermelons. This virus is transmitted by mechanical inoculation; grafting and contact between plants and by seeds, and can survive in crop debris for several years. The problem exists because of continuous cropping with watermelons. The disease is managed in all other countries in the world without MB by using techniques such as crop rotation, crop sanitation and pathogen free seeds. The nomination is reduced by 25% based on reductions of rates under barrier films (25g m2 with LPBF with 98:2) and the utilization of grated plants.	The Party reports that substrate production systems are not economically feasible.
Netherlands	Strawberry Runners	0.120	0.120	none	0.120		0.120		MBTOC recommends a CUE of 0.12 tonnes for 2007 for this use. The Party states that time is still required to complete trials on several alternatives currently in progress. MBTOC notes the nominated MB fumigations are carried out in chambers fitted with recapture systems.	CUN provides no economic data
New Zealand	Strawberry fruit	42.000	34.000	none	24.780		0 NR		MBTOC does not recommend this nomination. The party indicates that MB is used because high rainfall in some years leads to a long waiting period for 1,3-D/Pic, which cannot be accommodated in the crop cycle at present. The main pest is Phytophthora cactorum. Pic alone and Pic +LPBF are effective for this pathogen (Porter et al. 2004, Sydorovych et al. 2004; Ferguson et al. 2001; De Cal et al, 2004; TEAP May 2006b). The current application method used in New Zealand gives poor depth of penetration of fumigants in soil. The Party states that improved application methods would enable Pic to be better distributed and MBTOC still considers this a possible alternative. Improved application methods should	CUN states that VIF or equivalent is not economically feasible due to the cost of imports, therefore 40 micron polythene is used as an alternative. CUN provides an updated economic feasibility report to support this re-nomination. This provides typical costs and returns for strawberry fruit production by New Zealand growers, and evaluates the potential impacts of Telone C35 on strawberry

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									continue to be sought for application of 1,3;D/Pic. There are at least 2 months between harvest and planting, providing sufficient time for fumigation. Phosphorous acid treatments were found to be beneficial in reducing Phytophthora in one of the main varieties used in New Zealand (Pajaro) (Horner et al. 2005). The transition would also be assisted by use of more resistant varieties and further reductions in Phytophthora infestation in the nursery stock.	growers. Telone C35 fumigation on soil previously fumigated with methyl bromide reduces yield by ten to twelve percent. In fruiting bed trials with Telone C35 fumigation for a second year, yield was reduced by thirty percent. This results in a 17% reduction in gross profit margin for the first year and a 53% reduction for subsequent years.
New Zealand	Strawberry runners	8.000	8.000	none	7.793		6.234		MBTOC recommends 6.234 tonnes for this use in 2007. The CUN states that MB is required to meet the certification standards for strawberry runners. The Party states that the 25 g/m2 rate is justified due to their heavy soils. The Party's request exceeds MBTOC's standard presumption that a rate of 20 g/m2 of MB is effective for production of 'high health' strawberry runners using LPBF films and other emission control technologies (UNEP/TEAP October 2005). The Party's claim that LPBF is not economically feasible is based on only a comparison of film costs. MBTOC's assessment is that the increase in LPBF costs is typically offset by the reduction in the amount of MB:PIC required. The Party states that 1,3-D + PIC is the most promising registered alternative but does not control disease adequately in heavy soils and does not have acceptable plant back times due to soil retention and resulting phytotoxicity. The Party states that the most promising unregistered alternative is MI. MBTOC recognizes that New Zealand has registered a MB:PIC 30:70 mixture to further reduce MB use and emissions.	CUN states that VIF or equivalent is not economically feasible due to the cost of imports, therefore 40 micron polythene is used as an alternative. CUN states further that the use of Telone C35 decreases gross revenue of the runner grower. In addition, supply of infected runner plants to fruit growers has significant downstream effects on the gross and net revenue of those fruit growers.
Poland	Coffee & Cocoa Beans	See Medicinal Herbs	2.160	none	2.000		1.420		MBTOC recommends a revised, reduced CUN of 1.42 tonnes of MB specifically for treatment of cocoa and coffee imports infested with mites in 2007. Mites are difficult to control with the potential alternative, phosphine, requiring either very high dosages or split dosing. The latter is unduly time consuming in an import situation. The Party reports that relatively cheap products that are purchased, and it appears the mite infestations are likely to result from excessive humidity of those products. Mites are an indication that fungal contamination of the product is present. The source of	CUN states that gas form phosphine (which is not registered, inter alia because of the expected small market) is 30% more expensive, largely as a result of additional costs associated with fumigation time of 12 days; high cost of speed boxes and phosphine generators. These additional costs make the fumigation treatments with

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									the mite infestation needs to be determined to allow planning of alternative control strategies. The methyl bromide requirement could be reduced if lower moisture content products were imported; potential fungal and mycotoxin contamination problems would also be alleviated. The dosage rates used for some fumigations, 50-60 g m^3, for mite control with coffee are higher than necessary and MBTOC recommends a dosage rate of 30 g/m^3 in line with EPPO standards for coffee treatment, with allowance for presence of mites. The CUN recommendation has been revised to standardise the dosage rate for coffee, but no reduction has been made for the treatment of cocoa, which is under recapture and recycling. The use of recaptured methyl bromide leads to an effective methyl bromide usage of 8 g m^3. The CUN has been recalculated on the basis of volume figures given in the nomination.	phosphine more expensive by 50 Euro per ton. CUN states that irradiation is expensive because of the high cost of transportation to the facility.
Poland	medicinal herbs and mushrooms	4.100	3.560	none	1.800		1.800		MBTOC recommends 1.800 tonnes for this use in 2007. These products are contaminated with both insects and pathogens. The Party has moved towards chamber treatments which allowed the use of lower dosage rates for a portion of the commodity, resulting in considerable decrease in MB use. The usual treatments for these commodities against insects, phosphine and CO_2 are not effective against pathogens. The Party is encouraged to consider steam treatments and irradiation in use in other EU countries since they are effective against insects and pathogens. The Party is actively trying to encourage the registration of sulfuryl fluoride as part of their transition plan, although its effectiveness against pathogens needs further investigation.	CUN states that phosphine (which is not registered, inter alia because of the expected small market) is more expensive, largely as a result of additional costs associated with fumigation time of 12 days; high cost of speed boxes and phosphine generators. These additional costs make the fumigation treatments with phosphine more expensive. CUN states that irradiation is expensive because of the high cost of transportation to the facility.
Poland	Strawberry runners	40.000	40.000	none	25.000		24.500		MBTOC recommends a reduced amount of 24.5 tonnes for this CUN for 2007. The reduction has been made to account for the Party including the entire amount of the formulation in their nomination [400 kg/ha of 98:2] instead of the MB portion only [392 kg/ha]. The CUN states that MB is needed to meet the certification standards for strawberry runners. Potentially effective alternatives such as 1,3-D + Pic and Pic alone are not currently registered, nor are MB formulations with higher proportions of chloropicrin. While dazomet and MS are registered, their slow decomposition and long plant back time in the early spring precludes expanded	CUN provides data on costs and net revenue of alternatives, and argues that net revenue using Dazomet will range from 50% lower to 10% higher than MBr. CUN mentions that organic amendments and crop rotations cannot be considered as direct replacement for MB because of high production costs of plug plants for export.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									use due to production timing using currently available application equipment. Poland is currently acquiring improved application equipment. By mid-2006 rotating-spading injection equipment for MS was installed in Poland under a GEF project (Barel, pers. comm.). The CUN stated that the application of MS using modern application equipment in 2006 will allow for larger uptake of alternatives in 2006 and the year after.	
Spain	Cut flowers (Andalucia and Catalonia)	73.000	57.000	none	47.840		43.490		MBTOC recommends a reduced CUN of 30.65t for Andalucia and the full amount of 12,84 t for Catalonia for 2007. The reduction is based on a rate adjustment conforming to MBTOC's standard presumptions (175 g/m^2) in combination with use/ emission reduction technologies for situation where high infestations of nutsedge exist. Fusarium wilt of carnations and root knot nematodes are also reported as key pests in the CUN. Dosage rates for Andalusia have been adjusted to conform to MBTOC standard presumptions. MBTOC recognises the effort made by the Party in reducing the requested amount with respect to the CUE of last year. In future nominations further clarification is required to substantiate the claim that substrates are economically unfeasible for this nomination particularly for some flower types such as carnations and bulbs. A key and efficient alternative, 1,3-D+pic (Peguero, 2004, Melero-Vara *et al, 2005)* has recently become registered for carnations, which make up a large proportion of this nomination and rapid transition is considered possible. .	CUN states that 1,3-D, Telone presents economic disadvantages because of the longer waiting period and longer application period and because it is corrosive (C), while 1,3-D + Chloropicrin leads to a loss of yield and steam has economic disadvantages. CUN argues that substrates are not economically feasible because of the cost. CUN states that substrates require high investment and increases the costs of the crop. Adoption needs a gradual process of farm modernization, and is expensive. CUN cites data that show that an investment of 270,455 € is necessary on an area of 5,000 m^2, and the enterprise is unprofitable for the first five years. CUN also states that the transformation cost for the industry in Catalonia is estimated at more than 108 million €.
Spain	Peppers	200.000	155.000	none	45.000		45.000		MBTOC recommends 45 tonnes for this use in 2007. MBTOC recognises the efforts made by the Party in substantially reducing the amounts requested for this crop going from 150T in 2005 to 45 T in the present nomination. The CUN states that the nomination is restricted to where alternatives are not available because of economic and technical reasons. Pepper production is mostly concentrated in Murcia and Valencia where, due to local soil and climatic	CUN provides data on costs and net revenue of alternatives, and argues that net revenue using Dazomet will range from 50% lower to 10% higher than MBr. CUN mentions that organic amendments and crop rotations cannot be considered as direct replacement for MB because of

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									conditions, the occurrence of high levels of infestation of fungi and nematodes is very common. *Phytophthora capsici, Meloidogyne incognita*and nutsedge are the main key pests. The recommended amount is considered necessary for final transition to alternatives and it is expected that this is the last nomination from this Party for this use. Alternatives are presently available for pepper production in Spain: Chloropicrin, 1,3 D, steaming, soil less culture (Barel, 2004; Spotti, 2004; Tognoni *et al, 2004; Leoni* et al, 2004). Grafting is now developing for this crop in Spain just like in other Mediterranean countries (Spotti, 2004). Substrates are used in about 80 ha pepper in Spain and it is expected that this acreage could be expanded in the future.	high production costs of plug plants for export.
Spain	Strawberry fruit	556.000	499.290	none	80.000		0,0796 for research		MBTOC recommends 79.6 kg MB requested for research but does not recommend the nomination for strawberry fruit use in 2007. MBTOC recognizes that the Parties decided that MB for research should be taken from stocks (Decision XVII/9, 7). The main grounds of the nomination were uncertainty about the on-going EC review of pesticides and a longer waiting period when using alternatives in heavier soils. MBTOC recognizes that several available alternatives, for example, 1,3-D/Pic, Pic alone (or with LPBF), are technically feasible alternatives as indicated in the data presented in the nomination and from studies recently carried out in Spain (De Cal et al, 2004; Lopez-Aranda et al., 2002, 2003, 2004, 2005). Alternatives were adopted for strawberry fruit in Spain at the average annual rate of at least 1627 ha/year since 2004 according to data in the nomination, and the EC Management Strategy (2006) indicates adoption of up to 1627 –2000 ha/year. The area nominated for 2007 is 800 ha which represents 8% of the historical MB use. The impact of the longer plant back times suggested by the Party is not substantiated by data in the nomination, nor trials in similar production regions of other countries for this crop.	CUN states that wider adoption of soil-less cultivation systems is unviable economically and technically and adoption would be catastrophic for the sector; the adoption of plug plants would suppose a great convulsion in the system because of costs of transport; while the adoption of steam is hampered by the cost of providing the necessary infrastructure and equipment for its application. CUN also states that the cost of 1,3D + Pic is lower than MB in the 2nd year, but higher in the 3rd year. Finally, CUN states that diverse factors restrain the large-scale adoption of LPBF, including the costs of changing from polyethylene.
Spain	Strawberry runners	230.000	230.000	none	230.000		230.000		MBTOC recommends 230 tonnes for this use for 2007. The difficult growing conditions of high elevation nurseries in Spain substantially limit the feasibility of alternatives to control target pests in order to meet certification standards of strawberry runners. The	CUN provides data on the costs and net revenue of alternatives to MB, but not that of MB itself. CUN states that yields of alternatives are 14.6 to 17.1%

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									CUN states that there are no technically feasible alternatives available at this time. The Party has also indicated that a key potential future alternative (methyl iodide) has been withdrawn from consideration for EU registration at this time. The nomination is based on use of rates of 20g/m2 or less or LPBF films which MBTOC considers are appropriate to meet certification standards for this crop.	lower. CUN also argues that the adoption of LPBF is constrained by high costs.
United Kingdom	Aircraft	none	none	none	0.165		0.165		MBTOC recommends 0.165 tonnes MB for this use in 2007. The CUN requested MB to control rats and mice in large aircraft. The two alternatives used in neighbouring countries within the European Union, CO_2 and HCN, are not registered for aircraft in the UK. CO_2, when used to kill rodents, as opposed to insects, is fast and the applicant is encouraged to pursue registration. However, efficacious fumigations and aerations will require the use of fans and other mixing devices, similar to that required during methyl bromide fumigations as indicated in the CUN. The Party is asked to submit its cited report on economics of use of CO2 for aircraft to assist MBTOC's review. Members of the TEAP expressed concern that MB would be used in aircraft where flight safety may be jeopardized if MB deteriorates materials used in aircraft construction. Parties using MB on aircraft will want to consult with aircraft manufacturers and aviation safety authorities to verify whether such MB use is prudent.	CUN argues that the next best alternative (CO_2) is too high because of the large and unmanageable quantities as well as logistic constraints of application and distribution within all areas of the aircraft fuselage. In addition, the costs of disruption to airline operations must be accounted for, as an aircraft unserviceable on the ground costs £100-£750 per minute depending on aircraft type.
United Kingdom	Cereal Processing Plants	16.384	8.131	none	3.480		3.480		MBTOC recommends 3.480 tonnes for 2007. This amount represents a 57% reduction over the CUE for 2006. The CUN includes 5 companies that are part of the trade association for wheat, maize and rice processing. The Party is asked to clarify its reporting of measurement of gastightness in rice mills. Sulfuryl fluoride, the intended alternative was registered for these cereal food processors in December 2005. Several trials are in progress to adapt the treatment method for cereal processors and time is needed to continue this transition process.	CUN states that the immediate economic implications in the absence of MB for fumigation include increased production costs, increased down time and extra labour costs, with the ultimate risk of product and brand failure and unquantifiable economic loss due to lack of public confidence. On alternatives, CUN states that Hydrogen Cyanide, which was used before MB would be difficult and expensive to re-register, and uneconomic for a small potential market, while sulfuryl fluoride and heat

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
										treatment are from 2 to 3 times as expensive as MB. CUN also states that there is no economically viable system for the recapture of MB for use in buildings in the UK.
United Kingdom	Cheese	1.640	1.248	none	1.248		1.248		MBTOC recommends 1.248 tonnes for this use in 2007. The applicant has investigated diatomaceous earth which was unsuccessful, and ozone which caused taint. Work is continuing on UV light. At present MBTOC knows of no alternative treatment for control of mites in cheese stores when cheese is present. Further avenues of investigation for cheese stores might include peer-industry information exchange, reviews of pertinent literature, pest control through temperature manipulation and improvements in IPM approach and sanitation that will reduce infestation until the cheese can be removed from the store. Since there may be a lengthy requirement for the use of MB in cheese stores and since the stores are fairly gastight, the Party may wish to consider the use of recapture equipment to reduce emissions from this continued use.	CUN states there are no economically feasible alternatives based on lack of technically feasible alternatives. CUN presents no economic data or analysis.
United Kingdom	Commodities (Herbs & Spices)	0.035	0.037	none	0.030		0 NR		MBTOC does not recommend this use. In the instance of the occasional infestation that occurs with the small amount of spice and food products included in this CUN the Party is encouraged to use alternatives, such as freezing, steam treatments, irradiation or to use modified atmosphere treatments.	CUN states that phosphine or CO2 would cost 5 times and irradiation would cost 7 times as much as MB treatment, CUN notes losses would result from additional downtime when alternatives are used.
United Kingdom	Mills (consolidation of 13 mill CUNs)	30.750	10.195	none	4.509	none	4.509		MBTOC recommends 4.509 tonnes for flour mills in 2007. The Party provided 13 flour mill CUNs detailing specific information for the mills which are included in this consolidated response. The Party is asked to submit its cited document on risk assessment of heat treatment to assist MBTOC's review. The Party is in transition to sulfuryl fluoride, which has been registered for two years. The applicants have invested in extensive lab and field research to optimize the efficacy of sulfuryl fluoride for mills located in temperate and cool climates. As a result, the applicants have developed new application methods for a combined heat and sulfuryl fluoride treatment, but it has not yet been completed for all mill configurations. Although a rapid adoption rate has been proposed,	CUN states that, in addition to not being technically feasible, Sulfuryl Fluoride is at least 2.5 times the costs of MB. In addition, as the structural treatment has not yet reached commercialisation, the costs of heat treatment are unknown.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									some time is needed to efficiently transition to alternatives. Given the relatively low amount of MB requested by the Party, in the face of numerous mills that will require pest control, the Party might need to consider allocation strategies that reserve MB for those mills whose size, layout and design, age and/or location make transition most difficult. MBTOC's knowledge of sulfuryl fluoride and heat treatments indicate that more time is required to develop effective strategies to treat larger, more complex mills in locations with cooler temperatures because sometimes combination processes are required.	
United Kingdom	Mills,Food Processing (Biscuits)	2.525	1.787	none	0.479		0.479		MBTOC recommends 0.479 tonnes for 2007. This amount represents approximately a 70% reduction over 2006 use levels. The CUN includes one company, a manufacturer of rye bread crackers. Sulfuryl fluoride, the intended alternative, was registered for these cereal food processors in December 2005. Several trials are in progress to adapt the treatment method for cereal processors and time is needed to continue this transition process.	CUN states that, in addition to not being technically feasible, Sulfuryl Fluoride is at least 2.5 times the costs of MB. In addition, as the structural treatment has not yet reached commercialisation, the costs of heat treatment are unknown.
United Kingdom	Structures (Herbs & Spices)	4.728	1.872	none	0.908		0.908		MBTOC recommends 0.908 tonnes for 2007. This amount represents a 50% reduction over 2006 CUE. The CUN includes several companies in the association of spice processors. Sulfuryl fluoride, the intended alternative, was registered for spice processing facilities in December 2005. The companies have begun using heat and modified atmosphere treatments and improved IPM tools. Trials are in progress to adapt sulfuryl fluoride treatment methods for spice processors and time is needed to continue this transition process.	CUN states heat or SF treatment would cost 200% more than MB treatment.
United Kingdom	Structures (Whitworth)	1.1	0.880	none	0.257		0.257		MBTOC recommends 0.257 tonnes for 2007. This CUN includes the facility of one company which packs and stores numerous food commodities and raw materials. The nearly 70% reduction expected for 2007 over the amount granted by the Parties for 2006 reflects that this company uses other treatments for pest control and to avoid infestation. It may be possible to continue the advancements in the use of IPM tools to continue to avoid infestation, eliminating the requirement for MB in the near future.	CUN reports no economic data on alternatives. Party's response to EC states costs for SF would be up to 5 times the costs of methyl bromide.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
United States	Commodities	89.166	87.719	78.983		67.699		58.921 inc. 0.021 for research	This CUN includes walnuts, dried fruit, beans and dates. MBTOC recommends the 0.021 tonnes planned to support alternatives research for these commodities. MBTOC recommends 35.110 tonnes for walnuts in 2008, a 20% reduction from the nominated amount of 43.888 tonnes. MBTOC believes that the industry can transition at least 20% of its current methyl bromide use for walnuts to sulfuryl fluoride by harvest season 2008 (September to November). As MBTOC was conducting its final assessment, CODEX adopted and published MRLs for fluoride in tree nuts, and Germany, one of the major importers of California in-shell walnuts, approved the SF registration package which included the MRLs for fluoride in walnuts. The Party, in correspondence that preceded the CODEX and German announcements, indicated that if minimum residue levels for fluoride were to be published by CODEX and major importers, then that would allow for future transition to sulfuryl fluoride. Although there are difficulties segregating walnuts by country to which they will be exported, the industry is already making efforts to transition. Sulfuryl fluoride fumigations can be conducted in the same time frame as methyl bromide, an important factor since there is a pressing need for fast fumigation and rapid turnaround to reach the holiday market in Europe. That progress notwithstanding, the difficulties in segregating walnuts by importing countries and the challenges associated with switching the huge harvest to this relatively newly registered alternative will require some time. Currently, the dried fruit sector plans only a 7% reduction in 2008 over 2007 use levels, MBTOC recommends 17.410 tonnes for dried fruit for 2008. The new MRLs for fluoride may also allow greater transition for dried fruit, although the extent or rate of the transition cannot be quantified at this time. Given the transition rate for beans and dates and the likely transition rate for walnuts, MBTOC finds the planned transition rate for dried fruit to be inexplicably low. The Party could ensure that Decision IX/6 is more fully met by ensuring dried fruit sector only uses MB when short turn around or immediate treatment before holiday marketing is required and where sulfuryl fluoride can not be used. Beans and dates sectors have planned	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									reductions greater than 30% in 2008 over 2007 use levels. Accordingly, MBTOC can recommend 4.371 tonnes for beans and 2.009 tonnes for dates. Bean sector has investigated using cylinderized phosphine finding it useful for product in storage but too time consuming for the immediate post-harvest treatment before holiday marketing. The Party has indicated that part of its domestic regulatory process for methyl bromide allocation includes a review of transition rates when more is known about potential to adopt alternatives such as sulfuryl fluoride. Given the very recent news, the Party may receive industry comments concerning adoption rates which will impact its domestic methyl bromide allocation amounts. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives and why alternatives are not applicable in the circumstances of the US. Specifically, (1) sulfuryl fluoride, (2) decreased MB dosage rates either through logistics improvements that remove the need for vacuum treatment or reduced dosage rates for vacuum treatment, (3) improvements in storage and fumigation logistics to allow greater adoption of phosphine or propylene oxide, and (4) an improved transition rate for dried fruit.	
United States	Cocoa beans (NPMA subset)	61.519	55.367	64.082	none	53.256		53.188	MBTOC recommends 53.188 tonnes for this use in 2008. The CUN for cocoa beans is included in the US CUN titled NPMA, but MBTOC has disaggregated it. The Party has indicated it could achieve a 17% decrease over the amount granted by the Parties for this use in 2007 (resulting in 53.188 tonnes). Currently the Party indicates a need for two fumigations per year of the cocoa beans: the first fumigation upon import and a second fumigation immediately before shipment to the chocolate manufacturers. However, recent approvals for sulfuryl fluoride and research indicating SF does not cause end product quality problems, together with technical effectiveness of other registered treatments, leads MBTOC to believe it might soon be possible to replace the second fumigation before shipment to chocolate manufacturers. For the first fumigation, changed logistics or building alterations that may allow increased use of phosphine. In-transit treatments with	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									phosphine conducted at time of export from producing countries may be useful in reducing the need for the first fumigation (Watson et al, 2002). For the second fumigation, cylinderized phosphine or sulfuryl fluoride timed for weekend fumigation may prove sufficient either as a complete disinfestation or as a post-embryonic treatment; egg kill should not be a requirement if the chocolate manufacturers quickly use the cocoa beans shipped to them. Additionally, if low product temperature (< 20°C) is considered to be a deterrent to sulfuryl fluoride use, is it may be reasonable to expect use of SF or phosphine during summer months. In the case of delay of use of cocoa beans at chocolate manufacturers, temperature control in their storage bins would help ensure continuing pest-free status. Propylene oxide is also registered for use in cocoa beans, although suitable chambers would have to be installed. Carbon dioxide at high pressure is in use in other countries. IPM improvements such as enhanced cocoa inspection programs and methods could be investigated to determine if either or both the first or second fumigation could be avoided, especially during winter and possibly in other circumstances. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives used in other countries and why these alternatives are not applicable in the circumstances of the US. Specifically, (1) phosphine in registered formulations, (2) sulfuryl fluoride in a variety of methods described above, (3) improvements in IPM and inspection, (4) in-transit fumigation both bulk and in container, (5) fumigation in exporting country, (6) temperature manipulations, (7) propylene oxide, (8) carbon dioxide at high pressure, and (9) a combination of several of these.	
United States	NPMA food processing structures (cocoa beans removed)	83.344	69.118	82.771	none	71.690		69.208	MBTOC recommends 69.208 tonnes for food processing facilities included in this CUN. This CUN originally included cocoa beans, but MBTOC has disaggregated the CUN and comments on cocoa beans in another section. The amount recommended was determined based on the Party's report that it can achieve a 17% transition in 2008 over 2007 levels. However, MBTOC's recommendation was based on a	CUN states that the economic impacts cannot be assessed since the applicant is not the end-user. Economic impacts arise from three contributing factors: direct pest control costs increase because of increased labor time required for longer treatment

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									17% reduction from the amount granted by the Parties for 2007 for processed foods (62.153 tonnes) and herb and spice facilities (4.059 tonnes). MBTOC did not apply the transition rate to cheese stores (2.996 tonnes) because MBTOC knows of no alternative to control mites in cheese stores when cheese is present. The CUN reports that the absence of adopted maximum residue levels (MRL) for fluoride by the European Union restricts the wider adoption of sulfuryl fluoride by this Party's food processing facilities. Although MBTOC recommends 4.059 tonnes for herb and spice facilities, MBTOC does not find that the use of MB for herb and spice commodity to be consistent with Decision IX/6 since several alternatives are available and in widespread commercial use. The Party is requested to ensure herb and spice commodity are not included in facility fumigations using MB. Cheese stores are only treated with MB upon requirement of inspectors from United States Department of Agriculture in response to pest infestation. To ensure the requirements of Decision IX/6 are met, the Party should conduct research to find alternatives and/or methods to reduce infestation and the requirement to use MB. Further avenues of investigation for cheese stores might include peer-industry information exchange, reviews of pertinent literature, pest control through temperature manipulation and improvements in IPM and sanitation that will reduce infestation until the cheese can be removed from the store. Since there may be a lengthy requirement for the use of MB in cheese stores and since the stores are fairly gastight, the Party is encouraged to consider the use of recapture equipment to reduce emissions from this continued use. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives and why alternatives are not applicable in the circumstances of the US. Specifically, (1) heat treatments both full site and spot heat, (2) sulfuryl fluoride, (3) improvements in IPM and inspection leading to complete avoidance of MB use or decreased frequency of fumigation, (4) phosphine or phosphine combination treatments, and (5) a combination of several of these.	time and increased number of treatments; capital expenditures may be required to adopt phosphine for accelerated replacement of plant and equipment due to its corrosive nature; and additional production downtimes for the use of alternatives are unavoidable.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
United States	Mills and processors	483.000	461.758	401.889	none	362.952		348.237	MBTOC recommends 348.237 tonnes for this use in 2008. This CUN includes quantities requested for the following disaggregated sectors: rice mills, bakeries, pet foods and flour mills. For rice mills, 66.543 tonnes is recommended for 2008. This amount was calculated based on the amount of MB granted by the Parties for this sector in 2007 (64.150 tonnes), plus the amount determined by US government to have been removed in their error in 2007 (17 tonnes). This total (81.150 tonnes) was then decreased by a transition rate of 18% for the likely adoption to alternatives, as determined by USG. For flour milling, MBTOC recommends 240.765 tonnes MB for 2008. This amount represents a 12.3% reduction over 2007 levels, part of a continued downward trend in MB use. For bakeries MBTOC recommends 14.269 tonnes. This amount represents an approximate 40% decrease over the levels granted by the Parties in 2007, reflecting both adoption of alternatives and resolution of a facility design problem highlighted in the 2007 CUN. For pet foods, MBTOC recommends 26.660 tonnes which is a 32% decrease over the 2007 MB amount granted by the Parties. Sulfuryl fluoride was registered in 2005, and adoption of heat and phosphine treatments increased, which resulted in a decrease in MB use requested by the Party. In spite of these successes, the CUN states that, currently, 25% of pet food facilities, 28% of bakeries 42% of wheat mills and 10% of rice mills will not be able to transition to alternatives even after several years. The Party is encouraged to conduct and strengthen its research program and assist commercial adaptation of alternatives to ensure the requirements of Decision IX/6 are fully met for all sectors included in this CUN and to avoid these future requirements for MB. The Party has indicated it will reassess the quantity of MB to be permitted through domestic regulation if the circumstances of the nomination change. For example, as more experience is gained with sulfuryl fluoride and heat by 2008, it should be possible to decrease the need for MB in flour and rice milling to allow these sectors to more closely mirror decreases made in pet foods and bakeries. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									the technical effectiveness and economic feasibility of alternatives and why alternatives are not applicable in the circumstances of the US. Specifically, (1) heat treatments both full site and spot heat, (2) sulfuryl fluoride, (3) improvements in IPM and inspection leading to complete avoidance of MB use or decreased frequency of fumigation, (4) phosphine or phosphine combination treatments, and (5) a combination of several of these.	
United States	Smokehouse ham	67.907	40.854	18.998	none	19.669		19.669	MBTOC recommends the requested amount of 19.669 tonnes for this use in 2008. Although alternatives for this use are unknown to MBTOC, the onus rests on the Party to ensure use of methyl bromide is minimized as much as possible. The Party has begun a survey of facility gastightness in this sector; low facility gastightness is a major contributing factor to MB use by two of the applicants included in the CUN. However, two other applicants have already invested in improved facilities that reduce MB use. MBTOC expects that facilities operated by members of American Meat Association and National Country Ham Association will be required to improve gastightness as a condition of MB use by 2008. MBTOC notes that USDA has provided funds to enable the industry to initiate a research program, including investigating the effectiveness of sulfuryl fluoride and IPM, to control pests of ham. The Party is encouraged to conduct research to reduce dosage and emissions by improving gastightness to ensure the requirements of Decision IX/6. MBTOC also recommends research to investigate methods to avoid infestation and processing logistics to allow treatment by phosphine.	The industries that use methyl bromide are, in general, subject to limited pricing power, changing market conditions, and government regulations. Companies operate in a highly competitive global market with high sales volumes, low profit margins, and rapid turnover of inventories. In addition, producers' associations generally manage companies of this type, and, therefore, making new capital investment is often difficult.
United States	Cucurbits (field)	1187.800	747.839	592.891		588.949		473.211 inc. 0.941 for research	MBTOC recommends 473.211 tonnes for this use in 2008. This comprises 19.89 tonnes for Michigan, 452.380 tonnes for the South East and Georgia and 0.941 tonnes for research. Reductions in the nominated amounts conform to the standard presumptions for dosage rate of MB/Pic formulations of 17.5 g/m2 for nutsedge and 15 g/m2 for pathogens with adoption of LPBF and formulation changes of MB/Pic to achieve the reductions. Modifications of formulations, for example of e.g. MB/Pic 50:50 are available and versions of LPBF, (eg.VIF and metalized	Party reports that 2-stem grafted plug plants cost more than 125% of non-grafted plugs.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									films) have been widely tested since 2000 and have shown equivalent effectiveness to MB at approximately 50% of the commercial dosage rate.In Michigan, the key pests are Phytophthora capsici and Fusarium. MBTOC recognizes the Party's statement that 1,3-D + Pic may be an effective alternative but growers will miss the optimal market window due to longer plant back times. According to the Party, this treatment cannot be applied in autumn because of the bad climatic conditions. In addition, a fall application of a methyl bromide is not feasible because, over the fall and winter months deer and other animals damage the plastic and irrigation tape. In SE and Georgia, the key pest is nutsedge. Karst topography limits affects the use of alternatives which include 1,3-Dichloropropene, which are the best alternatives for these pests. The Party states that metam sodium or metam potassium are also promising alternatives but still do not provide consistent control under the circumstances of the nomination and require further trialling. In addition, the Party states that trials are underway to investigate lower MB/Pic formulations such as 50:50 as there are no regulatory restrictions to the use of these formulations. The Party has indicated that 32.5 to 34% of the nomination could transition to alternatives. The Party proposes a 4.7% transition by 2008 and have stated it will take more than 7 years to transition the full amount. If future nominations are submitted, MBTOC urges the party to provide specific data from trials on cucurbits to show the performance of suitable alternatives.	
United States	Eggplant (field)	76.712	81.162	85.363		79.546		47.582 inc. 0.444 for research	MBTOC recommends a reduced amount of 47.582 tonnes for this use in 2008. This comprises 2.880 tonnes for Michigan, 44.258 tonnes for Georgia and Florida and 0.444 tonnes for research. Reductions in the nominated amounts conform to the standard presumptions for dosage rate of MB/Pic formulations of 17.5 g/m2 for nutsedge and 15 g/m2 for pathogens with adoption of LPBF and formulation changes of MB/Pic and has been adjusted for strip fumigation. Modifications of formulations, for example 50:50 MB/Pic are available and versions of LPBF, (eg.VIF and metalized films) have been widely tested since 2000 and have shown equivalent effectiveness to MB	Party reports that 2-stem grafted plug plants cost more than 125% of non-grafted plugs.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									at approximately 50% of the commercial dosage rate. In addition, the Party states that trials are underway to investigate lower MB/Pic formulations such as 50:50 as there are no regulatory restrictions to the use of these formulations. In Michigan, the key pests are Phytophthora capsici and fusarium. MBTOC recognizes the Party's statement that 1,3-D/chloropicrin may be an effective alternative but growers will miss the optimal market window due to longer plant back times with this alternative. According to the party, this treatment cannot be applied in autumn because of climatic conditions. In addition, a fall application of methyl bromide is not feasible because over the fall and winter months deer and other animals damage the plastic and irrigation tape. In Florida, the key pests are yellow and purple nutsedge, Phytophthora, nematodes, Pythium and sclerotinia. In Georgia the key pests are yellow and purple nutsedge, Phytophthora, nematodes, southern blight and Pythium and sclerotinia. Karst topography limits the use of alternatives which include 1,3-Dichloropropene, which are the best alternatives for these pests on 40% of the growing acreage in Florida and 8% of the acreage in Georgia. The Party states that metam sodium or metam potassium are promising alternatives but still do not provide consistent control under the circumstances of the nomination and require further trialing. For Florida and Georgia, the majority of MBTOC (87% of members present) considers that 25% transition can occur by 2008 and has reduced the nomination accordingly. A minority considered that this transition rate was inappropriate. The Party acknowledged that (26%) of the total nomination can be transitioned to alternatives over time. The Party proposes a 4% transition in 2008 and has stated it will take more than 7 years to transition the full amount. MBTOC considers several alternatives available for the nomination, and that uptake of alternatives for this crop in regions with similar pests and climate has occurred within 4 years or less (eg Spain, Italy, Australia) (Leoni and Leda, 2004; Spotti, 2004; Tostovrsnik et al 2005;Minuto et al, 2003). MBTOC considers that there are technical alternatives for both karst and non-karst areas in Florida, Georgia and the southeast. In	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									tomato trials conducted in Florida on a key pest, nutsedge, 1,3-D/pic 65:35 with and without VIF MNa/Pic provided similar yields as MB/Pic 67:33 in 3 trials over the spring and fall of 2003 and spring of 2004 (Santos, et al, 2005) even with moderate to severe nutsedge infestations. In other studies involving commercial scale fields, similar control of pests and similar yields have been realized (refs).	
United States	Forest nursery	192.515	157.694	122.032		133.140		96.829	MBTOC recommends a reduced amount of 96.829t for this use in 2008. MBTOC has adjusted the rates to a uniform rate of 20 g/m2 to conform to the standard presumptions for dosage rate of MB/Pic formulations with adoption of LPBF and formulation changes of MB/Pic to achieve the reductions. Technologies are available to glue LPBF films on a broadacre basis (IPM Technologies, Rimini Pty Ltd). MBTOC recognizes that propagative material requires a very high level of soilborne pest and pathogen control in order to avoid widespread distribution of pests and pathogens. The Party has averaged a transition reduction in the amount nominated of 8% per year since 2006 nomination. Based on this, MBTOC has adjusted the recommended amount to account for 8% adoption of alternatives in 2008. The CUN is based on economic infeasibility of using substrates and the lack of effective alternatives for control of nutsedge and a range of fungal pathogens. It covers certified seedling production in 7 forest nursery regions. Research is ongoing to determine if Pic with metham sodium, 1,3-D alone or in combination with Pic and /or herbicides can provide acceptable control of moderate to severe levels of nutsedge (Muckensfuss, 2005, Wang, 2005, 2006). To date, metham sodium and chloropicrin in combination showed promising results, but when used without plastic sheeting caused severe crop injury. The Party acknowledged that this treatment (and others) when used in conjunction with LBPF barrier films, may provide an effective technical alternative and avoid crop injury. MBTOC also considers glyphosate can be used as a pretreatment to reduce pressure from nutgrass and 1,3-D/Pic + metham sodium (or glyphosate) should be further evaluated for control of nutsedge as results in trials have been promising (Fraedrich, 2005; Culpepper and Langston, 2004).	The CUN is based on economic infeasibility of using substrates and the lack of effective alternatives for control of nutsedge and a range of fungal pathogens. It covers certified seedling production in 7 forest nursery regions and one region in Michigan growing herbaceous perennials. Certification requires that seedlings must be pest/pathogen free. The Party states that all regions use broadacre fumigation, but with different mixtures and rates of MB/Pic. MBTOC recognizes that the key pest is nutsedge. Research is ongoing to determine if Pic with metham, 1,3-D and /or herbicides can provide acceptable control of moderate to severe levels of nutsedge. To date, metham sodium and chloropicrin in combination showed promising results, but when used without plastic sheeting caused severe crop injury. The Party acknowledged that this treatment (and others) when covered with plastic films, particularly LPF barrier films, may provide an effective technical alternative and avoid crop injury. MBTOC considers new films and glues are available for broadacre

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
										tarping under most conditions, however the Party will need time to trial and scale up this alternative. Although no further reductions have been made by MBTOC to the nomination, the Party is urged to consider adoption of LPF barrier films to reduce dosage rates in regions where their use is permitted. Broadacre use of LPF barrier films exists in other regions worldwide. MBTOC also considers glyphosate can be used as a pretreatment to reduce pressure from nutgrass and 1,3-D/Pic + metham sodium (or glyphosate) should be further evaluated for control of nutsedge as results in trials have been promising (Culpepper and Langston, 2004). The nomination states that containerised plants are not economically feasible for regions A through G. MBTOC considers substrates to be an effective technical alternative for most forest nurseries, however understands that present costs ($US0.12 vs. $0.04 per seedling) make this practice economically infeasible at the present time.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
United States	Nursery stock (fruit, nut, flower)	45.800	64.528	28.275		51.102		23.253 inc. 1.506 for research	MBTOC recommends 23.253 t for this use in 2008. This represents 1.998 t for roses, 11.289 t for fruit trees, 8.46 t for raspberries, and 1.506 t for research. MBTOC has adjusted the raspberry amount using MBTOC's standard rate of 20 g/m2 for propagative material to conform to the standard presumptions for dosage rate of MB/Pic formulations with adoption of LPBFand formulation changes to achieve the reductions. LPBF cannot be used with MB in California. MBTOC recognizes that propagative material requires a very high level of soilborne pest and pathogen control in order to avoid widespread distribution of pests and pathogens. This nomination is for propagation materials that needs to be certified as free of pests and diseases. Certification is mandatory for California and is voluntary in Washington. The crop has no value if it is not certified. MBTOC acknowledges the difficulty in protecting raspberry roots to 1.5m depths. MBTOC acknowledges that MB/Pic formulations 67:33 and 50:50 were used in other countries and urges the Party to consider these alternatives as a transition strategy to reduce MB dosage in the absence of effective alternatives. Further validation of their effectiveness is sought in future nominations. MBTOC has identified studies (McKenry, 1999) which indicate that 1,3-D at high rates (greater than 390 kg/ha) can be effective at controlling pests and killing old perennial roots up to 1.5m deep. Although, these high rates are not allowed by regulation in California, it appears that the high rates would be allowed in Washington. MBTOC has therefore reduced the amount of methyl bromide requested by raspberry nurseries to account for implementation of use of 1,3-D on 10% of the nominated area.	No economic data on alternatives given

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
United States	Orchard replant	706.176	527.600	405.400		405.666		365.094	MBTOC recommends a reduced amount of 365.09 tonnes for this use in 2008. This represents a 10% reduction of the nominated amount to account for adoption of the MB/Pic 67/33 formulation. Also MBTOC understand the limitation of 1,3-D/Pic use in this nomination. MBTOC considers this formulation effective against both fungal pathogens and nematodes. Commercial adoption of this formulation and others containing lower amounts of MB (eg 50:50) were used predominantly for orchard replant treatment in other countries before they switched to alternatives. Based on the Party response to questions, the use of MB formulations with a higher amount of Pic (e.g. MB/Pic 67:33) is an option where fungal pathogen cause replant disorder. According to Trout et al, 2003, chloropicrin has been found to have a positive effect in some replant syndrome in orchard situations and this product is now used routinely in New Zealand Orchard replant situations.	An economic analysis was not done for this sector because most of the losses cannot be quantified. Factors that contribute to losses include delayed planting, fallow, additional use of herbicides, tree loss, replant costs to replace tree losses, loss of trees replanted, yield loss of fruit or nuts, delayed achievement of full yield potential, earlier loss of productivity of whole orchard.
United States	Ornamentals	154.000	148.483	137.835		138.538		123.333 inc. 4.060 for research	MBTOC recommends a reduced amount of 123,333t for this use in 2008. This includes 62.68 t for California, 2.213 t for Michigan, 58.44 t for Florida, and 4.060 t for research. MBTOC adjusted the Michigan portion to conform to the standard presumptions for dosage rate of MB/Pic formulations with adoption of use/emission reduction techniques such as LPBF and formulation changes of MB/Pic to achieve the reductions and in California to standard dosage rates of 200kg/ha with standard polyethylene films. The Party states that high rates of 350 kg/Ha are necessary for controlling tubers in high organic (muck) soils in Florida and MBTOC requests studies demonstrating that lower doses will not achieve adequate control. The party has averaged a transition reduction in the amount nominated of 7.75% per year since 2006 nomination. Based on this, MBTOC has adjusted the nominated amount to account for 7.75% adoption of alternatives in 2008. This nomination is essentially 100% field grown ornamentals in California and Florida and Michigan nurseries. One of the key issues for California and Florida is cleaning fields of bulbs and tubers left from previous crops. The Party has identified 1,3 -D/Pic + herbicides or metham + Pic as potential alternatives (Gilreath et al, 1999; Elmore et	CUN reports yield losses of 20-25 percent with alternatives. Operating costs were assumed same as with methyl bromide. CUN reports substantial decreases in gross and net revenues. Negative net revenues predicted for calla lilies and bulbs in California and for caladiums in Florida. Alternatives for herbaceous perennials in Michigan show 3-5% decrease in yield.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									al. 2003; Gilreath et al., 2005b). The Party states that the nomination accounts for use of MB fumigation less than once per year where applicable. For any future CUN, MBTOC hopes to receive extensive, detailed research or commercial trial data evaluating the technical effectiveness and economic feasibility of alternatives and why alternatives are not applicable in the circumstances of this nomination.	
United States	Peppers (field)	1094.782	1243.542	1106.753		919.006		551.045 inc. 2.844 for research	MBTOC recommends a reduced amount of 551.045 tonnes for this nomination for this use in 2008. This comprises 10.62 t for Michigan, 57.724 t for the Southeast, 105.446 t for Georgia, 374.412 t for Florida and 2.844 tonnes for research for use in 2008. Reductions in the nominated amounts conform to the standard presumptions for dosage rate of MB/Pic formulations of 17.5 g/m2 for nutsedge and 15 g/m2 for pathogens with adoption of LPBF and formulation changes of MB/Pic and has been adjusted for strip fumigation. Modifications of formulations, for example of e.g. 50:50 MB/Pic, are available and versions of LPBF, (eg.VIF and metalized films) have been widely tested since 2000 and have shown equivalent effectiveness to MB at approximately 50% of the commercial dosage rate. In addition, the party states that trials are underway to investigate lower MB/Pic formulations such as 50:50 as there are no regulatory restrictions to the use of these formulations. In Michigan, the key pests are Phytophthora capsici and fusarium. MBTOC recognizes the Party's statement that 1,3-D/chloropicrin may be an effective alternative but growers will miss the optimal market window due to longer plant back times with this alternative. According to the Party, this treatment cannot be applied in autumn because of climatic conditions. In addition, a fall application of methyl bromide is not feasible because over the fall and winter months deer and other animals damage the plastic and irrigation tape. Phytophthora is controlled in many regions by foliar sprays and grafting. In Florida, the key pests are yellow and purple nutsedge, Phytophthora, nematodes, Pythium and sclerotinia. In Georgia the key pests are yellow and purple nutsedge, Phytophthora, nematodes, southern blight and Pythium and sclerotinia. In the southeast the key pests are	Party reports that 2-stem grafted plug plants cost more than 125% of non-grafted plugs.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									yellow and purple nutsedge, Phytophthora, Pythium and plant parasitic nematodes. Karst topography limits the use of alternatives which include 1,3-Dichloropropene, which are the best alternatives for these pests. The Party states that metam sodium or metam potassium are promising alternatives but still do not provide consistent control under the circumstances of the nomination and require further trialing. For the Southeast, Florida and Georgia, the majority of MBTOC (87% of members present) considers that a 25% transition can occur by 2008 and has reduced the nomination accordingly. A minority considered that this transition rate was inappropriate. The Party acknowledged that 32% of the total nomination can be transitioned to alternatives over time. The Party proposes a 4.6% transition in 2008 and have stated it will take more than 7 years to transition the full amount. MBTOC considers several alternatives available for the nomination, and that uptake of alternatives for this crop in regions with similar pests and climate has occurred within 4 years or less (eg Spain, Italy, Australia) (Spotti, 2004; Tostovrsnik et al 2005;Minuto et al, 2003). MBTOC considers that there are technical alternatives for both karst and non-karst areas in Florida, Georgia and the southeast. In tomato trials conducted in Florida on a key pest, nutsedge, 1,3-D/pic 65:35 with and without VIF MNa/Pic provided similar yields as MB/Pic 67:33 in 3 trials over the spring and fall of 2003 and spring of 2004 (Gilreath *et al,* 2004; Santos, et al, 2005) even with moderate to severe nutsedge infestations. In other studies involving commercial scale fields, similar control of pests and similar yields have been realized (Locascio et al, 2000, Nelson et al, 2002, Gilreath and Santos, 2004; Gilreath et al., 2005; Lacasa, 2006; Gilreath *et al*, 2006).	
United States	Strawberry (field)	2052.846	1730.778	1476.019		1604.669		1025.388 inc. 2.377 for research	MBTOC recommends a reduced amount of 1085.682 tonnes for this nomination for 2008. This comprises 897.917 t for California, 114.225 t for Florida, 71.163 t for Eastern states and 2.377 t for research. The nomination for California is based on regulatory constraints (township caps and county limits), hilly terrain preventing the use of drip-applied alternatives, missed market windows due to longer set-up or	Party reports detailed enterprise analysis for strawberry fruit production in California and eastern US. Based on the Party's predicted yield loss with the best alternatives, net revenue declines 62% in California and 42% in eastern US.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									treatment times, and lack of protocols for commercial application of alternatives. A large number of studies have shown that alternatives such as 1,3-D/Pic, Pic+metam, Pic and Pic+LPBF provide similar yields to MB in strawberry fruit production (Ajwa et al 2002, 2003, 2004, Haar et al. 2001, Gilreath, 2005ab; Nelson et al. 2001a,b; studies cited in TEAP May 2006 Special Report). By 2005 almost half (about 6000 ha) of the Californian strawberry fruit sector had adopted alternatives. The average adoption rate of alternatives has been 12% of the crop area/year since 2002 (about 1400 ha/year), and the Californian Strawberry Commision stated the current rate is 10-15% per year. Over a longer timeframe, since 1999, the adoption rate was 181 tonnes reduction per year average. MBTOC has calculated that this rate can continue for 2008 without exceeding the township and county restrictions on fumigants, and has therefore reduced the nomination to reflect this. Many growers have chosen to adopt alternatives despite the fact that supplies of MB are available, with the result that alternatives have been adopted by about 50% of the sector. On hilly terrain, injection or pressure-compensated drip systems can be used in a number of cases. LPBF/VIF is not allowed for MB in California at present, so MBTOC did not apply further reductions for this. In Eastern states the nomination request is based on a lack of protocols for alternatives, moderate to severe pest pressure affecting part of the crop area, and small farm buffer zones which limit use of 1,3-D in certain areas. MBTOC considers that alternatives are available for areas of moderate pest pressure (1,3-D/Pic, Pic+LPBF), and for buffer zones (Pic, Pic+LPBF, metham + Pic) (Ajwa et al. 2003, 2004; Gilreath, 2005ab). For the Southeast, the majority of MBTOC (87% of members present) considers that 25% transition can occur by 2008 and has reduced the nomination accordingly. A minority considered that this transition rate was inappropriate.The Party acknowledged that 33% of the total nomination can be transitioned to alternatives over time. The party estimates it may take 7 years to transition. However, adoption rates for alternatives have been significantly greater in comparable strawberry production regions.	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									MBTOC reduced the nomination to allow for uptake of alternatives on part of the area of low-moderate pest pressure. The standard dose rates (17.5 and 15 g/m2) were used to calculate the amount for the remaining area. The nomination request in Florida is based on a lack of protocols for commercial use of alternatives in 2008 for moderate to severe pest pressure (primarily nutsedge) which affects 37% of the area. However, parts of the CUN experience low to moderate pest pressure (on karst) where alternatives (e.g. pic+metam, pic+LPBF) provide yields that are statistically similar to MB (Fennimore et al. 2003, Gilreath et al 2003, Nelson et al 2002, Ajwa et al 2003, 2004; Gilreath 2005a, studies cited in TEAP May 2006 Special Report), therefore MBTOC reduced the nomination to allow for uptake of alternatives on part of the area of low-moderate pest pressure. The rate on the remaining area has been adjusted to the current MBTOC standard doses (17.5 and 15 g/m2). Recent studies on the economics of alternatives for strawberry production in California and southeastern US concluded that the net revenues from certain alternatives are not significantly below MB levels, and in some cases alternatives provide greater net revenues than MB (Goodhue & Fennimore; Sydorovych et al. 2006, 2004; Norman, 2005)	
United States	Strawberry runners	54.988	56.291	4.483		8.838		7.944 inc. 0.454 for research	MBTOC recommends 7.944 tonnes for this use in 2008. This comprises 4.69 tonnes for CA , 2.8 tonnes for SE and 0.454 tonnes for research. The CUN states that MB is required to meet the certification standards for strawberry runners. The Party's request exceeds MBTOC's standard presumption of 20 g/m2 of MB which is considered effective for production of 'high health' strawberry runners using LPBF and other emission control technologies (UNEP/TEAP October 2005); however, California's certification requirements specify minimum amounts of MB that must be applied. Furthermore, California regulations prohibit the use of LPBF. The Party indicates that key alternatives include 1,3-D + PIC, 1,3-D + PIC + MS, and 1,3-D + MS and Daz + Pic but that these have not been sufficiently developed to provide adequate disease and nematode control throughout the root zone (up to 1 m deep). In future nominations, the Party is requested to	Party notes that higher costs of LPBF may be offset by reduced fumigant costs because of reduced rates. It is noted that in the case of VIF films installation is slower leading to higher costs for this stage of production.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									provide supporting data to validate the impact of this on the disease levels observed on strawberry runners for MB and alternatives.	
United States	Sweet potato slips	0.000	80.830	0.000		18.144		0 NR	MBTOC does not recommend this nomination. MBTOC agrees with the Party that this nomination is for a contingency use of methyl bromide, in case the grower preferred alternative of 1,3-D is not available due to township caps.	No economic data on alternatives given. Factors that contribute to losses include delayed planting due to use of alternatives; fallow; additional use of herbicides; losses due to weeds, insects and diseases resulting in smaller, less attractive produce (quality loss)
United States	Tomatoes (field)	2876.046	2476.364	2065.246		1840.100		1076.508 inc. 2.844 for research	MBTOC recommends a reduced amount of 1076.508 tonnes for this use in 2008. This comprises 22,680 tonnes for Michigan, 87.74 t for Georgia, 281.795 for the SE, 681.449 for Florida and 2.844 tonnes for research. Reductions in the nominated amounts conform to the standard presumptions for dosage rate of MB/Pic formulations of 17.5 g/m2 for nutsedge and 15 g/m2 for pathogens with adoption of barrier films, LPBF, and formulation changes of MB/Pic and has been adjusted for strip fumigation. Modifications of formulations, for example 50:50 MB/Pic are available and versions of LPBF, (eg.VIF and metalized films) have been widely tested since 2000 and have shown equivalent effectiveness to MB at approximately 50% of the commercial dosage rate. In addition, the Party states that trials are underway to investigate lower MB/Pic formulations such as 50:50 as there are no regulatory restrictions to the use of these formulations. In Michigan, the key pests are Phytophthora capsici and fusarium. MBTOC recognizes the party's statement that 1,3-D/chloropicrin may be an effective alternative but growers will miss the optimal market window due to longer plant back times with this alternative. According to the Party, this treatment cannot be applied in autumn because of climatic conditions. In addition, a fall application of methyl bromide is not feasible because over the fall and winter months deer and other animals damage the plastic and irrigation tape. Phytophthora is controlled in many regions by foliar sprays and grafting. In Florida, the	Party notes that higher costs of LPBF may be offset by reduced fumigant costs because of reduced rates. It is noted that in the case of VIF films installation is slower leading to higher costs for this stage of production. Party reports that 2-stem grafted plug plants cost more than 125% of non-grafted plugs.

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
									key pests are yellow and purple nutsedge, Phytophthora, nematodes, Pythium and sclerotinia. In Georgia the key pests are yellow and purple nutsedge, Phytophthora, nematodes, southern blight and Pythium and sclerotinia. In the southeast the key pests are yellow and purple nutsedge, Phytophthora, Pythium and plant parasitic nematodes. Karst topography limits the use of alternatives which include 1,3-Dichloropropene, which are the best alternatives for these pests. The Party states that metam sodium or metam potassium are promising alternatives but still do not provide consistent control under the circumstances of the nomination and require further trialing. For the Southeast, Florida and Georgia, the majority of MBTOC (87% of members present) considers that 25% transition can occur by 2008 and has reduced the nomination accordingly. A minority considered that this transition rate was inappropriate. The Party acknowledged that 57% of the total nomination can be transitioned to alternatives over time. The Party proposes a 8.1% transition in 2008 and have stated it will take more than 7 years to transition the full amount. MBTOC considers several alternatives available for the nomination, and that uptake of alternatives for this crop in regions with similar pests and climate has occurred within 4 years or less (eg Spain, Italy, Australia) (Spotti, 2004; Tostovrsnik et al 2005;Minuto et al, 2003). MBTOC considers that there are technical alternatives for both karst and non-karst areas in Florida, Georgia and the southeast. In tomato trials conducted in Florida on a key pest, nutsedge, 1,3-D/pic 65:35, with and without, VIF MNa/Pic provided similar yields as MB/Pic 67:33 in 3 trials over the spring and fall of 2003 and spring of 2004 (Santos, et al, 2005) even with moderate to severe nutsedge infestations. In other studies involving commercial scale fields, similar control of pests and similar yields have been realized (Locascio et al, 2000, Nelson et al, 2002, Gilreath and Santos, 2004; Gilreath et al., 2005; Lacasa, 2006).	

Country	Industry	2005 approved	2006 approved	2007 approved	2007 new nomination	2008 nomination	2007 recommendation	2008 recommendation	MBTOC comments	MBTOC comments on economics
United States	Turfgrass	206.827	131.600	78.040		52.189		0 NR	MBTOC does not recommend MB for use in USA sod production. Effective alternatives have been found for 99% of all turf production and the Party has significantly reduced the nomination requests for this use from 207 t in 2005 to 78 t in 2007. Alternatives such as dazomet provide equal control of weedy grasses and slightly better control of broadleaf weeds when compared to MB, (Unruh et al., 2002). 1,3-D and 1,3-D + Chloropicrin can be used if nematodes are the primary pest, or possibly in conjunction with dazomet or metam-sodium. Metam-Sodium /Chloropicrin provided comparable control (vs. MB) of weedy grasses and nutsedge (e.g., Unruh and Brecke, 2001; Unruh et al., 2002).	CUN is for turf production intended to be sold as certified sod. CUN identifies dazomet as next best alternative to methyl bromide and states quality losses with dazomet would exclude much of production from certified market leading to substantial losses in gross and net revenue. CUN states price for non-certified sod is 75 percent lower than price for certified sod.

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3. MBTOC Work plan 2006, Budget 2007

3.1 Introduction

The Parties, at their Sixteenth Meeting, decided to adopt the elements related to procedures and terms of reference of the Methyl Bromide Technical Options Committee (MBTOC) related to the evaluation of nominations for critical uses of methyl bromide as set out in Annex I to the report of the Sixteenth Meeting of the Parties (16MOP) (Decision XVI/4).

Paragraph 15 of Annex I to the report of 16MOP states that an annual work plan should be drawn up by MBTOC (supported by the Ozone Secretariat) in consultation with TEAP and that MBTOC should submit it to the Meeting of the Parties each year.

In accordance with paragraph 15 of Annex I to the report of 16MOP, MBTOC has prepared its 2007 work plan in consultation with TEAP and with support of the Ozone Secretariat. The work plan is contained in section 3 of the current document for consideration by the Parties at their Eighteenth Meeting.

Paragraph 15 of Annex I to the report of 16MOP also specifies that a summary report of MBTOC activities over the previous year (paragraph 15(h)) should also be indicated in the MBTOC plan. In accordance with this requirement, the summary report is provided in section 4 of the current document.

3.2 Allocation of the Funds under Decision XVI/5

The Parties, at their Seventeenth Meeting, included in the approved Secretariat budget for 2006 a maximum amount of US$34,150, on an exceptional basis, to cover the costs of expert assistance to MBTOC as supplemental funding. Section 5 of the current document provides a detailed report on how the supplemental funds were allocated to MBTOC activities. The report on allocation of the funds was prepared in pursuance of the fundamental principle adopted by the Parties of ensuring transparency in the process of assessing critical use nominations.

3.3 MBTOC Work plan for 2007 - Details

Paragraph 1 of Annex I to the report of 16 MOP provides the schedule for the MBTOC assessment of critical-use exemptions. In accordance with the schedule, MBTOC envisages its activities in 2007 as set out in Table 1 below. The elements of the work plan as specified under paragraph 15 of Annex I to the report of 16MOP have been incorporated. The schedule of the work to be carried out by MBTOC on the MBTOC composition is also included. The list of current membership of MBTOC is contained in Annex I to the current document.

The work plan also includes an indicative budget for the activities in 2007, which are related to evaluation of CUNs. Although Parties had indicated in the 2006 approved budget that 2006 is the last year for providing supplemental funding to MBTOC, such financial assistance is needed to ensure the effective operation of MBTOC in continuing to carry out the evaluation of CUNs. In particular, some funding for non-Article 5 MBTOC members is strongly recommended; most non-Article 5 members do not have funding to attend meetings. As mentioned in the 2006 work plan of MBTOC contained in the Final CUN report of last year (Report of the Technology and Economic Assessment Panel, October 2005: Evaluation of 2005 Critical Use Nominations for Methyl Bromide and Related Matters, Final Report) the financial burden on individual members and/or their research institutions has become unsustainable due to the increased workload and number of meetings resulting from the CUN

process. In addition, the requirement for MBTOC reports to more clearly and completely reference the reasons for decision making under the circumstances of particular nominations strengthens the need for field trips to affected regions, for occasional consultation with experts on particular topics, for reports summarizing particularly complex issues, and to cover the costs of obtaining reference documents. The Parties may wish to consider these issues.

Table 10. MBTOC work plan and indicative budget

Tasks and actions	**Indicative budget needs where applicable**	**Indicative completion date**	**Dates of meetings**
Assessment of the CUNs			
1. Parties submit their nominations for critical-use exemptions to the Secretariat	-	24 January 2007	
2. The nominations are forwarded to MBTOC co-chairs for distribution to the subgroups of appointed members	-	7 February 2007	
3. Initial summarization of the nominations	-		
4. Nominations in full are assessed by the subgroups of appointed members. The initial findings of the subgroups, and any requests for additional information are forwarded to the MBTOC co-chairs for clearance	Funds for assistance in technical analysis, report preparation, field tours and reference docs (throughout the process as necessary): US$ 10,000		
5. MBTOC co-chairs forward the cleared advice on initial findings and may request additional information on to the nominating Party concerned and consult with the Party on the possible presumption therein	-	21 February 2007	
6. Nominating Party develops and submits its response to the MBTOC co-chairs	-	7 March	
7. MBTOC Meeting No 1 to assess nominations, including any additional information provided by the nominating Party prior to the MBTOC meeting under action 5 and any additional information provided by nominating Party through pre-arranged teleconference, or through meetings with national experts, in accordance with paragraph 3.4 of the terms of reference of TEAP	Funds for travel of 3 non-A5 members: US$10,000* Meeting Costs $6,000 (Non A5 Co-chairs funded separately)*	19-23 March	19 – 23 March, 2007, Torino, Italy
8. Field missions by selected MBTOC members to some key sites where methyl bromide is used as per nominations.	Funds for travel: US$6,000	18 or 24 March, 2007	
9. MBTOC provides its draft recommendations on the CUNs to TEAP		27 March, 2007	
10. TEAP Meeting: To assess the MBTOC report on critical-use nominations and submits the finalised interim report on recommendations and findings to the Secretariat.	Funds for travel of 1 non-A5 member: US$ 5,000* (Non A5 Co-Chairs funded separately)*		27 – 30 March, 2007, Rome, Italy
11. The Secretariat posts the finalised report on its web site and circulates it to the Parties	-	23 April, 2007	
12. OEWG Bilateral Discussions: Nominating Party has the opportunity to consult with MBTOC on a bilateral basis in conjunction with the Open-ended Working Group meetings			4-8 June 2007
13. The nominating Party submits further clarification for the critical-use nomination in the "unable to assess" category or if requested to do so by the Open-ended Working Group, and provides additional information should it wish to appeal against a critical-use nomination recommendation by MBTOC/TEAP	-	Early July 2007	

Tasks and actions	Indicative budget needs where applicable	Indicative completion date	Dates of meetings
14. MBTOC Meeting No 2: • reassess only those critical-use nominations in the "unable to assess" category, those where additional information has been submitted by the nominating Party and any critical-use nominations for which additional information has been requested by the Open-ended Working Group • finalise the report, including notice of any proposed new standard presumptions to be applied by MBTOC • conduct any bilateral consultations requested by Parties • draft work plan and budget for MBTOC for 2007	Funds for travel of 3 non-A5 members: US$12,000 Meeting costs: $US 6000. (Non A5 Co-Chairs funded separately)*	Mid July 2007	Tentative: 16 – 20 July, 2006, possible venue Brazil
15. MBTOC draft final report considered by TEAP, finalised and made available to Parties through the Secretariat	-	End July, 2007	
16. Nineteenth Meeting of the Parties			17-21 September 2007
Total budget:	**US$47,000.** **Meeting Costs $12,000 covered separately**		
Composition of MBTOC			
17. At the MBTOC meeting on the assessment of nominations, MBTOC will also update the list of members and their expertise and decide on missing expertise. The list and missing expertise to be submitted to the Secretariat.	Updated list attached separately	…….	
18. The Secretariat will update on its website the list of members and their expertise as well as the information on 'experts required for TEAP and its TOCs'.		……	

- The costs of the 2 non-Article 5 Co-Chairs are expected to be covered by support of Canada and the European Commission.

3.4 Summary Report of the Activities Carried out by MBTOC in 2006

- Initial summarization of the CUNs (initial sorting and recording carried out by the Secretariat).
- Preparation of questions for Parties.
- First meeting of MBTOC on the assessment of the CUNs – Dubrovnik, Croatia 3-8 April 2006. Interim recommendations and report prepared for the Parties.
- Welcomed new member from Spain, and departures of members from the Philippines, from Malaysia and from Italy
- Progress report drafting after the April meeting.
- TEAP meeting – Beijing, 23-28 April 2005.
- Issuance of the interim report for consideration by the OEWG as part of 2006 TEAP Progress report.
- Completion of the meta-analysis report and its review and endorsement by TEAP. Issuance of the report as a special report of TEAP.
- 26OEWG (Montreal, 3 – 6 July 2006). Bilateral meetings with Australia, Japan, European Commission, Spain, Poland, Italy, USA, US Food Processing and Agriculture Industry members.
- Second MBTOC meeting for evaluation of CUNs that had been classified as "Unable to assess" at previous meeting and preparation of MBTOC Assessment Report – Yokohama, Japan August 28 – September 2, 2006.

- Visit by 6 MBTOC members to Canadian pasta manufacturing facility to review pest control issues.
- Visits by 9 MBTOC members to Kumamoto ginger production sites on August 27 and by all MBTOC members to Ibaragi and Chiba strawberry and pepper production sites on August 30. To review the current production characteristics including alternatives, research and industry issues with these alternatives.
- Updated Matrix of MB alternatives for soils
- Preparation of the first draft of the MBTOC 2006 Assessment Report in accordance with decision XV/53 and pursuant to Article 6 of the Montreal Protocol. The report will be finalised by December 31st, 2006

3.5 Allocation of the Funds provided under the 2006 budget approved at the Seventeenth Meeting of the Parties

Parties decided to provide MBTOC with financial assistance on an exceptional basis for 2006 as supplemental funds for the maximum sum of $34,150. The funds were allocated for activities related to evaluation of critical use nominations as follows:

- Further work on the referencing, and presentation of data from the TEAP Special Report : US$16,000
- Yokohama meeting (MBTOC second meeting) organization: US$1,600
- Bus transport for the field trips in Japan (Ibaragi, Chiba and Kumamoto): US$2,000
- Dubrovnik meeting costs $5,977.50 (Funds supplied by UNEP)
- Financial support for 2 non-Article 5 experts for the Dubrovnik meeting (first MBTOC meeting): US $6,871
- Financial support for 2 non-Article 5 experts for the Yokohama field trip: US $2,533.
- Financial support for one non A5 MBTOC member to attend the Yokohama meeting: US $5,094.

TOTAL: US $34,098

Note: Field missions to food processing sites in the US were cancelled due to lack of funds.

The actual certified expenditure against the allocations will only become available after the closing of 2006 accounts in March 2007. This is a provisional report of information that has already been recorded in the UN integrated management information system (IMIS).

3.6 Management and Personnel Issues

Annex II lists MBTOC members, country, work affiliation and expertise. MBTOC members represent an impressive scope and depth of experience and ability; MBTOC has members from 24 countries. More than new members, MBTOC needs to have its members funded to attend meetings, and able to commit to contributing to the work of MBTOC outside of the meetings. Most members have been appointed by Parties, yet it is a constant struggle for many members to obtain sufficient funding to attend all MBTOC meetings, and even more so to be funded to spend the time necessary to accomplish the heavy workload.

The response of the Parties to MBTOC's indicative budget will, more than anything, clarify MBTOC's membership needs. Without funding to attend meetings, many current non-A5 MBTOC members will be unable to attend. If there is to be no change in the funding situation, MBTOC may need to replace several of its members; the loss of that many experienced members would threaten both the best completion of CUN decisions and the excellence of the Assessment report.

MBTOC continues to search for well-qualified members, particularly from Article 5 countries and countries with economies in transition (CEIT), with expertise in:

- Weed control, in crops that generate critical use nominations
- Replant disease

4. Recapture of methyl bromide – information provided under Decision XVII/11.

4.1 Introduction

The text of Decision XVII/11 reads:

> *"1. To encourage Parties who have deployed in the past, currently deploy or plan to deploy technologies to recapture/recycle/destroy or reduce methyl bromide emissions from fixed facilities or sea container fumigation applications to submit to the Technology and Economic Assessment Panel details of efficacy, including destruction and removal efficiency (DRE), logistical issues and the economic feasibility of such fumigations, by 1 April 2006;*
>
> *2. To encourage Parties to report on any harmful by-products created using such technologies;*
>
> *3. To adopt the form annexed to this decision for the purpose of submitting data;*
>
> *4. To include the findings of data submitted in the 2006 progress report of the Technology and Economic Assessment Panel and summarize Parties' positive and negative past experiences of recovery and destruction technologies;".*

Two Parties, Australia and the US, provided details of methyl bromide recapture and destruction systems in response to Decision XVII/11. The form referred to in Decision XVII/11(3) was used as requested to provide a summary of the data. The submissions are given in Annex 1 and 2 below.

Two other Parties, Belgium and Poland, gave information to MBTOC on recapture system under development. However, these were not in response to Decision XVII/11 and were not in a form suitable for inclusion in this report. Recapture, recycling and destruction systems will be specifically discussed in the MBTOC 2006 Assessment Report.

4.2 Background and definitions

Methyl bromide, a short-lived and potent ozone-depleting substance, is used in fumigations as a biocide. While it is subject to controls on production and consumption in Article 5(1) countries and has been subject to 100% phaseout in non-Article 5 countries since 2005, there continue to be some uses of the fumigant. These are the remaining uses in Article 5(1) countries, critical uses in non-Article 5 countries under Decision IX/6, and uses falling within the category of 'Quarantine and Pre-Shipment' (QPS) that are exempt from phaseout under Article 2H.

Most QPS and other postharvest uses are, or should be, carried out in well-sealed enclosures. At present, it is common practice to vent the residual methyl bromide to atmosphere. The proportion of the initial fumigant charge of methyl bromide remaining as methyl bromide varies widely with circumstances, environmental effects and the fumigated commodity. The Task force on Collection, Recovery and Storage (TEAP 2002) estimated that emissions of 9,300 – 11,535 tonnes of methyl bromide could be prevented, on the basis of 70% of methyl bromide being available for recapture on average from QPS and other commodity fumigations, based on 1998 data. The present situation with regard to amount of MB that is available to be captured and destroyed is not clear. MB use for post-harvest has declined significantly over the last few years in non A5 countries, but increased trade and quarantine

officials' emphasis on stopping the spread of exotic wood-destroying insect pests, such as ISPM 15, may have led to increased use of MB for QPS. The situation will only become clear when accurate numbers for QPS use are known.

For QPS treatments, Decisions VII/5(c) and XI/13(7) urge Parties to minimize use and emissions of methyl bromide through containment and recovery and recycling methodologies to the extent possible. At this point, there has been very limited adoption of recovery technologies for methyl bromide. Initially, recapture systems were installed in response to local air quality ordinances. In the absence of regulations, companies reported they would not invest in the systems, because their competitors would then have a cost advantage. Lately, some regions have begun requiring the use of recapture systems as a means of ozone protection as well as local air quality.

Technically, the recapture and destruction of methyl bromide from fumigations has similarities with the recapture and destruction of CFCs from foams. Both are dilute sources. Both suffer losses between their application or discharge from the concentrated supply to the time where recapture may be carried out in practice. In one key aspect recapture of used methyl bromide is much less difficult than recapture from used foams. Used methyl bromide is held in the sealed fumigation chamber ready for convenient recapture; used foams have to be gathered and transported to a recapture or destruction facility.

The efficiency of recapture/destruction can be described in several ways. For dilute methyl bromide sources, the same general concepts may be applied as for dilute CFC sources. These are the overall Destruction Efficiency (DE), the Recovery and Destruction Efficiency (RDE) and the Destruction and Removal Efficiency (DRE). Decision XVII/11 specifically requests information on DRE. These various measures of efficiency of destruction, and thus ozone protection, are defined (TEAP 2002, 2005) thus:

- Destruction Efficiency (DE) is determined by subtracting from the mass of a chemical fed into a destruction system during a specific period of time the mass of that chemical that is released in stack gases, fly ash, scrubber water, bottom ash, and any other system residues and expressing that difference as a percentage of the mass of the chemical fed into the system.

- Destruction and Removal Efficiency (DRE) has traditionally been determined by subtracting from the mass of a chemical fed into a destruction system during a specific period of time the mass of that chemical alone that is released in stack gases, and expressing that difference as a percentage of the mass of that chemical fed into the system.

- Recovery and Destruction Efficiency (RDE) is given by the quantity of the chemical destroyed in the destruction system as a percentage of that present in situ prior to the start of the destruction system. This measure includes losses in segregation, decommissioning, mechanical recovery and incineration or other destruction process.

With specific regard to methyl bromide from fumigation, the DRE is a measure of the recapture/destruction process itself, while the DE is a measure of the complete process. The DE includes losses from leakage and reaction on the commodity, as well as inefficiencies in removing the substance (methyl bromide) from the fumigation enclosure for input to the recapture/destruction system. Leakage losses will be emissions to the atmosphere and thus ODS emissions not controlled by a destruction process. These are typically regulated by best fumigation practice, including good sealing of the enclosure, good dosing procedures and minimizing recirculation pressures induced by recirculation fans.

4.3 Submissions under XVII/11

4.3.1 Summary of submissions

Two submissions were received under Decision XVII/11 – from Australia and from the US. Reformatted versions of these submissions are given in Annex 1 and 2 respectively.

The submission from Australia described commercial operation of a recapture/destruction system based on sorption on to activated carbon, followed by destruction of the sorbed methyl bromide using an aqueous thiosulphate wash. The submission from the US gave data for three systems: a carbon-based absorption system, a wet scrubber using thiosulphate and a zeolite-based sorption system. The carbon-based destruction system is in commercial use. After use at the fumigation site, the methyl bromide-loaded carbon is transported to a central site for incineration. The wet scrubbing destruction system is still under development, while the zeolite system is no longer in use, though several full-scale prototypes were constructed and tested. The zeolite system was specifically designed to allow recycling of recaptured methyl bromide – all others are destruction systems only, though in principle the carbon-based systems could be adapted to release sorbed methyl bromide for reuse.

A summary of the submissions is given in Table 1. Values as given or calculated from the submissions.

Table 11. Operating efficiencies and costs per kg of methyl bromide destroyed for systems submitted under Decision XVII/11 – summary.

Party	System	Operating principle	DRE (%)	DE (%)	Cost ($US/kg destroyed)	Projected cost ($US/kg destroyed) (a)
Australia	Nordiko Chamber	Carbon absorption (b)	>99.9	71-77	21-24	11-12
Australia	Nordiko Clip on	Carbon absorption (b)	>99.9	61-69	28-30	15-17
Australia	Nordiko Under Tarp	Carbon absorption (b)	>99.8	58-75	5.8-7.6	3.2-4.2
USA	MBECp	Carbon absorption (c)	95	94	31.84	-
USA	Value Recovery	Thiosulphate scrubbing	88	87	-	-

(a) Likely costs given for widespread adoption
(b) Subsequent MB destruction by thiosulphate wash with regeneration of the carbon
(c) Subsequent destruction by combustion of the MB-loaded carbon.

4.3.2 Comment on recapture and destruction performance

The DRE figures given in the submissions are all quite high (>88%). However the DREs for the carbon-based systems, at least, are based on the assumption that the destruction system used, thiosulphate washing or incineration, is 100% efficient and that there are no inadvertent losses during the destruction process. Measurements in support of this assumption were not supplied.

In the Australian system the calculated DE values are quite low, on average suggesting losses of about 30% of the methyl bromide prior to entry into the recapture/destruction system. The losses appear to be independent of the commodity treated and enclosure used, suggesting a systematic cause of this loss. This may need investigation to achieve overall better recapture

of applied methyl bromide, but does not influence the DRE of the recapture/destruction system itself.

None of the submissions described any toxic byproducts arising from the destruction processes.

4.4 Conclusion

The carbon-based recapture/destruction systems, described herein, have similar DREs, >95%, to the destruction processes for the only dilute source so far approved by the Parties. These are municipal waste incineration and rotary kiln incineration for CFCs from foams (Annex II, Report of 15MOP).

Subject to the constraints on good housekeeping and emissions set out in Annex III and IV of the Report of 15MOP, appropriately amended to take into account the special chemical and use features of methyl bromide, Parties may wish to consider adding carbon-based recapture/ destruction systems (thiosulphate washing or incineration) to the list of Approved Destruction Processes. A stipulation that the processes must achieve a DRE of >95% would be consistent with restrictions on Approved Destruction Processes for dilute ODS sources from foams.

Thiosulphate-based wet scrubbing is still under development and it may be appropriate to consider the process for Approved Destruction Processes status when it is routinely capable of giving a DRE of >95%.

4.5 References

TEAP 2002. Report of the Technology and Economic Assessment Panel. April 2002. Vol. 3. Report of the Task Force on Collection, Recovery and Storage and the Report of the Task Force on Destruction Technologies. UNEP: Nairobi.

TEAP 2005. Report of the Technology and Economic Assessment Panel. May 2005. Vol. 2. Report of the Task force on Foam End-of –Life Issues. UNEP: Nairobi.

TEAP 2006. Report of the Technology and Economic Assessment Panel. May 2006. Progress Report. UNEP: Nairobi.

Appendix I to Chapter 4: Submission of Australia under Decision XVII/11.

Introduction

Australia has employed methyl bromide recapture and destruction technologies at several locations in Australia.

The use of methyl bromide recapture and destruction technologies has been implemented because of occupational health and safety concerns associated with methyl bromide fumigation. As occupational health and safety is substantially regulated by Australia's States and Territories, the precise nature of control varies across Australia.

Two Australian States (Victoria and Tasmania) have mandated the use of methyl bromide recapture technology in some circumstances (particularly for container fumigations in dockyards) on occupational health and safety grounds.

This technology used in Australia gives significant productivity and economic benefits to users as it permits imported shipping containers to be turned around after fumigation much faster than would occur if the container was withheld to permit the methyl bromide to naturally dissipate to the atmosphere.

In Victoria, containers must be allowed to air for 24 hours after fumigation to ensure that the methyl bromide used to fumigate the container has time to dissipate to safe levels. In New South Wales, the requirement is for containers to be aired for six hours. Other Australian States and Territories generally require about six to 12 hours airing until fumigated containers may be handled. In contrast, extracting and destroying methyl bromide from containers after fumigation significantly reduces this time to around one hour.

The reduced turn around time means that importers can access their goods on the same day that the fumigation is concluded. It also means that fumigators can use the fumigation pad for a subsequent treatment much sooner when compared to a site that has a container airing.

Recapture technology also avoids the problem of fumigant pooling around containers well after a fumigation has been conducted. Incidences like this can have significant occupational health and safety impacts on dock workers.

These benefits provide an economic incentive for importers and fumigators to use recapture technology in preference to traditional fumigation where the methyl bromide is permitted to vent to the atmosphere.

The attached papers contain detailed information on the cost and amount of methyl bromide recaptured from fumigations using recapture and destruction technology.

Submission Form for Methyl Bromide Recapture

	Date of test	**January 2006**	**20 February 2006**	**21 February 2006**	**23 February 2006**
A	Recapture or destruction system used:	Nordiko Chamber	Nordiko Chamber	Nordiko Chamber	Nordiko Chamber
B	Location:	Raymond Terrace, NSW	Raymond Terrace, NSW	Raymond Terrace, NSW	Raymond Terrace, NSW
C	Submitting body	Nordiko	Nordiko	Nordiko	Nordiko
D	Commodity Treated	Timber	Timber	Timber	Timber
E	Fumigation contents and volume:	3.3 m3	3.4 m3	3.06 m3	3.06 m3
F	Chamber or tent volume:	38.2 m3	38.2 m3	38.2 m3	38.2 m3
G	Percentage loading of chamber:	9%	9.00%	8.00%	8.00%
H	Gas quantity retained by the recapture or destruction system:	1870.93 g	1772.1 g	1827.76 g	1916.15 g
I	Quantity lost during the fumigation by leakage or reaction:	629 g	727.5 g	671.5 g	582.36 g
J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system:	0.5 ppm	2.6 ppm	5 ppm	10 ppm
K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation):	0.5 ppm	2.6 ppm	5 ppm	10 ppm
L	Quantity of gas transiting the recapture/destruction system and lost by leaks in the system:	Negligible leaks	Negligible leaks	Negligible leaks	Negligible leaks
M	Measurement of gas exhausted after recapture stopped:	0.07 g	0.39 g	0.74 g	1.49 g
N	Total gas present in the fumigated system at start of recapture:	1871 g	1772.5 g	1828.5 g	1917.64 g
O	Net efficiency of recapture:	99.99%	99.97%	99.95%	99.92%
P	Cost per kg recaptured/destroyed (US$): See note below	(a) $22.52 (b) 11.26	(a) 21.99 (b) $10.99	(a) 23.06 (b) 11.53	(a) 23.78 (b) 11.89

	Date of test	13 January 2006	16 January 2006	17 January 2006
A	Recapture or destruction system used:	Nordiko Clip on	Nordiko Clip on	Nordiko Clip on
B	Location:	Tasmania	Tasmania	Tasmania
C	Submitting body	Nordiko	Nordiko	Nordiko
D	Commodity Treated	Yarn	Yarn	Yarn
E	Fumigation contents and volume:	30 m3	30 m3	30 m3
F	Chamber or tent volume:	33 m3	33 m3	33 m3
G	Percentage loading of chamber:	90%	9.00%	8.00%
H	Gas quantity retained by the recapture or destruction system:	1199.49 g	1249.23 g	1099.36 g
I	Quantity lost during the fumigation by leakage or reaction:	600 g	550 g	700 g
J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system:	4 ppm	6 ppm	5 ppm
K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation):	4 ppm	6 ppm	5 ppm
L	Quantity of gas transiting the recapture/destruction system and lost by leaks in the system:	Negligible leaks	Negligible leaks	Negligible leaks
M	Measurement of gas exhausted after recapture stopped:	0.51 g	0.77 g	0.64 g
N	Total gas present in the fumigated system at start of recapture:	1200 g	1250 g	1100 g
O	Net efficiency of recapture:	99.95%	99.93%	99.94%
P	Cost per kg recaptured/destroyed (US$): See note below	(a) 27.77 (b) 15.27	(a) 26.66 (b)14.67	(a) 30.30 (b) 16.66

	Date of test	2 January 2006	3 January 2006	4 January 2006	6January 2006
A	Recapture or destruction system used:	Nordiko Under Tarp	Nordiko Under Tarp	Nordiko Under Tarp	Nordiko Under Tarp
B	Location:	Tasmania	Tasmania	Tasmania	Tasmania
C	Submitting body	Nordiko	Nordiko	Nordiko	Nordiko
D	Commodity Treated	Hydro Equipment	Hydro Equipment	Hydro Equipment	Hydro Equipment
E	Fumigation contents and volume:	120 m3	120 m3	120 m3	120 m3
F	Chamber or tent volume:	134 m3	134 m3	134 m3	134 m3
G	Percentage loading of chamber:	89%	89%	89%	89%
H	Gas quantity retained by the recapture or destruction system:	4993.74 g	4595.83 g	5794.79 g	5995.3 g
I	Quantity lost during the fumigation by leakage or reaction:	3000 g	3400 g	2200 g	2000 g
J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system:	12 ppm	8 ppm	10 ppm	9 ppm
K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation):	12 ppm	8 ppm	10 ppm	9 ppm
L	Quantity of gas transiting the recapture/destruction system and lost by leaks in the system:	Negligible leaks	Negligible leaks	Negligible leaks	Negligible leaks
M	Measurement of gas exhausted after recapture stopped:	6.26 g	4.17 g	5.21 g	4.69 g
N	Total gas present in the fumigated system at start of recapture:	5000 g	4600 g	5800 g	6000 g
O	Net efficiency of recapture:	99.87%	99.90%	99.91%	99.92%
P	Cost per kg recaptured/destroyed (US$): See note below	(a) 6.96 (b) 3.83	(a) 7.56 (b) 4.16	(a) 6.00 (b) 3.30	(a) 5.79 (b) 3.18

Note: (a) = Actual present usage; (b) = Full utilization

N = Gas concentration (end of fumigation) x F

M=J x F

H=N – M - L

I = Gas injected - N

0= H x 100%/ N

K=J

Appendix II to Chapter 4: Submission of the United States of America under Decision XVII/11.

Voluntary submission of information on the efficacy, logistical issues, and the economic feasibility of technologies to recapture, recycle, destroy, or reduce methyl bromide emissions from fixed facilities or sea container fumigation applications.

Introduction

The United States is aware of three technologies that have been used to recapture/recycle/destroy methyl bromide from structural fumigations domestically. The first technology is currently used in a commercial setting and the second has undergone recent commercial-scale tests. The third technology is no longer in use. Best available data on the efficiency and cost of these technologies, as requested by Decision XVII/II of the 17th MOP, are only provided for commercially available technologies.

- .**Methyl Bromide Emission Control Process (MBECp)** - developed by USDA-ARS, GFK Consulting, and Great Lakes Chemical Corporation, this methyl bromide recovery system is currently commercially available from Great Lakes, but is in limited use,
- .**Phase Transfer Catalysis** - this recovery and destruction system is being developed by Value Recovery, Inc. and is not yet commercially available.
- **Bromosorb**® - this recovery and recycling system was developed by Knowzone Solution, Inc and Cryo-Line Supplies, Inc. and is no longer commercially available.

Decision XVII/11 forms

***Table I. Methyl Bromide Emission Control Process*:**
These performance data were originally reported at the 2005 Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions.

Information Requested			
A	Recapture or destruction system used	Methyl Bromide Emission Control process (MBECp)	
B	Location	Installed at Dallas/Fort Worth Airport in Texas, Well-Pict Berries in Watsonville, California, and Bush International Airport in Houston, Texas	
C	Submitting body. (please provide name and e-mail address of individual to be contacted in the event of a query)		
D	Commodity treated	Dallas/Fort Worth Airport: acorns, bell peppers, wood crates, herbs, flowers, pinecones, and ceramic tiles Well-Pict Berries : several varieties of berries fumigated	
E	Fumigation contents and volume	20.2m^{3} [a]	
F	Chamber or tent volume	161.8m^{3} [a]	
G	Percentage loading of the chamber	12%	
		Units	**Percentage of Total Quantity Applied (Where Appropriate)**
H	Gas quantity retained by the recapture or destruction system	2.14 kg	94%
I	Quantity lost during the fumigation by leakage or reaction	0.04 kg	2%
J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system	0.06 kg	3%

K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation)	0.04 kg [b]	2% [b]
L	Quantity of methyl bromide transiting the recapture/destruction system and lost by leaks in the system	2.13 kg	95%
M	Measurement of gas exhausted after recapture stopped	~ 500 ppm [c]	
N	Total gas present in the fumigated system at start of recapture	2.20 kg	98%
O	Net efficiency of recapture	95%	
P	Cost per kg recaptured/destroyed	$US31.84 per kg recovered	

[a] Knapp (2005) only reported the volume of free space surrounding 40,000 lbs of contents (141.6 m^3). The bulk density of 40,000 lbs of strawberries (900 kg/m^3) was used to estimate the content's volume, chamber volume, and "Percentage Loading of Chamber." Please note that these values are dependant upon the bulk density of the commodity.

[b] It was assumed that the commodity absorbs 2 % of the methyl bromide introduced into the chamber during fumigation (Knapp, 2005).

[c] Once the methyl bromide concentration reaches ~500 ppm, the MBECp system is bypassed and methyl bromide is released directly into the atmosphere. The chamber is aerated until the concentration reaches ~5 ppm. This results in the atmospheric release of 0.06 kg of methyl bromide, if 2.24 kg is applied during fumigation.

[d] It is assumed that the quantity of methyl bromide absorbed by the commodity is not released into the atmosphere.

Table 2. Phase Transfer Catalysis:
These performance data were provided by Value Recovery. Comments clarifying how each value was estimated are presented in Attachment B.

The testing conducted by Value Recovery involved the fumigation of solid wood packaging with 4.745 kg of methyl bromide introduced into a 76.46 m^3 chamber. As shown, the Value Recovery system is able to absorb and recapture 4.141 kg of the 4.745 kg of methyl bromide initially introduced into the chamber (about 87%). Approximately 0.577 kg of the methyl bromide applied is released into the atmosphere (about 12%) through leaks in the fumigation and recapture systems and venting of any residual gas left. in the fumigation chamber after recapture stops. The net efficiency of recapture is estimated to be 88%, where net efficiency is equal to the amount of methyl bromide captured by the MBECp system divided by the total amount of methyl bromide remaining in the fumigation system at the start of recapture.

Although the purveyor of this scrubber system was able to share cost estimates with the U.S., the Party had no means to verify this information as the technology is not yet commercially available.

Information Requested			
A	Recapture or destruction system used	Methyl Bromide Scrubber System	
B	Location	Value Recovery, Inc. is located in Bridgeport, NJ	
C	Submitting body. (please provide name and e-mail address of individual to be contacted in the event of a query)		
D	Commodity treated	Solid Wood Packaging	
E	Fumigation contents and volume	22.94m^3	
F	Chamber or tent volume	76.46 m^3	
G	Percentage loading of the chamber	30%	
		Units	**Percentage of Total Quantity Applied (Where Appropriate)**
H	Gas quantity retained by the recapture or destruction system	4.141 kg	874%
I	Quantity lost during the fumigation by leakage or reaction	0.046 kg	1%

J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system	0.106 Kg	2%
K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation)	0.027 kg [a]	1% [a]
L	Quantity of methyl bromide transiting the recapture/destruction system and lost by leaks in the system	4.566 kg	96%
M	Measurement of gas exhausted after recapture stopped	240 ppm	
N	Total gas present in the fumigated system at start of recapture	4.566 kg	98%
O	Net efficiency of recapture	88% [b]	
P	Cost per kg recaptured/destroyed	Not yet in commercial use	

a It is assumed that the quantity of methyl bromide absorbed by the commodity is not released into the atmosphere.

b. This estimate of net efficiency is calculated by dividing the total amount of methyl bromide retained by the MBECp system by the total amount of methyl bromide remaining in the fumigation system at the start of recapture. Two different interpretations of net efficiency were provided by Value Recovery, Inc., and are presented in Table 3 of Attachment B.

Background on the Technologies

Methyl Bromide Emission Control Process (MBECp)

The Methyl Bromide Emission Control process (MBECp) was developed and tested under a Cooperative Research and Development Agreement with USDA-ARS) Great Lakes Chemical Corporation) and GFK Consulting, and is currently commercially available. The system uses coconut-based activated carbon) which can be loaded with I pound of methyl bromide per 5-10 pounds of carbon) to remove methyl bromide during the end-of-treatment venting from commodity fumigations (ARS, 2001).

During fumigation, a container holding the commodity is placed in the fumigation chamber and covered with a tarp. Methyl bromide is then introduced into the chamber to eliminate pests. After the fumigation period, the methyl bromide recovery process begins by aerating the chamber and directing the chamber's air through the MBECp system to collect the methyl bromide. The system continues to operate until the concentration of methyl bromide in tile chamber is reduced to ~500 ppm. At this concentration, the system is less efficient at absorbing methyl bromide, thus the air in the chamber is directly vented into the atmosphere until it reaches -5ppm methyl bromide (Knapp, 2005).

Once the activated carbon can no longer absorb additional methyl bromide, it must be transported to a carbon regeneration facility where the absorbed methyl bromide is recovered and the carbon is reactivated. The recovered methyl bromide is then decomposed into elemental bromide (Br2) (Knapp, 2005).

A series of tests have been conducted to determine the efficiency and feasibility of the MBECp system. These tests were held at the ports of San Pedro, CA, Newark, NJ, Philadelphia, P A, and Wilmington, DE and at the processing plant of Well-Pict Berries in WatsonvilIe, CA. Fumigated commodities included kiwis, brassware, botanicals, lemons, yams, and strawberries (Knapp et al, 1998). In these tests, initial methyl bromide concentration ranged between 7,000 ppm and 12,000 ppm. With the MBECp systems in place, the concentration of methyl bromide that was discharged directly to the atmosphere was reduced to 500 ppm. Thus, use of the MBECp system reduced the maximum methyl bromide mass emission rate by 93-96%, thereby decreasing the environmental concentration of methyl bromide in the vicinity of the fumigation site. fu addition to the mass emission rate, the overall amount of methyl bromide entering the environment was also reduced significantly (Knapp, McCallister, and Leesch 1998).

The first operational MBECp system was installed at the International Perishable Treatment Center in the Dallas/Fort Worth (DFW) Airport in Dallas, Texas, to improve the rate of cargo traffic for South American import products, such as cut flowers (ARS, 2001 and Great Lakes Corporation, 1999). Local air regulations prohibit the release of more than 1.11bs of methyl bromide per hour, so a system was needed to recapture methyl bromide released during fumigation. The DFW system is designed to recover methyl bromide from an enclosure of up to 4,500 ft^3 in 30 minutes (Great Lakes Corporation, 1999).

Since the installation at DFW Airport, the MBECp system has been installed at a Well-Pict Berries facility in Watsonville, California, and at Bush International, Airport in Houston, Texas. Well-Pict Berries uses the system to recover methyl bromide after the fumigation of berries; their installation is a relatively simple version of the MBECp systems-it consists of an adsorber and a suction fan that keeps the whole system under a slight negative pressure for safety reasons, The system installed in Bush International Airport is part of a new state-of-the-art treatment facility, and includes many additional features, such as redundant adsorbers, redundant blowers, continuous methyl bromide monitors, plus a data acquisition system (Knapp 2005). This system was installed in 2005 for applications similar to the facility at DFW, but has not yet begun methyl bromide recovery operations (McCallister, 2006 and Russell, 2006).

Phase Transfer Catalysis

Under a Phase I Small Business Innovative Research grant from the USDA, awarded in 2005, Value Recovery, Inc. is currently developing a methyl bromide recovery and destruction technology called Phase Transfer Catalysis.(PTC). This scrubbing system is able to convert (and thus destroy) methyl bromide (and other alkyl and acyl halides) into a benign salt using ammonium thiosulfate. The process takes place at low temperatures (~50°C), which prevent the formation of ozone depleting free radicals that can be associated with high temperature incineration processes (Value Recovery, Inc., 2006).

Figure 2 in Attachment C shows a visual depiction of the PTC process for recovery and destruction of methyl bromide. The portable scrubbing system consists of a forced air blower and a scrubber tank. During the recovery/destruction process, a ventilation fan directs fresh air into the fumigation chamber, which the forced air blower then redirects through the scrubber tank. In the scrubber tank, methyl bromide is destroyed, using ammonium thiosulfate to transform methyl bromide into ammonium methylthiosulfate (a benign salt) and ammonium bromide. The system uses infra-red analyzers to closely monitor inlet and outlet concentrations of methyl bromide (Value Recovery, Inc., 2006).

Testing data collected thus far indicate that the scrubber system can remove more than 85% of the methyl bromide in a single pass and more than 99% when a modified, multiple pass system is used. However, there may be practical and logistical constraints to the multiple pass system. A successful commercial-scale demonstration at the Port of Wilmington, Delaware recently took place using the single pass through method. In that demonstration, 87% of the methyl bromide that would have been vented into the atmosphere was destroyed (Value Recovery, Inc., 2005a). This company is investigating methods to recover more than 95% of the methyl bromide in a single pass and is also examining the potential to recover methyl bromide from soil fumigations using their scrubber system (Value Recovery, Inc., 2005b).

In addition to developing the recovery/destruction system, Value Recovery has conducted research on converting dilute aqueous waste into useful commercial products (Bielski and Joyce, 2003). In particular, testing undertaken by Value Recovery has shown that reacting methyl bromide with sodium phenolate can produce a 95% yield of anisole. Therefore, if destroyed methyl bromide can be converted to a valuable end- product, such as anisole, there may be an economic incentive associated with the use of the PTC technology to recover methyl bromide (Value Recovery, Inc. 2006).

Bromosorb®

Bromosorb® was originally developed Knowzone, Inc. and Cryo-Line Supplies, Inc., but is no longer commercially available (Cryo-Line Supplies, Inc., 2006). The system used an absorbent material called Halozite®, which removed methyl bromide as air circulated through the unit. Since Halozite® has a greater absorbent capacity than carbon, the system was able to recover methyl bromide at concentrations below 500 ppm. The Bromosorb® system was able to recapture approximately 95% of the methyl bromide normally released into the atmosphere after fumigation. In addition, the unique chemical properties of Halozite® allowed recovered methyl bromide to be recycled for future fumigations (ARS, 1997).

Initial tests on the efficiency of the Bromosorb® system were conducted in a Chilean fruit processing plant (ARS, 1997). This testing included four empty chamber fumigations and a single fumigation with a pallet of fruit. In the four empty chamber test runs, Bromosorb® was able to reduce the concentration of methyl bromide in the chamber by 95.5%. In a fifth run, the methyl bromide concentration was reduced by 94%. The tests were conducted in a chamber with one pallet of fruit, which did not generate sufficient water vapor or volatile compounds to determine whether the methyl bromide recovered contained unacceptable contaminants. During each run, there was a loss of around 1..6 kg of methyl bromide, which was most likely due to leaks in the connection between the chamber and recovery unit (ARS, 1997).

Additional testing was conducted by Metbro Technologies and Cryo-Line Supplies at a ship hold at a port facility in Canada. The ship hold's concentration of methyl bromide was reduced from 22,000 ppm to 390 ppm (99.99% reduction). When the methyl bromide concentration reached 390 ppm, methyl bromide was detected in the systems exhaust, indicating that collectors were full (Weightman, 1999).

In the early 1990s, Halozone installed a Bromosorb® system in the Port of San Diego, California, in response to public health concerns about the concentration of methyl bromide in neighborhoods adjacent to the fumigation facility (Allen, 1994). The system was later removed because the methyl bromide recovered by the system and recycled could not meet purity standards (Cryo-Line Supplies, Inc., 2006). In addition, the system experienced technical problems. The recycled gas was highly corrosive due to the introduction of water vapor which reacted with the methyl bromide to produce hydrobromic acid in the recycled material (Sansone, 2006). In 1997, the Port of San Diego stopped fumigating with methyl bromide entirely, at least in part as a result of public pressure stemming from concerns about local air quality (Ross and Walker, 1998; NRDC, 2004; Rowe, 2002).

Bromosorb® is no longer commercially available; however, the same technology is used to recover refrigerants. It is unlikely that Bromosorb® will be commercially available in the United States in the future, since no companies are currently involved in its distribution or future development. In addition, apart from Cryo-Line Supplies, the other companies that were initially involved with the development and distribution of the system are no longer in operation (Cryo-Line Supplies, Inc., 2006).

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Attachment A: Interpretation of the Information Requested by Decision XVII/II

Table 1: Interpretation of Information Requested by Decision XVII/I1 of the 17th MOP

	Data requested by 17th MOP	Interpretation
A	Recapture or destruction system used	Name of system
B	Location	Location of installed systems or vendor
C	Submitting body. (please provide name and e-mail address of individual to be contacted in the event of a query)	Point of Contact Party
D	Commodity treated	Commodity treated in fumigation chamber
E	Fumigation contents and volume	Volume of commodity treated in fumigation chamber
F	Chamber or tent volume	Volume of fumigation chamber
G	Percentage loading of the chamber	Volume of Commodity as a percent of the Volume of the fumigation Chamber
H	Gas quantity retained by the recapture or destruction system	Methyl bromide recaptured/destroyed by system
I	Quantity lost during the fumigation by leakage or reaction	Methyl bromide lost during fumigation from the fumigation chamber
J	Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system	Methyl bromide left in fumigation chamber at the end of the recapture/destruction period
K	Remaining sorbed gas (taking into account any gas naturally present prior to fumigation)	Methyl bromide absorbed by the commodity being fumigated
L	Quantity of methyl bromide transiting the recapture/destruction system and lost by leaks in the system	Methyl bromide recaptured/destroyed plus methyl bromide lost by leaks in the recapture/destruction system
M	Measurement of gas exhausted after recapture stopped	Concentration of methyl bromide in fumigation chamber after the recapture/destruction period
N	Total gas present in the fumigated system at start of recapture	Quantity of methyl bromide in fumigation chamber after fumigation, but before recapture/destruction (i.e., amount of methyl bromide initially introduced to fumigation chamber minus amount absorbed by the commodity minus quantity lost during the fumigation by leakage or reaction)
O	Net efficiency of recapture	Methyl bromide retained by recapture system divided by methyl bromide present in the fumigated system at start of recapture
P	Cost per kg recaptured/destroyed	Cost of recapturing or destroying methyl bromide per kg

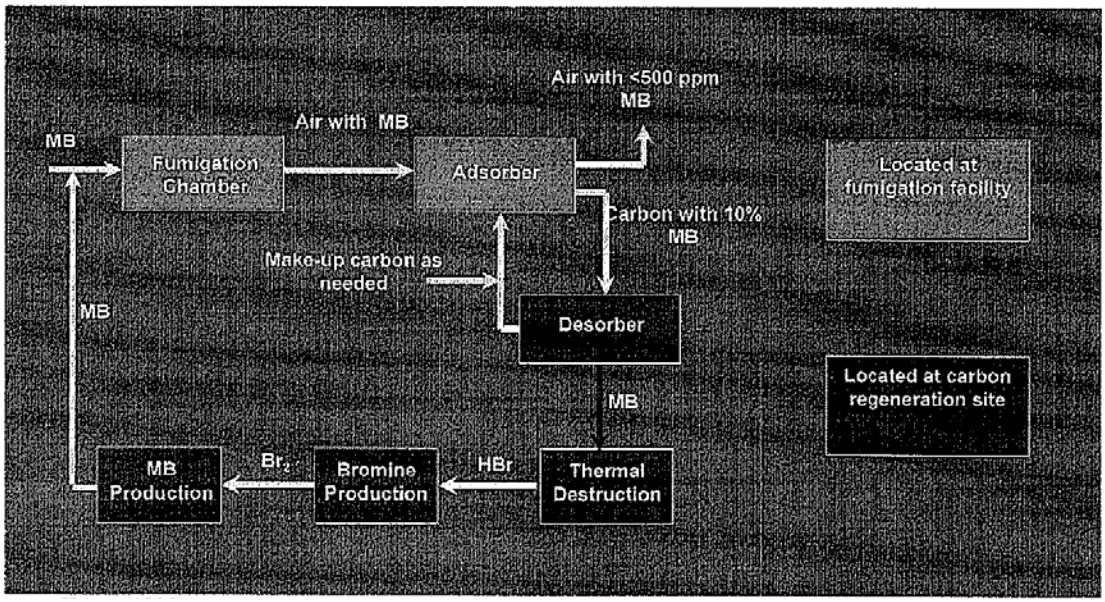
Attachment B: Performance Data and Schematic of the MBECp Methyl Bromide Recovery System

Table 2: Performance Data for the MBECp System

Volume of Enclosure Containing Commodity	141.5 m^3
Mass of Methyl bromide Applied During Fumigation	9.1 kg
Mass Absorbed by MBECp System	7.0
Mass retained by Commodity	0.2
Mass Released into Atmosphere	1.9
Leakage through Tarp	0.5
Bypass through System at end of MB Recovery	1.5
MB Concentration of System Exhaust at End of MB Recovery	500 ppm
Final MB Concentration in Enclosure after MB Recovery and Aeration	5 ppm

Source: Knapp, 2005
Note: Totals may not sum due to rounding.

Figure 1: MBECp System Schematic



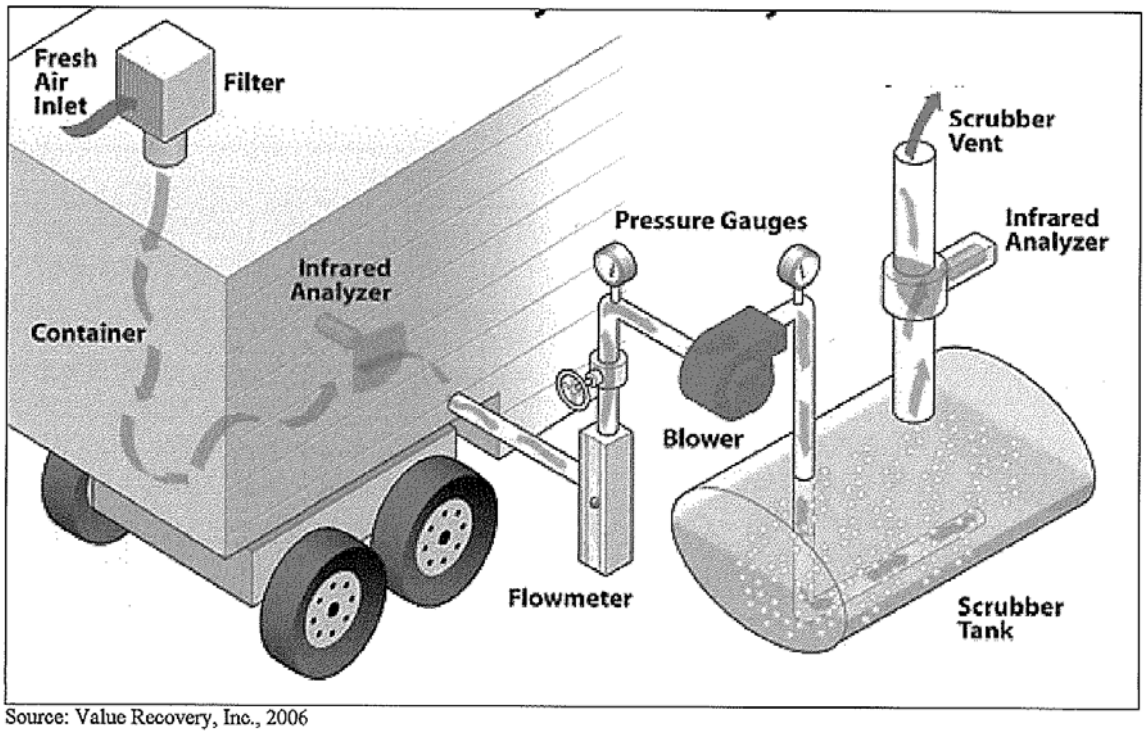
Attachment C: Performance Data and Schematic of the Value Recovery, Inc. Methyl Bromide Scrubber

Table 3: Performance Date on the Methyl Bromide Scrubber and Comments Provided by Value Recovery, Inc.

Data Requested by 17th MOP	Value Recovery, Inc. Answer	Comments
Commodity treated	Solid Wood Packaging	Machinery export under ISPM-15
Fumigation contents and volume	22.94 m3	Assumed contents inside container
Chamber or tent volume	76.46 m3	Total container volume
Percentage loading of the chamber	30%	Assumed volume displacement of contents
Gas quantity retained by the recapture or destruction system	4.141 kg	Total amount destroyed in scrubber
Quantity lost during the fumigation by leakage or reaction	0.046kg	Estimated 1% Loss due to leakage. Zero ppm measured at 10m, 50m and 100m distance from the equipment.
Residual free gas left in the enclosure after extraction of methyl bromide into the recapture system	0.106 kg	Derived from concentration profile and exhaust gas rate = Volumetric flow rate x concentration
Remaining sorbed gas (taking into account any gas naturally present prior to fumigation)	0.027 kg	Estimate based on free concentrations
Quantity of methyl bromide transiting the recapture/destruction system and lost by leaks in the system	4.566 kg	Total amount of methyl bromide removed from container
Measurement of gas exhausted after recapture stopped	240 ppm	Measured concentration at end of scrubbing cycle
Total gas present in the fumigated system at start of recapture	4.745 kg	Transiting plus sorbed plus residual plus lost
Net efficiency of recapture Scrubber Efficiency	87.3%	Total Destroyed/ Total Present
	90.7%	Total Destroyed/ Total through VR System
Cost per kg recaptured/destroyed (US$)		Operating Cost plus Capital Cost (Operating Cost includes waste disposal cost obtained from vendor quotation)

Source: Joyce and Bielski, 2006

Figure 2: System Schematic of the Value Recovery Methyl Bromide Scrubber



Source: Value Recovery, Inc., 2006

ANNEX I

Decision IX/6

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

(a) That a use of methyl bromide should qualify as "critical" only if the nominating Party determines that:

(i) The specific use is critical because the lack of availability of methyl bromide for that use would result in a significant market disruption; and

(ii) There are no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination;

(b) That production and consumption, if any, of methyl bromide for critical uses should be permitted only if:

(i) All technically and economically feasible steps have been taken to minimise the critical use and any associated emission of methyl bromide;

(ii) Methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide, also bearing in mind the developing countries' need for methyl bromide;

(iii) It is demonstrated that an appropriate effort is being made to evaluate, commercialise and secure national regulatory approval of alternatives and substitutes, taking into consideration the circumstances of the particular nomination and the special needs of Article 5 Parties, including lack of financial and expert resources, institutional capacity, and information. Non-Article 5 Parties must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes. Article 5 Parties must demonstrate that feasible alternatives shall be adopted as soon as they are confirmed as suitable to the Party's specific conditions and/or that they have applied to the Multilateral Fund or other sources for assistance in identifying, evaluating, adapting and demonstrating such options;

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

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

Para. 2 of Decision IX/6 does not assign TEAP the responsibility for determining the existence of "significant market disruption" specified in paragraph 1(a)(i).
TEAP assigned its Methyl Bromide Technical Options Committee (MBTOC) to determine whether there are *no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination*, and to address the criteria listed in Decision IX/6 1(b).

ANNEX II

Report of the Sixteenth Meeting of the Parties to the Montreal Protocol (Annex I), Prague, 22–26 November 2004), paragraph 15.

(Decision XVI/4. Review of the working procedures and terms of reference of the Methyl Bromide Technical Options Committee)

"15. An annual work plan will enhance the transparency of, and insight in, the operations of MBTOC. Such a plan should indicate, among other things:

(a) Key events for a given year;

(b) Envisaged meeting dates of MBTOC, including the stage in the nomination and evaluation process to which the respective meetings relate;

(c) Tasks to be accomplished at each meeting, including appropriate delegation of such tasks;

(d) Timing of interim and final reports;

(e) Clear references to the timelines relating to nominations;

(f) Information related to financial needs, while noting that financial considerations would still be reviewed solely in the context of the review of the Secretariat's budget;

(g) Changes in the composition of MBTOC, pursuant to the criteria for selection;

(h) Summary report of MBTOC activities over the previous year, including matters that MBTOC did not manage to complete, the reasons for this and plans to address these unfinished matters;

(i) Matrix with existing and needed skills and expertise; and

(j) Any new or revised standards or presumptions that MBTOC seeks to apply in its future assessment of critical-use nominations, for approval by the Meeting of the Parties. "

ANNEX III: List of methyl bromide critical uses for soils or commodities: amounts nominated (2005 – 2008) and exempted by Parties or recommended for exemption by TEAP/MBTOC (2005 – 2008).

A. Preplant Soils Applications

Party	Industry	TOTAL CUN MB Nominated				Total CUE MB Approved or Recommended by TEAP/MBTOC			
		2005	2006	2007	2008	2005	2006	2007	2008
Australia	Cut Flowers field	40.000	22.350			18.375	22.350		
Australia	Cut flowers - protected	20.000				10.425			
Australia	Cut flowers, bulbs – protected Vic	7.000	7.000	6.170	6.150	7.000	7.000	3.598	3.500
Australia	Strawberry Fruit	90.000				67.000			
Australia	Strawberry runners	35.750	37.500	35.750	35.750	35.750	37.500	35.75	
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		
Belgium	Strawberry runners	3.400	0.900			3.400	0.900		
Belgium	Tomato (protected)	17.170	4.500			5.700	4.500		
Belgium	Tree nursery	0.230	0.155			0.230	0.155		
Canada	Strawberry runners (PEI)	14.792	6.840	7.995	7.462	(a)14.792	6.840	7.995	7.462
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	Incl in.tomato cun	27.500	6.000			27.500	6.000	

France	Strawberry fruit	90.000	86.000	34.000		90.000	86.000	0	
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 Includes eggplants		125.000	48.400	0	
France	Eggplant		27.500				48.400	0	
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	
Israel	Cucumber - protected new 2007			25.000				25.000	
Israel	Cut flowers – open field	77.000	67.000	80.755		77.000	67.000	74.500	
Israel	Cut flowers - protected	303.000	303.000	321.330		303.000	240.000	220.185	
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		125.650	99.400	99.500	
Israel	Potato	239.000	231.000	137.500		239.000	165.000	137.500	
Israel	Seed production	56.000	50.000			56.000	28.000		
Israel	Strawberries – fruit	196.000	196.000	176.200		196.000	196.000	65.100	
Israel	Strawberry runners	35.000	35.000			35.000	35.000	28.000	
Israel	Tomatoes			90.000				22.750	
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	0	
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	0	
Italy	Strawberry Runners	100.000	120.000	35.000		120.000	120.000	35.000	
Italy	Tomato (protected)	1300.000	1030.000	418.000		871.000	697.000	80.000	
Japan	Cucumber	88.300	88.800	72.400	68.600	88.300	88.800	72.4	51.450
Japan	Ginger - field	119.400	119.400	112.200	112.100	119.400	119.400	109.701	84.075
Japan	Ginger - protected	22.900	22.900	14.800	14.800	22.900	22.900	14.471	11.100
Japan	Melon	194.100	203.900	182.200	182.200	194.100	203.900	182.2	136.65
Japan	Peppers (green and hot)	189.900	200.700	169.400	162.300	187.200	200.700	156.700	121.725
Japan	Watermelon	126.300	96.200	94.200	43.300	129.000	98.900	94.2	32.475
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				0.000		
New Zealand	Strawberry fruit	42.000	42.000	24.780		42.000	34.000	0	

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		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	43.490	
Spain	Cut Flowers - Catalonia	20.000	18.600	12.840		20.000	15.000	Included above	
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		230.000	230.000	230.000	
UK	Cut flowers		7.560				6.050		
UK	Ornamental tree nursery	12.000	6.000			6.000	6.000		
UK	Strawberry (& raspberry in 2005)	80.000	63.600			68.000	54.500		
UK	Raspberry nursery		4.400				4.400		
USA	Chrys. Cuttings/roses	29.412				29.412	0.000		
USA	Cucurbits - field	1187.800	747.839	598.927	588.949	1187.800	747.839	592.891	473.211
USA	Eggplant - field	76.761	101.245	96.480	79.546	76.721	82.167	85.363	47.582
USA	Forest nursery seedlings	192.515	157.694	152.629	133.140	192.515	157.694	122.032	96.829
USA	Ginger	9.200				9.200	0.000		
USA	Orchard replant	706.176	827.994	405.415	405.666	706.176	527.600	405.4	365.094
USA	Ornamentals	210.949	162.817	149.965	138.538	154.000	148.483	137.835	123.333
USA	Nursery stock - fruit trees, raspberries, roses	45.789	64.528	12.684	51.102	45.800	64.528	28.275	23.253
USA	Peppers - field	1094.782	1498.530	1151.751	919.006	1094.782	1243.542	1106.753	551.045
USA	Strawberry fruit – field	2468.873	1918.400	1733.901	1604.669	2052.846	1730.828	1476.019	1025.388
USA	Strawberry runners	54.988	56.291	4.483	8.838	54.988	56.291	4.483	7.944
USA	Tomato - field	2876.046	2844.985	2334.047	1840.100	2876.046	2476.365	2065.246	1076.508
USA	Turfgrass	352.194	131.600	78.040	52.189	206.827	131.600	78.04	0
USA	Sweet potato	224.528			18.144				0

ANNEX III (Cont'): List of methyl bromide critical uses for soils or commodities: amounts nominated (2005 – 2008) and exempted by Parties or recommended for exemption by TEAP/MBTOC (2005 – 2008).

B. Commodity Applications

Party	Industry	TOTAL CUN MB Nominated				Total CUE MB Approved or recommended by TEAP/MBTOC			
		2005	2006	2007	2008	2005	2006	2007	2008
Australia	Almonds	1.900	2.100			1.900	2.100		
Australia	Rice consumer packs	12.300	12.300	14.300	9.200	6.150	6.150	7.380	
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	0.000		
Belgium	Old buildings	7.000	0 .306			1.150	0.306		
Belgium	Old buildings and objects	0.450	0.282			0.000	0.282		
Belgium	Woodworking premises	0.300	0.101			0.300	0.101		
Canada	Flour mills	47.200	34.774	30.167	28.650	(a)47	34.774	30.167	28.650
Canada	Pasta manufacturing facilities	(a)	10.457	6.757		(a)	10.457	6.757	
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	
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	0	
Israel	Artefacts	0.650	0.650	0.600		0.650	0.650		
Israel	Dates (post harvest)	3.444	3.444	2.200		3.444	2.755	2.200	
Israel	Flour mills (machinery & storage)	2.140	1.490	1.490		2.140	1.490	1.040	
Israel	Furniture– imported	1.422	1.422	2.042		1.422	0.000	0	
Italy	Artefacts	5.500	5.500	5.000		5.225	0.000	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	7.100	6.800	6.500	6.300
Latvia	Grains		2.502				2.502		
The Netherlands	Runners post harvest		0.120	0.120		0.120	0	0.12	
Poland	Medicinal herbs & dried mushrooms as dry commodities	4.000	3.560	1.800		4.100	3.560	1.800	
Poland	Coffee, cocoa beans	(a)	2.160	2.000			2.160	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	3.480	
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	0	
UK	Mills and Processors (biscuits)	2.525	1.787	0.479		2.525	1.787	0.479	
UK	Spices structural equip.	1.728				1.728	0.000		
UK	Spices stored	0.030				0.030	0.000		
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	0.523				0.050	0.000		
UK	Woven baskets	0.770				0.770	0.000		
USA	Dried fruit and nuts (walnuts, pistachios, dried fruit and dates and dried beans)	89.166	87.719	91.299	67.699	89.166	87.719	78.983	58.912

USA	Dry commodities/ structures (cocoa beans)	61.519	61.519	64.028	52.256	61.519	55.367	64.082	53.188
USA - NPMA	Dry commodities/ structures (processed foods, herbs and spices, dried milk and cheese processing facilities) NPMA	83.344	83.344	85.801	72.693	83.344	69.118	82.771	69.208
USA	Smokehouse hams (Dry cure pork products) (building and product)	136.304	135.742	40.854	19.669	67.907	81.708	18.998	19.669
USA	Mills and Processors	536.328	505.982	401.889	362.952	483.000	461.758	401.889	348.237

ANNEX IV: Methyl Bromide Technical Options Committee Members– September 2006

Names	Gender	Affiliation	Expertise	Length of service	Country	Article 5 status
Co-Chairs						
1. Mohamed Besri	M	Institut Agronomique et Vétérinaire Hassan II (Academia)	Researcher, particularly MB and alts in A5 (PhD)	B	Morocco	A5
2. Michelle Marcotte	F	Consultant	Consultant, particularly food processing, regulations and irradiation	A	Canada	Non-A5
3. Marta Pizano	F	Consultant	Consultant, MB alts, particularly cut flower production	B	Colombia	A5
4. Ian Porter	M	Department of Primary Industries (Government research)	Researcher, soils MB use and alts, particularly fungal pathogens and IPM (PhD)	B	Australia	Non-A5
Members						
5. Marten Barel	M	Consultant	Consultant, , specialist on soil disinfections, Soiless Hydroponics, Steaming, Bio-fumigation and Solarization	D	Netherlands	Non-A5
6. Jonathan Banks	M	Consultant	Consultant, postharvest, particularly nonchemical and gas technologies (fumigants, CA) (PhD)	A	Australia	Non-A5
7. Chris Bell	M	Consultant, formerly Central Science Laboratory (Government research)	Postharvest technologies, particularly fumigants, phosphine; sulfuryl fluoride, controlled atmospheres and heat' (PhD)	B	UK	Non-A5
8. Antonio Bello	M	Centro de Ciencias Medioambientales (Government research)	Non-chemical alternatives (PhD, Prof.)	A	Spain	Non-A5
9. Aocheng Cao	M	Chinese Academy of Agricultural Sciences (Government research)	Researcher, soil alternatives, particularly in China (A5) context (PhD)	C	China	A5
10. Peter Caulkins	M	Associate Director, Special Review & Reregistration Division US EPA	Registration of alternatives, regulatory issues (PhD)	D	US	Non A-5

11. Fabio Chaverri	M	IRET-Universidad Nacional (Academia)	Researcher, soil alternatives, including solarisation	C	Costa Rica	A5
12. Ricardo Deang	M	Consultant	Regulatory and registration. Entomologist (PhD)	A	Philippines	A5
13. Patrick Ducom	M	Ministère de l'Agriculture (Government research)	Postharvest and structural alternatives	B	France	Non-A5
14. Abraham Gamliel	M	Agricultural Research Organization, The Volcani Center, (Government Research)	Alternatives for soils, horticulture (PhD)	D	Israel	Non-A5
15. Darka Hamel	F	Institute for Plant Protection in Agriculture and Forestry (Government)	Postharvest and structural treatments, regulations	D	Croatia	A5
16. Saad Hafez	M	University of Idaho (Academia)	Soils alternatives, nematologist (PhD, Prof.)	C	US	Non-A5
17. George Lazarovits	M	Agriculture & Agri-food Canada (Government research)	Researcher, non chemical control of soilborne pathogens (PhD)	C	Canada	Non-A5
18. Nahum Marbán Mendoza	M	Universidad Autonoma de Chapingo (Academia)	Researcher, soils alternatives, particularly nematode problems (PhD, Prof.)	C	Mexico	A5
19. Carlos Medeiros	M	EMBRAPA (Government research)	Alternatives for tobacco, horticulture	D	Brazil	A5
20. Melanie Miller	F	Consultant	Consultant in MB alternatives use (PhD)	A	Belgium	Non-A5
21. Andrea Minuto	M	Agroinnova Universita Torino (Academia)	Researcher, MB and alternatives in soils (PhD)	D	Italy	Non-A5
22. Takashi Misumi	M	MAFF (Government research)	QPS expert	D	Japan	Non-A5
23. Kazufumi Nishi	M	Nat Institute of Vegetables and Tea Science (Government research)	Nonchemical alts, particularly heat systems for soils (PhD)	D	Japan	Non-A5
24. David Okioga	M	Ministry of Environment and Natural Resources (Government regulatory)	Postharvest and QPS MB alts (PhD)	A	Kenya	A5
25. Christoph Reichmuth	M	BBAGermany (Government research)	Researcher, MB alts in postharvest/structures (PhD)	B	Germany	Non-A5
26. Jordi Riudavets	M	IRTA-Departament of Plant Protection. (Government Research)	IPM for stored products and horticultural crops (PhD)	D	Spain	Non-A5
27. Ariane Saade	F	Totken Lebanon	Economics and trade	D	Lebanon	A5
28. John Sansone	M	SCC Products (Fumigator)	Fumigator, particular expertise in structures	A	US	Non-A5
29. James D. Schaub	M	United States Department of Agriculture (Government regulatory)	Agricultural economist (PhD)	C	US	Non-A5
30. Sally Schneider	F	United States Department of Agriculture	Researcher in soils alts,	C	US	Non-A5

		(Government research)	particularly replant problems and propagative material nurseries (PhD)			
31. JL Staphorst	M	Plant Protection Research Institute (Parastatal research)	Expert Soil Microbiologist (DSc)	B	South Africa	A5
32. Akio Tateya	M	Syngenta Japan K.K.	Application of MB and alts, particularly in Japan	A	Japan	Non-A5
33. Robert Taylor	M	Consultant	Postharvest technology, specifically A5 uses	A	UK	Non-A5
34. Alejandro Valeiro	M	Instituto Nacional de Tecnología Agropecuaria (Government research)	Introduction/use of soils alts, including tobacco	C	Argentina	A5
35. Ken Vick	M	United States Department of Agriculture (Government research)	Research in MB alternatives, incl. QPS (PhD)	A	US	Non-A5
36. Nick Vink	M	University of Stellenbosch (Academia)	Agricultural economics (PhD, Prof.)	C	South Africa	A5
37. Jim Wells	M	Environmental Solutions Group, LLC (Consultant)	Registration and regulatory - MB and alternatives, soil uses	A	US	Non-A5
38. Chris Watson	M	IGROX Ltd (Fumigator)	Practical use of MB and alternatives including the use of PH3, SF,CO2 and Heat Treatments for commodoties(inc timber) and structures	A	UK	Non-A5
Totals	M =32 F =6		A= 10 B= 8 C = 10 D= 10			A5=13 Non-A5=25

A - >10 years
B – 5-10
C – 2-5
D - <2 year