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UNEP

REPORT OF THE
TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL

SEPTEMBER 2013

EVALUATION OF 2013 CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED MATTERS

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MBTOC FINALCUN REPORT – SEPTEMBER 2013

Common Acronyms

1,3-D	1,3-dichloropropene
A5	Article 5 Party
ASD	Anaerobic soil disinfestation
CUE	Critical Use Exemption
CUN	Critical Use Nomination
DOI	Disclosure of Interest
EC	European Community
EMOP	Extraordinary Meeting of the Parties
EPA	Environmental Protection Agency
EPPO	European Plant Protection Organisation
IM	Iodomethane
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPM	International Standard Phytosanitary Measure
LPBF	Low Permeability Barrier Film (including VIF films)
MB	Methyl Bromide
MBTOC	Methyl Bromide Technical Options Committee
MBTOC QPS	Methyl Bromide Technical Options Committee, Quarantine and Pre-shipment Subcommittee

MBTOC SC	Methyl Bromide Technical Options Committee, Structures and Commodities Subcommittee
MBTOC S	Methyl Bromide Technical Options, Soils Subcommittee
MITC	Methyl isothiocyanate
MOP	Meeting of the Parties
MS	Metam sodium
Non-A5	Non Article 5 Party
OEWG	Open Ended Working Group
Pic	Chloropicrin
QPS	Quarantine and Pre-shipment
SF	Sulfuryl fluoride
TEAP	Technology and Economics Assessment Panel
TIF	Totally Impermeable Film
VIF	Virtually Impermeable Film
VOC	Volatile Organic Compounds

2013 Evaluations of Critical Use Nominations for Methyl Bromide and Related Matters – Final Report

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2013 EVALUATIONS OF CRITICAL USE NOMINATIONS FOR METHYL BROMIDE AND RELATED MATTERS

1.1 Scope of the Report

This 2013 final report provides final evaluations by MBTOC of Critical Use Nominations (CUNs) submitted for methyl bromide (MB) for 2015 by three Parties (Australia, Canada, USA). Only three of the CUNs submitted in 2013 required reassessment after the 33rd OEWG. As per provisions set out in Decision IX/6 (Annex I, MOP16), CUNs were submitted to the Ozone Secretariat by the Parties in accordance with the timetable shown in paragraph 1 of Annex I, Decision XVI/4. After the OEWG, Parties were requested to provide further information by the end of July 2013. Australia and Canada complied with these timelines, but the USA required further time to compile information and this was supplied at the end of August 2013. Consequently, assessment of the CUN from the USA was delayed and an advance copy of the report without the USA reassessment was posted. This final report replaces that version.

A review of an emergency use for two pasta warehouses by Canada is also provided.

This report needs to be read in conjunction with the 2013 May TEAP report, which provides full detail of all CUN assessments conducted in 2013. It also provides information on the standard presumptions used in the 2013 assessment, information on stocks (Decision Ex.1/4 (9f)), partial information on actual MB consumption for critical uses (in accordance with Decision XVII/9) and apparent adoption rates of alternatives, as evidenced by trend lines on reduction of MB CUNs (in accordance with Decisions XIX/9, XX/5).

No changes to the presumptions are proposed for future nominations and thus no consideration is required by Parties at the forthcoming MOP as per paragraph 2 in Annex 1 to the report of MOP16.

1.2 Evaluations of CUNs – 2013 round for 2015 exemptions

Detailed interim assessments of all CUNs were made by MBTOC at its meeting held in London, UK from 2-5 April, 2013, which was attended by the three MBTOC sub-committees: Soils, SC and QPS.

For the soils CUNs, Australia and Canada nominated similar amounts of MB to previous rounds for the strawberry runner sector, highlighting the difficulties with phase out of MB for this sector. In the USA the only soil CUN submitted was for strawberry fruit production.

In the postharvest sector, in 2012, there were five CUNs submitted by three Parties. By contrast, in 2013 two postharvest CUNs were submitted. Between 2012 and 2013, applicants from three Parties, Australia, Canada and the US, were able to complete their planned adoption of alternatives in flour and rice milling and several dried fruit sectors. Accordingly, Australia did not submit a CUN for rice processing, Canada did not submit a CUN for flour milling and the US did not submit a CUN for flour milling and also several dried fruit sectors. Completing the adoption of these former methyl bromide applications was no doubt difficult and required effort of the industry and government; MBTOC was happy to hear of these successes.

The total nominated amount for all countries for 2015 was 412.221 t representing a 14.8% reduction to that nominated in 2012 for 2014. MBTOC has made a final recommendation for all nominations from Australia, Canada and the USA of 313.766 t. The grounds used for these recommendations are given in detail for the relevant CUNs in Tables 1-4 and 1-6.

Also during the first meeting in London in April 2013, progress reports were prepared and 'Disclosure of Interest' declarations updated. At the 33rd OEWG meeting in Bangkok, MBTOC held bilateral meetings with Australia, Canada and the United States to discuss the interim recommendations and since then all three Parties have provided further information to support reassessment of the three

preplant soils nominations. In August, Canada informed MBTOC that it had granted emergency use of MB for two pasta warehouses under its domestic regulation as explained later in this report.

MBTOC did not hold a face-to-face second meeting this year in view the small number of CUNs and funding difficulties faced by many non-A5 members in relation to meeting attendance. Consideration of new information and reassessment of CUNs and discussion regarding the emergency use were thus conducted electronically.

As discussed in the May 2013 TEAP Progress Report, three Parties - Australia, Canada, and the USA- submitted nominations for critical uses of MB for either preplant soil use and/or postharvest use in 2015. Five nominations were submitted in this round (Tables 1-4 and 1-5). The total nominated amount for all countries for 2015 was 412.221t, which represented a 35% reduction with respect to amounts nominated in 2012 for 2014.

After reassessment by MBTOC after the OEWG, the final recommendation for 2015 was 313.766, i.e., 76% of that nominated (Table 1.1). MBTOC has recommended quantities of MB for 2015, which are less those nominated. The grounds used for these recommendations are given in detail in the relevant CUNs in Tables 1-4 and 1-6.

In general, the CUNs were submitted due to the following issues: regulatory restrictions that did not allow partial or full use of alternatives, difficulties in the scale-up of alternatives, alternatives considered uneconomical and unavailability of alternatives. Additionally, MBTOC-SC notes that one CUN use still does not have technically feasible alternatives. In paragraph 20 of Annex 1 referred to in Decision XVI/4, Parties specifically requested that MBTOC explicitly state the specific basis for the Party's economic statement relating to CUNs. Tables 1-4 and 1-6 provide this information for each CUN. MBTOC notes there was an improvement in the economic information supplied in this round, which allowed the MBTOC economist to better assess the nominations from this perspective.

1.3 Achieving Consensus

In accordance with decision XX/5(9) and similar subsequent decisions (XXI/11(4), XXII/6(4) and XXIII/4(3)) the Parties have indicated that MBTOC '*should ensure that it develops its recommendations in a consensus process that includes full discussion among all available members of the Committee and should ensure that members with relevant expertise are involved in developing its recommendations'*.

In 2013 as described in the May 2013 TEAP Progress Report, MBTOC's procedures were designed to improve members' contribution and reaching final decisions on nominations before, during and after the MBTOC meetings. The following procedure ensured all members were able to review all the information available and thus participate in final consensus.

Information from Parties was circulated electronically to all members for an opportunity to make comments about the reassessment. Members were asked to submit comments by mid -August, 2013 and these were considered by the relevant sub-committee. The coordinating Co-Chair (s) provided the sub-committee with a summary of all comments, and the members in question then reached a position which the Co-Chairs used to draft the proposed text boxes and recommendations. Sub-committee members then further discussed, commented on and made changes to this proposal. Once agreed, the text box and recommendation were circulated to the full MBTOC to obtain consensus (or agreement not to disagree) from each member of the Committee. Concerning the emergency use report, the process described was similar beginning with extensive discussion and further correspondence with the Party. The Co-Chair drafted the report, which was then circulated for further comment from MBTOC, which were then incorporated until full consensus was achieved.

Several members recused from evaluation of nominations as required by MBTOC's working procedures. These included George Lazarovits (US Strawberry fruit and Canadian Strawberry

Nurseries), Jim Wells (US Strawberry Fruit) and Ian Porter (Australian Strawberry nurseries). The recusals took place either as a result of a member's disclosure as per MBTOC's guidelines or members may have chosen to self recuse to avoid any perceived conflict of interest.

Table 1.1 - Summary of Critical Use Nominations and Exemptions of Methyl Bromide (tonnes)

	Quantities Nominated											Quantities Approved										Final Recommendation
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2005 (1ExMOP and 16MOP)**	**2006 (16MOP+ 2ExMOP+ 17MOP)**	**2007 (17MOP + 18MOP)**	**2008 (18MOP + 19MOP)**	**2009 (19MOP)**	**2010 (20MOP + 21MOP)**	**2011 (21MOP)**	**2012 (22MOP)**	**2013 (23MOP)**	**2014 (24 MOP)**	**2015**
Australia	206.950	81.250	52.145	52.900	38.990	37.610	35.450	34.660	32.164	30.947	29.79	146.600	75.100	48.517	48.450	37.610	36.440	28.710	31.708	32.134	[27.971]	[28.765]
Canada	61.992	53.897	46.745	42.241	39.115	35.080	19.368 +3.529	16.281	13.444	10.305	5.261	61.792	53.897	52.874	36.112	39.020	30.340 +3.529	19.368	16.281	13.109	[10.094]	[5.050]
EC[1]	5754.361	4213.47	1239.873	245.00	0	0	0	0	0	0	0	4392.812	3536.755	689.142	245.146	0	0	0	0	0	0	0
Israel	1117.156	1081.506	1236.517	952.845	699.448	383.700	232.247	0	0	0	0	1089.306	880.295	966.715	860.580	610.854	290.878	0	0	0	0	0
Japan	748.000	741.400	651.700	589.600	508.900	288.500	249.420	221.104	3.317	0	0	748.000	741.400	636.172	443.775	305.380	267.000	239.746	219.609	3.317	0	0
New Zealand	53.085	53.085	32.573	0	0	0	0	0	0	0	0	50.000	42.000	18.234	0	0	0	0	0	0	0	0
Switzerland	8.700	7.000	0	0	0	0	0	0	0	0	0	8.700	7.000	0	0	0	0	0	0	0	0	0
USA	10753.997	9386.229	7417.999	6415.153	4958.034	3299.490	2388.128	1181.779+ 6.339	691.608	442.337	377.170	9552.879	8081.753	6749.060	5355.976	4261.974	3232.856 +2.018	2055.200	993.706	562.328	442.337	[279.951]
TOTALS	**18704.241**	**15617.837**	**10677.552**	**8297.739**	**6244.487**	**4044.380**	**2928.142**	**1460.163**	**740.533**	**483.589**	**412.221**	**16050.089**	**13418.200**	**9160.714**	**6990.039**	**5,254.838**	**3572.183**	**2343.024**	1261.304	610.888	483.589	[313.766]

* Not yet available.

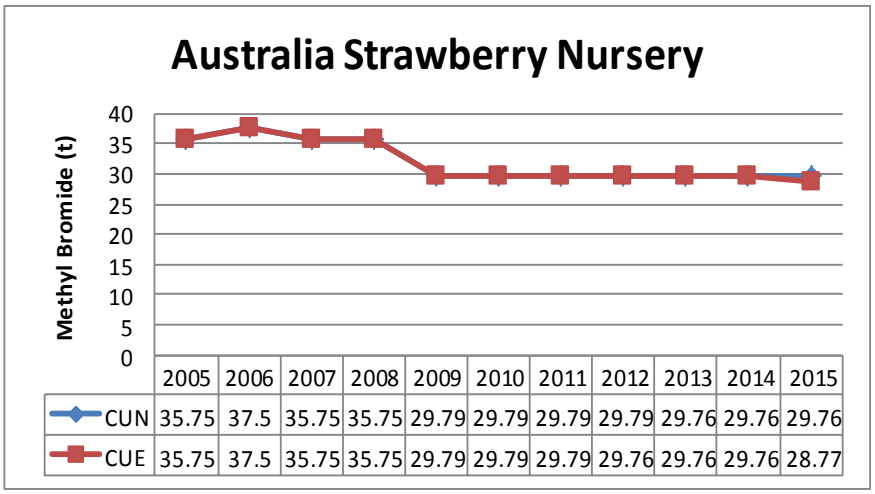
[1]Members of the European Community which had CUNs/CUEs included:
2005 – Belgium, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain, and the United Kingdom.
2006 – Belgium, France, Germany, Greece, Ireland, Italy, Latvia, Malta, Netherlands, Poland, Portugal, Spain, and the United Kingdom.
2007 – France, Greece, Ireland, Italy, Netherlands, Poland, Spain, and the United Kingdom
2008 – Poland, Spain

1.4 MBTOC Soils: Final evaluations of 2013 Critical Use Nominations for Methyl Bromide for 2015

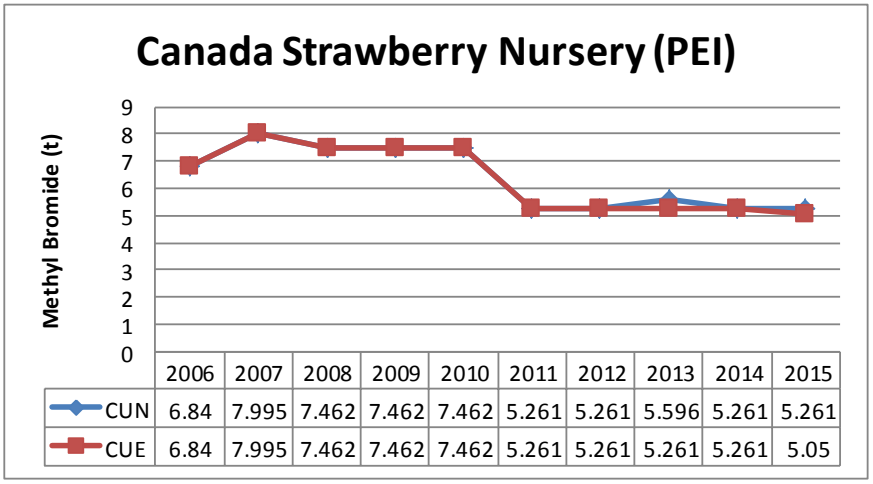
1.4.1 Critical Use Nominations submitted

At the Open Ended Working Group held in Bangkok from 24 to 28 June 2013, MBTOC Soils presented interim recommendations on all three nominations received from Australia, Canada and the United States as shown in Table 1-2. During bilateral discussions at the OEWG, all three Parties submitting nominations in the 2013 round indicated issues related to the interim assessments and subsequently sent further information and requests for reassessment.

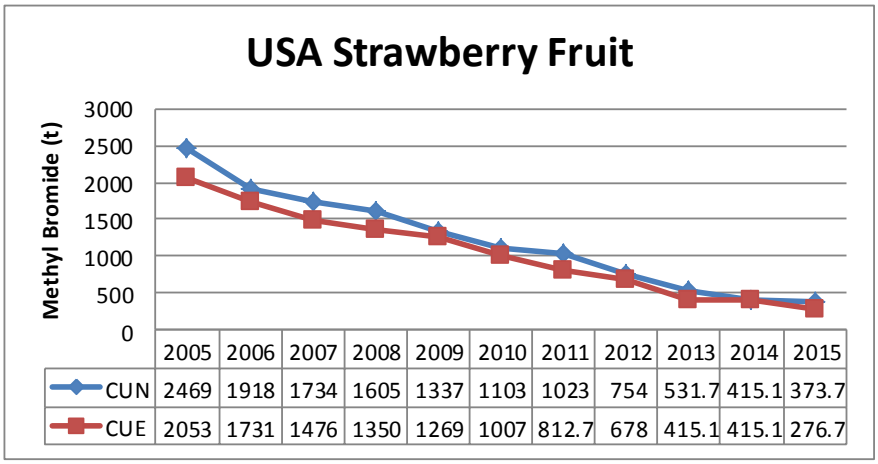
Figure 1-1*: *Amounts of MB nominated and exempted for CUE uses in Australian and Canadian Strawberry production and in the US strawberry fruit production from 2005 to 2015. Blue lines indicate the trend of CUN nominated and the red lines the amount CUE methyl bromide approved by the Parties or recommended for approval at the MOP in 2013 for 2015.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CUN	35.75	37.5	35.75	35.75	29.79	29.79	29.79	29.79	29.76	29.76	29.76
CUE	35.75	37.5	35.75	35.75	29.79	29.79	29.79	29.76	29.76	29.76	28.77



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CUN	6.84	7.995	7.462	7.462	7.462	5.261	5.261	5.596	5.261	5.261
CUE	6.84	7.995	7.462	7.462	7.462	5.261	5.261	5.261	5.261	5.05



1.4.2 CUN reassessment for preplant soil uses

In summary, in the final assessment, the Canadian CUN was unchanged from the interim recommendation (5.05 t) , but 28.765 t was reinstated for the Australian nomination

Table 1-2: Summary of the interim recommendations by MBTOC-S (in square brackets) for CUE's for preplant uses of MB (tonnes) submitted in 2013 for 2015

Country and Sector	Nomination by the Party for 2015	Interim Recommendation for 2015	Final Recommendation for 2015
1. **Australia** Strawberry runners	**29.760**	**[0]**	**[28.765]**
2. **Canada** Strawberry runners	**5.261**	**[5.050]**	**[5.050]**
3. **USA** Strawberry fruit	**373.660**	**[224.196]**	**[276.711]**
TOTAL	**408.681**	**[229.246]**	**[310.526]**

NA – Assessment not yet completed

1.4.3 General Comments on the Reassessment for Preplant Soil Use

The Australian and Canadian nominations for strawberry runner production were predominantly based on economic considerations, as MBTOC considered that soilless substrate systems were suitable as technical alternatives for at least part (if not all) of the nominations. This posed a unique challenge for the committee, as MBTOC has no standard economic criteria with which to assess a nomination. In these instances, MBTOC considered the economic information provided by the Party in context with the extent of commercial adoption for similar sectors worldwide as an indication of economic feasibility. The MBTOC economist also provided his views on the comparison of soilless with bare rooted runner production outdoors and whilst in general soilless culture was considered uneconomical based on the Parties information, it was recognized that on a small scale capital costs would be lower and less prohibitive to uptake of soilless systems and thus feasible. MBTOC also noted that where soilless production has been adopted, costs for production of runners have generally decreased as technological expertise and knowledge increase (see references ahead). For both the Australian and Canadian nominations it was also apparent that Parties were considering a range of technologies in their effort to determine the most suitable and cost effective production system.

MBTOC continues to encourage Parties to consider a review of regulations covering the registration, use and adoption of alternatives, particularly those regarding barrier films to reduce dosage rates and associated emissions of MB and its alternatives, MBTOC also notes that a large proportion of MB has been nominated for uses where regulations or legislation prevent reductions of MB dosage. In several cases, the mandatory use of MB is specified at a high dosage for either treatment of certified

propagation material or because regulations prevent use of barrier films which otherwise could have reduced the MB dosage rate. Further, regulations on the use of alternatives are preventing their uptake for preplant soil use in a substantial proportion of the remaining CUNs.

1.4.4 Standard Presumptions Used in Assessment of Nominated Quantities.

Table 1-3 below contains the standard presumptions applied by MBTOC-S for this round of CUNs for preplant soil uses. These standard presumptions were first proposed in the MBTOC report of October 2005 and were presented to the Parties at 17th MOP. Studies and reports to support them have been provided in previous reports and were revised for some sectors after consideration by the Parties at the 19th MOP. The rates and practices adopted by MBTOC as standard presumptions are based on maximum rates considered acceptable by published literature and actual commercial practice.

As in evaluations conducted in previous years, MBTOC considered reductions to quantities of MB in particular nominations to a standard rate per treated area where technical evidence supported its use. As a special case, MBTOC continues to accept a maximum rate of 200 kg/ ha (20 g/m^2) in MB/Pic formulations with high Pic-containing mixtures with or without barrier films for certified nursery production, unless regulations prescribe lower or higher rates. However, MBTOC notes that studies have shown that rates of 200 kg/ha (20g/m^2) or less of MB: Pic 50:50 are effective with barrier films for production of 'certified' nursery material and urge Parties to consider regulations which permit these lower rates. MBTOC also notes that certified runner production may involve regulations which specify the mandatory use of a fumigant such as MB or an alternative, in order for these nursery materials to be "certified".

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 1-3: Standard Presumptions Used in Assessment of CUNs for Preplant Soil Use of MB

	Comment	**CUN adjustment**	**Exceptions**
1. Dosage rates	Maximum guideline rates for MB:Pic 98:2 are 25 to 35 g/m^2 with barrier films (VIF or equivalent); for mixtures of MB/Pic are 12.5 to 17.5 g MB/m^2 for pathogens and nutsedge respectively, under barrier films depending on the sector. All rates are on a 'per treated hectare' basis.	Amount adjusted to maximum guideline rates. Maximum rates set dependent on formulation and soil type and film availability.	Higher rates accepted if specified under national legislation or where the Party had justified otherwise.
2. Barrier films	All treatments to be carried out under low permeability barrier film (e.g. VIF, TIF)	Nomination reduced proportionately to conform to barrier film use.	Where barrier film prohibited or restricted by legislative or regulatory reasons
3. MB/Pic Formulation: Pathogens control	Unless otherwise specified, MB/Pic 50:50 (or similar) was considered to be the standard effective formulation for pathogen control, as a transitional strategy to replace MB/Pic 98:2.	Nominated amount adjusted for use with MB/Pic 50:50 (or similar).	Where MB/Pic 50:50 is not registered, or Pic (Pic) is not registered
4. MB/Pic Formulation: Weeds/nutsedge ass control	Unless otherwise specified, MB/Pic 67:33 (or similar) was used as the standard effective formulation for control of resistant (tolerant) weeds, as a transitional strategy to replace	Nominated amount adjusted for use with MB/Pic 67:33 (or similar).	Where Pic or Pic-containing mixtures are not registered

	MB/Pic 98:2.		
5. Strip vs. Broadacre	Fumigation with MB and mixtures to be carried out under strip	Where rates were shown in broad acre hectares, the CUN was adjusted to the MB rate relative to strip treatment (i.e. treated area). If not specified, the area under strip treatment was considered to represent 67% of the total area.	Where strip treatment was not feasible e.g. some protected cultivation, emission regulations on MB, or open field production of high health propagative material

Table 1-4: Final evaluation of CUNs for preplant soil use submitted in 2013 for 2015

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015
Australia	Strawberry runners	35.750	37.500	35.750	35.750	29.790	29.790	29.790	29.760	29.760	29.760	29.760	**[28.765]**

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MBTOC recommends a reduced CUE of 28.765 tonnes of methyl bromide for use in 2015, which is a 3.4% reduction (0.995 tonnes) from the amount nominated by the Party.

According to the CUN, the foundation stock stage in the strawberry runner production chain has already transitioned to soil-less production. Trials and commercial adoption for this alternative have given good results for the past several years (HAL 2009, 2011). MBTOC finds however that an amount of 0.47 tonnes is allocated by the Party each year for soil-less production although *"The exemption amount allocated for the Victorian Strawberry Industry Certification Authority is unlikely to be used following the VSICA's successful transition to soil-less substrate production in 2011"* (http://www.environment.gov.au/atmosphere/ozone/publications/exemption-list.html). This is thus a contingency use, which cannot be recommended by MBTOC.

In addition, MBTOC considers that it is feasible to transition the mother plant stage (2.10 hectares, 1,000,000 plants as per Table 2, page 13 of the new information received) to soil-less production as well. This would reduce the nominated amount by a further 0.525 tonnes (2.10 ha x 250 Kg/ha=0.525 tonnes).

Nomination by the Party:

The quantity requested for this CUN to produce mother (2.10 ha) and certified plants (118 ha) is 29.760 tonnes, an amount that has essentially remained unchanged since 2009.

MBTOC reassessment for 2015 after the OEWG:

After the OEWG, the Party requested reassessment based on the time needed to transition to a non-chemical alternative (soil-less) and chemical alternatives (Pic Plus + herbicide, Pic Plus + MS , 1,3-D/Pic: 20/80).The Party reported that multiplication of strawberry runners consists of four consecutive generations (Nucleus, Foundation, Mother, and Certified stock). Currently the certification scheme specifies fumigation for mother and certified plants production with a 50:50 mix of MB/ chloropicrin applied at 500 kg/ha, a rate required to meet certification standards. Soil-less production has also been approved under the certification scheme. Although the required MB rate exceeds MBTOC's standard presumption of 20 g/m2, this lower rate is not registered. Additionally, a key alternative, 1,3-D:Pic, is considered ineffective due to phytotoxicity and doubling of plant back times in the heavy and wet soil conditions in the high elevation regions.

Recently, in the 2011/12 season, the Certification Authority commissioned the construction of screen house facilities for cost effective production of foundation stock in soil-less systems. According to the new information received from the Party, yields obtained for foundation stock grown with the soil-less system in 2011/12 averaged 150.8 runners per plant, and total production was 38,000 plants. By comparison, yields of foundation stock grown in soils treated with MB:Pic soils in 2010/11 averaged 212.9 runners per plant, and total production was 66,000 plants. MBTOC considers that it is difficult to compare across years and accepts that it may take time to adjust the soil-less system and determine ways to increase the number of plants to an equivalent number as in the open fields. .

Results obtained in 2005 show that fruit yields of plug plants produced in soil-less culture were 25% lower than those of bare-rooted runners produced in MB-treated soils. Trials in

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015

Queensland, also showed that plug plants yielded 40% less fruit than bare-rooted runners produced in MB:Pic treated soil (Menzel & Waite, 2006).

MBTOC considers that the reported results are 8 years old and have sometimes been contradicted by various reports from other countries.

Soil-less culture has been researched for production of some or all generations of strawberries in many A5 and Non A5 countries, and in a number of countries runners and plug plants are produced commercially, i.e. Japan (Yoshida, 2013), Belgium (Robbe, 1997, 1998; Lieten, 2013), The Netherlands (Lieten, 2013), Poland (Treder *et al*., 2007), New Zealand (Walter *et al.*, 2005), USA (Durner *et al*., 2002) and A5 countries e.g. Brazil (Janisch et al., 2012, Oliveira *et al.,* 2010,),Uruguay (Gimenez, 2008,), Paraguay (Nacimiento and Lopez- Medina, 2009) and others (Palha *et al.,* 2012; Roosta and Afsharipoor 2012).

MBTOC agrees with the Party that extrapolation of results obtained in other countries to runner production in Australia is difficult because of the differences in the physiology, the varieties and agronomic requirements for growing strawberry runners. However, trials with different types of substrates may help improve economic feasibility, allow for higher yields and better quality (i.e., through more efficient nutrition and irrigation, increased planting densities and other management practices). MBTOC has reviewed the references provided in the interim report and has included a further list which may help with lowering costs and technologies that lead to the development of more suitable systems

After the OEWG, the Party confirmed that research on MB alternatives is continuing and provided a research plan aimed at identifying the most promising chemical alternatives (Pic Plus + herbicide, Pic Plus + MS , 1,3-D/Pic: 20/80, soilless and others. In the past, research focused mainly on methyl iodide and on its anticipated registration, which is no longer being pursued by the manufacturer. This new research program is a new research plan, which is in accordance with Decision IX/6.

It is anticipated that the Party will make every effort to commercialise any new chemical or non chemical alternative as soon as possible in order to assist phase out of MB for certified strawberries plants production (118ha).

Circumstances of the Nomination by the Party:

The Party states that the key pests affecting strawberry runner production are fungi (*Phytophthora, Pythium, Rhizoctonia* and *Verticillium* spp.) and weeds (*S. arvensis, Agrostis tenuis, Raphanus* spp., *Poa annua, Cyperus* spp). In its answers to MBTOC, the Party reported that the fruit industry expansion in Victoria is currently constrained by the amount of MB:Pic available for the production of 'certified' transplants and that runner production in soils treated with MB:Pic is mandatory for meeting certification standards. The Victorian runner industry only produces runners in soils treated with MB:Pic, and is not using any other methods (other than substrates for foundation stock production). Some chemical alternatives are not feasible e.g., methyl iodide. Plant resistance is unreliable as an alternative to MB:Pic for delivering certified runners (Fang et al 2012).

MBTOC Comments on Economics 2013:

After the OEWG, the Party provided an economic analysis of strawberry runner production (mother stock and certified stock). The Party's main concern is that the significant capital investment for greenhouses/screen houses would only address a small portion of the problem and would only result in the foundation stock production. The economic analysis is based on the yields, revenue, and costs for the production of mother and certified stocks, and states that prices increase from A$0.34 per runner to A$2.03 and A$2.00 per runner, respectively, when using soil-less production systems. By comparison, soil-less systems are economically feasible for production of foundation stock plants, at a price of A$3.60 per runner in the 2011/2012 season. Soil-less culture has proven to be technically and economically feasible for production of some or all generations of strawberries in many Non A5 countries as described above.

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015
	Comments Requested in Dec. XX1/11 (para 9): • Dec. IX/6 b(i) Emission control: No, but standard films are claimed by the Party to perform the same as VIF in the cold temperatures and heavy wet soils typical for strawberry runner production. • Dec. IX/6 b(iii) Research program: The strawberry industry has a 3-year research plan in place to identify alternatives to MB based on the development of integrated disinfestation systems: efficacy of Pic Plus ,T80 (1,3 D/Pic 20:80), spading machines for application of metham sodium in the runner industry, and improvement of soilless production technology. A research leader has been appointed to implement the research plan. • Dec. IX/6 b(iii) Appropriate effort: Research effort is adequate.												
Country	**Industry**	**CUE for 2005[1]**	**CUE for 2006[2]**	**CUE for 2007[3]**	**CUE for 2008[4]**	**CUE for 2009[5]**	**CUE for 2010[6]**	**CUE for 2011[7]**	**CUE for 2012[8]**	**CUE for 2013[9]**	**CUE for 2014**	**CUN for 2015**	**CUE for 2015**
Canada	Strawberry runners (PEI)	6.840	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	5.261	5.261	[5.050]
	MBTOC Final Recommendation for 2015: MBTOC maintains its interim recommendation and recommends a reduced CUE of 5.050 tonnes, a 4% reduction of the nominated amount. This assumes adoption of alternatives for an amount of MB equivalent to production of 50% of the stock plants grown in foundation fields. **Nomination by the Party** The Party has nominated 5.261 t of MB, which was similar to the CUE granted for 2014. It is for use on (24.3 ha) of field grown runners and (2.0 ha) of stock plants. The nomination is based on a reduced rate of MB of 20 g/m² under high barrier films for the entire fumigated area (26.3 ha). **Circumstances of the Nomination by the Party**: The Party has attempted to replace MB with 1,3-D, but this product was banned for use in Prince Edward Island in January 2003 due to ground water contamination. Chloropicrin (PIC 100) has been registered by PMRA, but the PEI authorities have denied a permit for its use until further groundwater testing has been conducted. Ground water studies have been submitted to PMRA and are awaiting final reviews and a regulatory decision. Registration applications for MI, DMDS and EDN have not been submitted to date. The company has tested organic production from 2006 - 2009 with different varieties, but found that significant reductions in yield resulted, ranging from 40% to 70%. Only one variety using the organic production system compared favourably to conventional production. While MB:Pic 67:33 at 500 kg/ha is the only formulation registered for strawberry runners, which exceeds MBTOC's standard presumption of 200 kg/ha, the grower petitioned PMRA to use a lower rate under barrier films. PMRA, in the absence of a formal label amendment, granted permission to use a lower rate, but at the grower's own risk and liability. The CUN for 2015 is based entirely on a reduced rate for MB of 200 kg/ha for the entire critical area (26.3 ha). After the OEWG, the Party submitted further information, which showed that a groundwater study has finally been approved to evaluate whether Pic can be used on PEI. The Party stated that 'at this time greatest effort is being concentrated on this study as chloropicrin is currently considered the most feasible alternative for the grower. The Party is also seeking technical advice on soilless systems to reduce dependency on chemical fumigants, including an assessment of the technical and economic feasibility of soilless systems, and evaluating a range of potential growing techniques. The Party also provided a detailed description of the production system from micropropagated plants through to the sale of either bare rooted plants or runner tips which is achieved in 3 generations and not the usual 4 generations seen elsewhere in North America. The Party states that they believe that this avoids the need for a foundation stage, but this seems to be in contrast to the process described later in the attached Annex.												

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015
	MBTOC reassessment for 2015 after the OEWG: After reconsideration of the new information from the Party, MBTOC maintains its recommendation that alternatives are available for a proportion of the early generation production of strawberry runners and recommends a reduced amount of 5.050 t. MBTOC carefully considered the new information and appreciated the detailed documentation of the production system and the economic data provided. On review, MBTOC maintains its position that soilless culture is a suitable technical alternative for the early foundation and mother stock generations for strawberries, but does consider that costs will become prohibitive for latter generations. Also, MBTOC carefully reviewed the data provided on potential costs of soilless systems and whilst the costs for the method shown were higher than production using methyl bromide, the committee considered that lower cost systems exist and should be suitable for a small proportion of the production. MBTOC acknowledges that different soilless production systems (trough and tip vs substrate bins and bare rooted plants) require different capital costs and labour requirements, but more efficient systems are evolving rapidly. These systems are also considered to provide more sustainable and higher health production of runners. MBTOC is aware that the Party intends to initiate a review of alternative soilless systems and completely supports this initiative. MBTOC also urges the Party to consider moving to small scale soilless production facilities as soon as possible to ensure they are prepared for the potential scale up that may be required in 2015. MBTOC is also aware that not all the production may need to move to soilless culture, if Pic becomes available after positive outcomes from the groundwater studies. MBTOC is unclear on the current position with Pic Plus availability, but accepts the Parties statement that it is not currently available for use on PEI. MBTOC has reviewed the references provided in the interim report and has included a further list which may help with lower costs technologies to assist development of suitable systems for PEI. These include those used successfully in many Non A5 countries, e.g Australia (HAL 2009, 2011), Belgium and Holland (Lieten *et al*., 2004a, 2004b, Lieten, 2013), Japan (Yoshida, 2013), New Zealand (Walter *et al*., 2005), USA (Durner *et al*., 2002). MBTOC has recommended no further reductions in view of the Party stating the 'objective of an action plan' is that 2016 will be the final year for use of MB for this sector. MBTOC also notes that MB formulations containing Pic (67:33) are used in PEI under permit without groundwater contamination apparently occurring and suggests a similar situation should be possible for Pic alone, which is not currently permitted. **MBTOC comments on economics in 2013 for 2015:** The Party's main concern is that the significant capital investment for greenhouses/screen houses would only address a small portion of the problem and would only result in an 8% reduction in the amount of methyl bromide used by the grower. Canada is of the view that the required high cost investment is not justifiable from an economic standpoint and rather than focusing on less than l0% of the problem resources could be better used elsewhere. The Party presented costs for a soilless trough and tip system, which was estimated to have costs per runner, which were 3 times higher (42.5 c per runner) than bare rooted runners (13.5 c per runner). MBTOC considers there are cheaper systems available, which are being used commercially worldwide. **Comments requested in Dec. XX1/11 (para 9)** **Dec. IX/6 b(i)** Emission reduction: Yes, uses barrier films with a reduced application rate of MB conforming to MBTOC's presumptions **Dec. IX/6 b(iii)** Research program: A research program is proposed based on groundwater studies for Pic, evaluation of soilless methods to improve feasibility and consideration of improvements in the production processes. **Dec. IX/6 b(iii)** Appropriate effort: The Party has demonstrated now that it is engaged in an active research program and is implementing groundwater studies. The party has also engaged a consultant to assist full evaluation of potential alternatives to MB												

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015
United States	Strawberry (field)	2052.846	1730.828	1476.019	1349.575	1269.32	1007.477	812.709	678.004	461.186	415.067	373.660	**[276.711]**

MBTOC final recommendation for 2015:

MBTOC recommends a reduced amount of 276.711 tonnes for use in this sector for 2015. MBTOC acknowledges that the Party reduced the nomination by 10% from the amount approved for 2014, In its interim recommendation, MBTOC accepted that alternatives were now available for the whole nomination, and recommended a two year transition time to adopt alternatives to MB. During a bilateral at the OEWG and afterwards the Party provided information which requested more time to transition to suitable alternatives, especially chloropicrin which has in early 2013 had label changes which now allow higher dosage rates. After further review, MBTOC has accepted the Parties arguments and recommends a 3 year transition period rather than 2 years. MBTOC has based the transition from the MOP approved amount in 2014 as 415.067 tonnes (first year), recommends 276.711 tonnes in 2015 (second year) and anticipates that only 138.360 tonnes will be requested in 2016 (3rd year).

MBTOC also acknowledges that the Party has provided further information after the OEWG which states that the Party intends to phase out MB for this sector by the end of 2016.

MBTOC considers that alternatives (1,3-D/Pic and chloropicrin under the new permitted rates of up to 392 kg/ha) with or without barrier films, not restricted by regulations, are available to replace MB for specific uses, including *Macrophomina sp.* and *Fusarium spp.* in particular counties. This situation should also allow for greater use of 1.3-D/Pic formulations on a greater area where township caps are binding. MBTOC also considers that the alternatives suggested to replace MB for this nomination are similar to those already in commercial practice in California, however there are a number of regulatory issues that impact transition and therefore a three year period of transition period may be required. If the Party determines that chloropicrin and its mixtures can be implemented faster than the specified 3 year transition period from 2014 onwards, then it is anticipated that the Party will reduce the amount of MB further under its own domestic allocation rules.

Nomination by the Party:

The Party nominated 373.660 t for 2,198 ha at a dosage rate of 170 kg/ha for use in 2015. The proportion of total crop area to be treated with MB was noted by the Party as 13.5%. The CUN amount represented a 10% transition in 2015 from the exempted amount in 2014.

Circumstances of the Nomination by the Party:

The CUN requests MB specifically for areas: 1) where *Macrophomina* and *Fusarium* have not been acceptably controlled with alternative fumigant methods, 2) where a transition period is necessary to implement use of straight chloropicrin, and 3) where township caps adversely impact the use of 1,3-D as an alternative. There was no further breakdown of the rationale for each provided by the Party for the reduction in 2015, nor an action plan for total phase-out of MB.

At the bilateral with MBTOC, the US advised that they are planning further work to test the efficacy of metam-sodium on *Macrophomina* under California conditions. The Party also plans to gather data on the efficacy of the high rate of chloropicrin under TIF and its ability to control diseases caused by *Macrophomina, Fusarium* and *Verticillium* in commercial field applications over time on California strawberries and will apprise MBTOC of its findings.

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015

MBTOC reassessment for 2015 after the OEWG:

MBTOC maintains that shank applied 1,3-D/Pic as well as other similar Pic mixtures, Pic alone or Pic in sequential application with MITC generators (KPam, Vapam, dazomet) coupled with disease tolerant varieties of strawberries would be suitable to address a significant proportion of one or more of the 3 issues raised by the Party as a reason for the nomination (Medina-Minguez 2012, Noling and Cody 2011, Porter *et al.*, 2006, Zveibel *et al.*, 2012,). MBTOC also notes that formulations with chloropicrin are the key chemical alternative effectively adopted in other regions of the world. MBTOC notes that the technical expertise required for application of 100% chloropicrin already exists in California and uptake of this method should be feasible relatively quickly. As the nomination is for 2015, there is an additional period to gain further experience with these high rates of chloropicrin to accommodate both technical and regulatory issues, such as worker and bystander safety and effective pest control. Average annual use of chloropicrin for the last five years in California strawberry industry is of 1,786 t which accounts for 70% of the use of this product in the State (Cal DPR, 2012). There has been an increased use of chloropicrin alone and in formulations with 1,3-D in California. Their use has almost tripled between 2006 and 2010 (Cal DPR, 2012) whilst its use in formulations with MB has been declining.

Macrophomina phaseolina is a widespread fungus all over the world in many crops. MBTOC recognizes *Macrophomina* has increased in importance as a pathogen of strawberry crops in the last decade. Recent studies show effective alternatives to MB to control this pathogen in some countries. In Florida, Noling & Cody (2012) showed that 1,3D; DMDS+Pic; Vapam and KPam are as effective as MB for season-long protection of this pathogen. Zveibil *et al.,* in Israel (2012) also reported that metam sodium was as effective as MB. TeloDrip has given inconsistent results, which confirm the Parties' concerns with drip fumigation (Zveibel *et al.,* 2012). A number of cultivars are also considered to provide options for tolerance to this disease (Fang *et al.,* 2012; Daugovish *et al.*, 2011). MBTOC reiterates its 2010, 2011 and 2012 suggestion that shank injection of 1,3-D/Pic by strip or broadcast application would result in improved disease control compared to drip applications (Noling and Cody 2012, Medina-Minquez 2012, Zveibil *et al.,* 2012). Also in previous assessments it has been suggested that alternatives (1,3-D/Pic and Pic alone with or without barrier films), if not restricted by regulations, were considered available to replace MB for specific uses, including *Macrophomina* and *Fusarium* in specific counties.

MBTOC recognizes the potential benefit of the establishment of a new committee (Strawberry Non Fumigant Workgroup) to evaluate and adopt further chemical and non-chemical technologies such as anaerobic soil disinfestation, soilless substrate systems and steam (CalDPR, 2013).

MBTOC also notes that as of December 1, 2012, a new set of label changes went into effect for soil fumigant products, fully implementing important new protection for workers and bystanders. In light of these changes, the State of California now allows the use of VIF films for MB fumigation, which was formerly prohibited (Cal DPR, 2012b & c; EPA, 2013). MBTOC is at this time unclear on the impact this change could have in terms of potential reduction of MB dose rates as well as emission control. Studies continue to show the advantages of barrier films and other technologies for reducing emissions and improving efficacy of alternatives as well as MB (Qin *et al.,* 2013; Chellemi *et al.,* 2013; Luo *et al.*, 2013) and anticipate the party will fully address this issue in any future nominations.

MBTOC comments on economics in 2013 for 2015:

A recent peer reviewed study (Mayfield and Norman, 2012) highlights the strong growth in output in the California strawberry industry since 2004. This publication also questions the accuracy of the economic data (and varying yields) in CUNs and how this makes analysis of the economic information difficult.

The present CUN states that "The economic analyses…indicate fumigant-treated soils can result in gains or losses to net revenues that range from -37% (with drip Pic-Clor60) to 9% (with 100% broadcast chloropicrin), based on the cost of the individual fumigant and estimated yield loss".

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014	CUN for 2015	MBTOC final rec for 2015
	The information provided in the CUN excludes fixed costs from the calculation of changes in net revenue because "... fixed costs are considered to be identical for all alternative scenarios ..." but by convention when fixed costs can be allocated fully to a specific activity they should be included in a partial budget. Because this has not been done, steam appears to be an economically feasible alternative. **Comments Requested in Dec. XX1/11 (para 9):** **Dec. IX/6 b(i) Emission reduction:** In California low permeability (high barrier) films are not allowed for use with MB, but are allowed and available for use with alternatives, this regulation is presently under review. **Dec. IX/6 b(ii) Research program:** Yes, there is an on going research program, but specific data justifying CUN requests need to be provided. **Dec. IX/6 b(iii) Appropriate efforts:** California has extensive research programs being conducted and continual regulatory reviews on the use of MB and other fumigant alternatives in the State. MBTOC is unaware from the CUN application what efforts are being made to register some alternatives registered and being used in other areas of the USA (eg. Pic-Clor 60 and 80, DMDS in combination with Pic).												

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

d 16MOP; [2]16MOP+2ExMOP[2]16MOP+2ExMOP+17MOP; [3]MOP17+MOP18; [4]MOP18+MOP19; [5]MOP19+MOP20; [6]MOP20+MOP21; [7]MOP21+MOP22; [8]MOP22, [9]MOP23

1.5 Final evaluation of CUNs: Structures and Commodities and Report on Emergency Use by Canada of MB for Pasta Warehouses

MBTOC, Structures and Commodities (SC), Soils and QPS, met initially together in London, United Kingdom April 3-5, 2013 to develop interim recommendations.

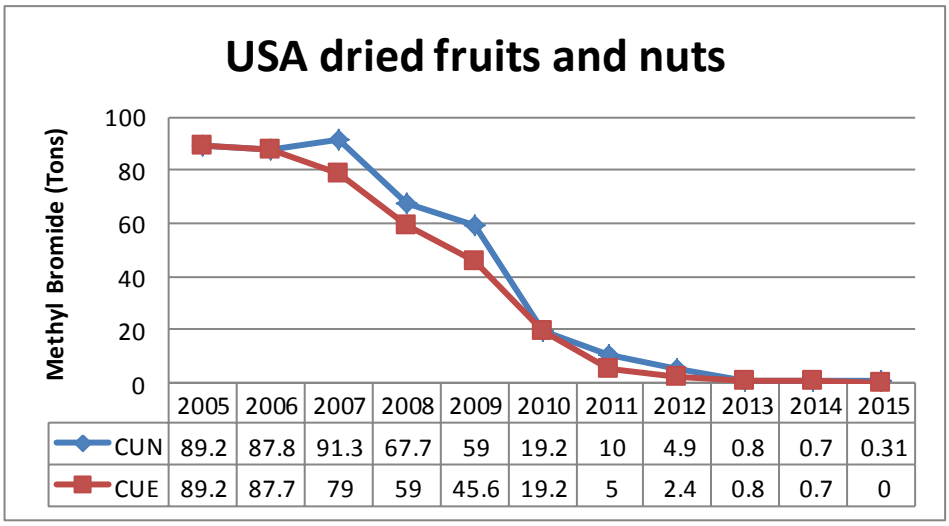
Those recommendations were included in the May 2013 TEAP Report and presented to the OEWG meeting in June in Bangkok. Although MBTOC met bilaterally with Parties in Bangkok, no Party requested re-reviews of the postharvest CUNs. Consequently the interim CUN recommendations became final recommendations as indicated here.

In 2012 there were five CUNs submitted by three Parties. By contrast, in 2013 there were two postharvest CUNs submitted by Parties. In 2013, the US submitted two postharvest CUNs for 2015; one CUN was for dry cure pork and for CUN was for fresh dates (formerly included in the dried fruit CUN).

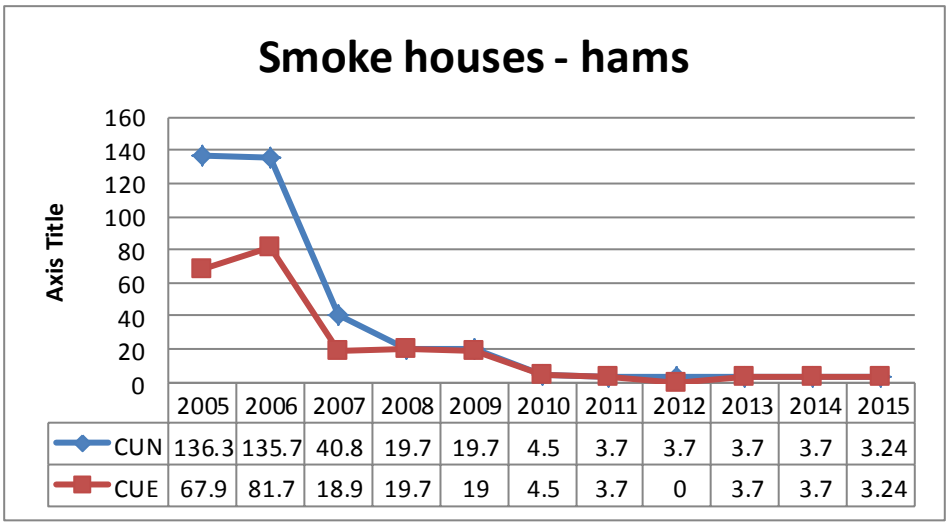
Between 2012 and 2013, applicants from three Parties: Australia, Canada and the US, were able to complete their planned adoption of alternatives. Accordingly, Australia did not submit a CUN for rice processing, Canada did not submit a CUN for flour milling and the US did not submit a CUN for flour milling and also several dried fruit sectors. Completing the adoption of these former methyl bromide applications was no doubt difficult and required effort of the industry and government; MBTOC was happy to hear of these successes.

For more information on the process used to determine the recommendations and other work conducted by MBTOC, Parties are referred to the May 2013 TEAP report for those details.

Figure 1-2*: *Amounts of MB nominated and exempted for CUE uses in Dates and cured pork from 2005 to 2015. Blue lines indicate the trend in of CUN nominated and the red lines the amount CUE methyl bromide approved by the Parties



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CUN	89.2	87.8	91.3	67.7	59	19.2	10	4.9	0.8	0.7	0.31
CUE	89.2	87.7	79	59	45.6	19.2	5	2.4	0.8	0.7	0



1.5.1 MBTOC Report on Canada's Emergency Use of Methyl Bromide to Fumigate Pasta Warehousing

1.5.1.1 Executive Summary:

In August, MBTOC was informed that Canada used methyl bromide (MB) to fumigate two pasta warehouses in response to the finding of *Sitophilus oryzae* (rice weevil) in pasta packages and in the warehouse following three fumigations with a phosphine combination process. The pests were later determined to be phosphine resistant. Multiple documents were submitted using the format for Critical Use Nominations accompanied by test results and other supporting documents.

Canada has an Emergency Use provision in domestic regulation. Permits to import and use methyl bromide under the emergency use provision are issued under the Ozone-depleting Substances Regulations, 1998 (Environment Canada).

The finding of phosphine resistant pests is both scientifically significant and of concern vis-à-vis the ability of Parties to use alternatives to MB. For example, MBTOC members noted that there were no previous published reports of phosphine resistant pests in Canada. Therefore, following the circulation of Canada's documents, several MBTOC members had questions about the situation and the use of MB in this circumstance.

MBTOC was unsure if it could send questions to the Party about this situation. Accordingly, we wrote Mr. Marco Gonzalez (Ozone Secretariat Executive Secretary) who responded that we were allowed to ask questions. Mr. Gonzalez also asked MBTOC, through TEAP, to prepare a report examining the Emergency Use focused on analyzing the cause of this use and recommending methods (if possible) to avoid similar situations and uses of MB in the future.

Emergency MB use is allowed under the Montreal Protocol. The Emergency Exemption for ODSs, other than MB, require consultation with TEAP prior to use and approval of the Ozone Secretariat, whereas the Emergency Exemption for MB specified retrospective review by MBTOC.

In his response to MBTOC, Mr. Gonzalez cited Decision IX/7 concerning emergency uses by Parties, "To allow a Party, upon notification to the Secretariat, to use, in response to an emergency event, consumption of quantities not exceeding 20 tonnes of methyl bromide. The Secretariat and the Technology and Economic Assessment Panel will evaluate the use according to the "critical methyl bromide use" criteria and present this information to the next meeting of the Parties for review and appropriate guidance on future such emergencies, including whether or not the figure of 20 tonnes is appropriate."

This is a consensus report of MBTOC.

1.5.1.2 Summary of Information Received from the Party

The basis for this summary of the Party's viewpoint is the CUN form, test reports, climate reports, and correspondence from the Party.

a. Fumigation and Pest Aspects:

Canada allowed the emergency use of 6,171 kg for the fumigation of two warehouses which held packaged pasta products. The pasta warehouses were owned by a Canadian pasta manufacturer located in the Province of Ontario, which had formerly submitted critical use nominations (MBTOC does not release company names).

One large pasta warehouse (166,750 m^3), was directly connected to the pasta processing facility and from there pasta packages were moved to the other, smaller, nearby warehouses (21,904 m^3). These warehouses had previously been fumigated with methyl bromide under critical use exemptions.

The Party reported the gas tightness of these warehouses to be 'poor'. MBTOC, in its Critical Use Nomination forms, which were also used by Canada for this Emergency Use notification, defines 'poor gas tightness' as "**poor** – 50-90% gas loss within 24 hours or half loss time of pressure difference 1-10 second". The Party later supplemented this information by saying, "Every effort is made prior to fumigation to ensure that the warehouse is adequately sealed to prevent gas loss and to maximize the effects of the methyl bromide fumigation. External ambient air monitoring reports showed 0 ppm of methyl bromide over the course of the fumigation, indicated sufficient sealing to ensure a successful and efficient fumigation." The gas tightness efforts were described as, "At all facilities, the doors, windows and vents in the structures are sealed with heavy duty 6mm tarp during a chemical fumigation to ensure that a suitable gas concentration can be maintained over the time period required for control of insects and rodents. "

Canadian regulation allows the fumigation of empty food processing premises with sulfuryl fluoride, however there is no food tolerance for sulfuryl fluoride in Canadian regulation. As a result, food products cannot be fumigated with sulfuryl fluoride in Canada.

Following the loss of the ability to use MB, both these warehouses were four times fumigated with a combination process that relied on Eco2Fume® (cylinderized phosphine), CO_2 and heat. The concentration of Eco_2Fume® used in 2010 was 300 ppm, which caused extensive damage by corroding machinery and equipment. In 2011, the concentration of Eco_2Fume used was 200 ppm. While this later concentration did not eliminate the corrosion damages completely, the damages were limited.

To limit corrosion risk in the facilities, at seen with Eco_2Fume® fumigations in 2010 and 2011, the last two fumigations with the aforementioned combination were conducted a low dosage rates of phosphine. During the July 2012 fumigation phosphine dosage rates ranged between 60 to 90 ppm, with an average of 71.5 ppm over the course of the 24 hour fumigation. The concentration of CO_2 during that same time was in excess of 6% while interior temperatures were on average 24°C. During the September 2012 fumigation phosphine dosage rates ranged between 70 to 172 ppm, with an average of 121 ppm over the four days from September 14 to 17. The concentration of CO_2 during that same time was approximately 6% while interior temperatures were on average 24.3°C. (Although adverse weather events can impact fumigation efficacy, the Party reported that no unusual weather events were reported during the fumigations. During the July 2012 fumigation, exterior temperatures averaged 21°C while during the September 2012 fumigation, the average exterior temperature was 16°C. Therefore the temperatures reported in the warehouses were likely a result of supplemental heat applied by the fumigator company.)

Noting that the July 2012 fumigation was ineffective in killing the pests, Canada reported on the applicant's measures to conduct a more effective fumigation in September 2012. The information provided shows that the phosphine treatment exposure period was increased from 24 hours during the July 2012 fumigation to over 72 hours for the September 2012. Additionally, average phosphine levels were increased from 71.5 ppm during the July 2012 fumigation to 121 ppm during the September 2012 fumigation.

Unfortunately, pests survived the second fumigation resulting in concerns about possible pest resistance to phosphine treatment. Canada notes that phosphine resistant pests have never before been reported in Canada.

Following the finding of surviving pests after the second fumigation, the applicant company sent infested pasta packages to a US fumigation company with sufficient scientific resources and experience to test for insect resistance. The test protocol of the UN Food and Agriculture Organization (FAO) for insect resistance was used (although there were slightly fewer test insects than needed to fully satisfy the protocol). The test method and reports confirming the resistance to these *Sitophilus oryzae* survivors to phosphine were sent to MBTOC. The American company noted this was the first instance in their experience of this species being resistant to phosphine.

The Party reported the applicant has plans intended to prevent another request for an emergency use of methyl bromide in the future. The applicant company has implemented a new partnership pest control program with a different licensed pest control company. The program includes additional time spent in the facilities (16 hours/week) using integrated pest management (IPM) tools such as additional visual inspections of facilities and packed product, locating and removing infested products. (MBTOC stresses the importance of a stringent IPM program and also notes that 16 hours/week may not be sufficient. Full-time staff in the facility should be trained to more carefully clean and monitor pests and take action early.) Any infested products will be fumigated off site. The pest control program also includes the use of pheromone traps, residual and ULV treatments. (Although the Party noted that there is no commercially available pheromone traps for *Sitophilus oryzae*.)

When fumigations with Eco2Fume® are resumed in 2014, the company will ensure that temperatures are at least in mid-20 ºC and the gas concentration is between 200 to 250 PPM, with an exposure time of 48 hours. To limit any corrosion from any future use of phosphine based products, sensitive equipment (such as computers, telephones, forklifts, light fixtures) will be removed or protected by tarps.

b. Economics Aspects: Costs of fumigation and pest contamination

The concentration of Eco_2Fume® used in 2010 was 300 ppm, which caused extensive damage by corroding machinery and equipment. Cost of the corrosion damage following the 2011 Eco2Fume® fumigation was approximately $25,000.

Following the 2010 fumigation, a combination process of Eco_2Fume®, CO_2 and Heat treatment in combination was done twice, BUT, the phosphine concentration was reduced. These two fumigations failed to kill the pests present. The cost of the two fumigations was reported as:

Cost of two fumigations:	$114,200
Disposed product costs:	$117,845
Trailer rental costs	$58,496
Temporary labour costs:	$108,264 (used to sort product to prevent from shipping infested pasta)
Total:	**$398,805**

The pasta company noted concerns about its reputation if infested products were circulated in the marketplace.

The cost of the methyl bromide fumigation was reported as approximately $100,000.

1.5.1.3 Comments by MBTOC

a. About the fumigation methods

Sub-lethal fumigations occur when one or more of the necessary fumigation treatment parameters are insufficient; achieving the necessary concentration of the fumigant, for the necessary time is key to a successful treatment (defined as one that kills all life stages of the stored product pests in question). These treatment parameters can be manipulated somewhat by changing environmental conditions such as increased temperature, which increases pest respiration and usually hastens death.

Identifying the correct treatment parameters involves first a knowledge of which pests are of concern, since their sensitivity to fumigants and environmental conditions varies. There are numerous papers available showing that pest species vary in their response to phosphine; Hole *et al*, 1976 discusses phosphine sensitivity to a wide variety of stored product pests. Additionally, Parties are encouraged to review MBTOC's previous Progress, CUN and Assessment reports.

Repeated sub-lethal fumigation treatments can lead to pest survivors. This is due to the survival during such treatments of resistant insects already present in populations, a process often termed selection. Non-resistant insects, however, will probably be killed. The offspring of surviving insects will also be resistant and the proportion of resistant insects in populations will be likely to increase with subsequent sub-lethal treatments. As a result the fumigant can become ineffective in controlling damaging insect.

Two early, but valuable, papers on phosphine resistance are Monro *et al*, 1972 and Nakakita 1987. The biological mode of action of phosphine resistance has been shown to be lack of uptake of phosphine by resistant pests as described by Price, 1984 and Reichmuth, 1990.

With the loss of methyl bromide to the pest control arsenal, it is absolutely critical that the use of alternative treatments be conducted properly, because the world cannot afford to lose more useful fumigants.

The phosphine, CO_2 and heat combination treatment method not well documented in scientific or industry literature, beyond that of a treatment in a Canadian cereal mill in the 1990's. The process has been used commercially in some mills in Canada but little has been written about it. Essentially, the method involves protecting electronic equipment (which can be damaged by exposure to phosphine) with plastic bubbles filled with CO_2. The early Canadian report noted that CO_2 was added to the mill as a combination treatment and not just to protect equipment. MBTOC is unclear how the CO_2 was used in the warehouses in this current situation.

MBTOC notes that there is not clarity in the research literature that CO_2 will allow the use of lower dosages of phosphine. Valizadegan *et al* (2012) noted that CO2 was effective in allowing lower dosages of phosphine (although this research team did not test *Sitophilus oryzae*) – but the dosages and temperatures used in Canada were lower..

Cylinderized phosphine is used to speed up the spread of the gas and supplemental heat is used to hasten the insect response to the gas. It is difficult to balance the need for a phosphine concentration high enough to kill pests with a concentration low enough not to cause extensive damage to elements of the mill or warehouse.

Nevertheless, without sufficient phosphine concentration and time the pests will not be killed and repeated fumigations at higher concentrations and time will also not kill them. (Noting also the factor that there are usually regulatory limits on the concentrations of fumigants that can be used.) Reichmuth, (1994) reported on differences of incorporation of phosphine by susceptible and resistant insects.

In response to the first treatment, where pest kill was good (300 pppm), damage to warehouse electronics was reported. In the next fumigation the phosphine dosage was 200ppm, which should be considered a minimum dose (see comments on Eco2Fume® label below). Pest control was achieved but some damage was reported. Then, without apparent critical thinking of the pest control impact, the phosphine dosage was significantly decreased, to the point where it was not an effective fumigation (60 – 90 ppm). A second fumigation at a higher but still insufficient dosage (70 – 172 ppm) and longer time also did not kill the pests.

The Eco2Fume® application manual (label) for Canada gives the following table: (Cytek Canada)

DOSAGE GUIDE
Recommended Dosages For ECO2FUME® **Fumigant Gas Phosphine**

Temperature	**Concentration**	**Maintained Duration**
Below 0º C (32 ºF)	Do not fumigate	Do not fumigate
0-4º C (32-39º F)	200 - 1000 ppm	6-14 days
5-12ºC (40-53º F)	200 - 1000 ppm	4-10 days
12-15ºC (54-59º F)	200 - 1000 ppm	3-5 days
16º C (60º F)-above	200 - 1000 ppm	2-3 days

MBTOC notes that neither of the 2012 fumigations reached the critically needed concentration of phosphine (200 ppm) for the required length of time (longer than 48 hr) as prescribed by the Eco2Fume® label. Temperature should also have been higher (above 25˚C, especially since the dosage and duration used is at the low end of the range).

MBTOC notes that temperature should be measured in the product when it is product (rather than facility) which is infested. The Party has only reported one temperature reading and that is insufficient to measure temperature. This becomes particularly important given that the September 2012 fumigation environmental temperature was lower (16˚C), therefore with a facility of poor gastightness there is potential for cool spots in the facility, which can further decrease fumigant efficacy.

It is no surprise that 48h fumigations of pasta facilities with low doses of phosphine fail to fully control pest beetles and weevils, particularly if naturally tolerant species/developmental stages are present (e.g., *Sitophilus oryzae*).

Following the September 2012 fumigation, the applicant company again noted the persistence of pests in pasta packages. Concerned that they could not find all the infested packages by visual inspection, knowing that if infested pasta was to enter the market place that company reputation would be harmed, and apparently not wanting to destroy all the pasta in the warehouse, applied for an emergency use of methyl bromide for the warehouses and the pasta contained therein, via Canada's domestic regulatory provisions for such use.

b. About the potential to destroy infested packages instead of fumigation

MBTOC is unaware of the extent of the infestation in these warehouses. These were large warehouses (one was very large); we acknowledge it is difficult, and sometimes impossible to locate infestation in a large warehouse. Therefore we do not know if it would have been possible, or not, to locate the infestation and destroy infested packages instead of conducting a fumigation. Generally speaking we

are not in favour of unnecessary food wasting but in the instance of a localized infestation, destruction, instead of fumigation should be considered. (In fact since food laws of most countries do not allow the sale of infested materials, whether pests are dead or alive, the destruction of infested packages is the norm.) We note that dead insects in food packages in quantities visible to consumers can cause just about as much consumer consternation as live insects. Therefore fumigation might not resolve the concern about consumer complaints.

Since the Party later reported that before the fumigated product was shipped, visual inspection of packages was conducted (followed by destruction of packages that appeared to have been infested). Therefore MBTOC wonders if another resolution of this problem might have been to conduct visual inspection before fumigation, then destroy infested or questionable packages, move non-infested items to a non-infested warehouse and fumigate the empty warehouse with sulfuryl fluoride as is allowed in Canadian regulations.

MBTOC asks whether visual inspection might have been a possibility in this instance of infestation by *Sitophilus oryzae* (as opposed to, for example, infestation by moths or some other pests) because *Sitophilus* is not quite as mobile and not as good at penetrating packages as some other pests (although *Sitophilus* is capable of drilling through packaging materials).

Sitophilus contamination usually occurs pre-packaging. Although the Party noted that the origin of the infestation was not found, the applicant company did fumigate the empty pasta processing facility with sulfuryl fluoride during the time that the warehouses were fumigated with methyl bromide. MBTOC hopes this will have resolved the problem of the origin of the infestation.

c. About the use of methyl bromide in facilities of poor gastightness

MBTOC is on record over several years of not accepting the use of MB in facilities noted to be of poor gastightness as defined by leak tests ("**poor** – 50-90% gas loss within 24 hours or half loss time of pressure difference 1-10 second"). In fact a facility with poor gastightness should not be considered to be a candidate for any fumigation; the fumigant leaks out, concentrations dip below necessary values, it is difficult to reliably determine fumigant concentrations, more gas must be added contributing to excessive costs etc.

Methods of improving gastightness of facilities prior to fumigation have been well described by many authors and are well known to the pest control industry. Reichmuth (1990a), described methods of testing gas tightness by pressure testing and impacts on fumigation costs.

MBTOC asks whether it would have been possible in the circumstances of these warehouses to manage the fumigation of infested packaged material by shrouding the infested material with leak-proof tarps using methods to result in good gastightness under the tarp and then only fumigate the infested material and not the entire (and in this case quite large) warehouse. However this method would only have been possible if the infestation was both localized and located, and MBTOC does not know if this was the case.

d. About the method used to determine pest resistance

The applicant company sent infested pasta packages to an American company known to have the scientific resources and experience necessary to conduct pest resistance testing.

This testing company's full report has been sent to MBTOC by Canada. We note that although the accepted FAO method to determine pest resistance was altered by virtue of having less pests available (only 50 pests) and somewhat less time (5 days instead of 14 days). There are reports indicating that *Sitophilus* mortality can be seen 10 – 14 days after phosphine treatment, therefore with *Sitophilus* it is even more important to hold the test pests long enough to properly judge mortality (Quereshi *et al*, 1965; Nakakita *et al*, 1974)

In spite of these deficiencies, MBTOC accepts the test company's assertion that the *Sitophilus oryzae* resulting from the insufficient fumigations in Canada were *likely* to be resistant to phosphine. This is the first reported incidence of phosphine pest resistance in Canada and the first instance that this experienced testing company has observed of pest resistance of this species.

In future, if the FAO method is to be used, MBTOC recommends it be followed as prescribed because then there is more certainty in the result. The reason that the correct use of resistance test protocols is needed is that in the past failed fumigations with phosphine have been claimed to be due to insect resistance when this has been in doubt and may have been the result of poor quality treatments, or fumigant leakage or other problems in fumigation technique.

The FAO test method while useful and precise, is tedious and time consuming. It produces reproducible and quantitative results, giving a quantitative measure of resistance level under the test conditions (20h exposure, adult insects). It has two major drawbacks in practice - it requires breeding up of a population of insects for testing (6 weeks or more) and it requires controlled laboratory conditions to carry out the testing, with a degree of training and experience in the method. It is therefore often not often used with the result of possible spread of resistant pests to other regions. MBTOC members report that other, faster and easier test methods are also available and could be used if this situation were to arise in other regions (Reichmuth, 1991b). Use of faster resistance tests allows on-site adjustments to fumigation parameters which can then result in effective fumigation and elimination of resistant pests (Mills, 2000)

As a substitute, the semi-quantitative quick test, as described by Savvidou *et al* (1994) and Bell *et al* (1994), can be carried out on site or in a minimally equipped laboratory. It is easy to do with minimal training. It used insects as collected, without requiring breeding up of test populations. As modified so that observations are taken at various times over 24 hours, it produces assessments of resistance levels quickly. The results are obvious to site operators if carried out on site.

Nayak et al (2012) provide a version of the quick test that discriminates between various levels of resistance. This is important as it allows setting of dosages for effective control of the tested strains. The rapid test permits rapid screening of a large number of samples. It forms an important part of current phosphine resistance screening in Australia. Populations found to contain resistant insects can be assessed later by the slower FAO method if desired.

e. About the costs to conduct repeated fumigations

As with many other things, the cost of doing things right the first time is less expensive in the long run.

f. Recommendations

Avoid pest infestation, spread and the need for fumigation through the use of a stringent IPM program managed by experienced and capable pest control operators. A stringent IPM program with its enhanced emphasis on sanitation, monitoring, identification, and treatments intended to minimize pest harborage, multiplication and spread is the first and best line of defense against pests. A stringent IMP program is both a necessary and effective pre-requisite to any full site treatment.

Avoid the development of pest resistance by correct (labelled) use of fumigation concentration and time, based on a knowledgeable assessment of the pests present and only fumigate facilities or structures of 'good' gastightness.

Methyl bromide should not be used in facilities of 'poor' gastightness.

If pest resistance is thought to be possible, use quicker tests which can then allow for a more targeted and more effective follow-up fumigation.

Parties may find previous MBTOC Progress, CUN and Assessment Reports to be useful references when faced with pest control problems.

1.5.2. Details of Postharvest CUN evaluations

Parties have submitted two CUNs for the use of MB in structures and commodities in 2013. This year all CUNs were for one year – 2015.

The total MB volume nominated in 2013 for non-QPS post-harvest uses, was 3.550 tonnes. Of the nominations in 2013 for 2015, MBTOC recommended 3.240 tonnes (Table 1-5 and 1-6). Table 9-11 provides the MBTOC-SC final recommendations for the CUNs submitted.

Table 1-5: Summary of the final recommendations by MBTOC SC (in square brackets) for CUE's for postharvest uses of MB (tonnes) for 2015 submitted in the 2013 round.

Country and Sector	**Nominated in 2013 (tonnes)**	**Recommended for 2015 (tonnes)**
United States – cured pork	3.240	[3.240]
United States – fresh dates	0.310	[0]
Total	**3.550**	**[3.240]**

Table 1-6: Final evaluations of CUNs for structures and commodities submitted in 2013 for2015

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015
United States	Commodities (Dates only)	89.166	87.719	78.983	58.921	45.623	19.242	5.000	2.419	0.822	0.740	**0.310**	**[NR]**

MBTOC Final Recommendation for 2015:

MBTOC does not recommend the use of methyl bromide for fresh dates in the United States in 2015.

Nomination by the Party:

The Party nominated 0.310 tonnes of methyl bromide for fresh dates in 2015. The nomination represented a 58.1% reduction in the former US Commodities CUN of which dates was an element in previous years. In 2012, as part of the Commodities CUN, the Party nominated 0.325 tonnes for dates, and therefore the 2013 CUN for dates represents a 4.6% reduction in the amount nominated for dates compared to 2012.

Circumstances of the Nomination:

This nomination is for the portion of fresh dates for which quick shipment (defined as either three or 3-5 days in the CUN and subsequent correspondence) to the fresh market segment. The Party notes that phosphine and sulfuryl fluoride are the primary fumigants for dates, although sulfuryl fluoride has not been found to be effective at killing the eggs of pests at temperatures at or below 26.6˚C (80°F) which often occurs in Riverside County of California, their main date production area.

The Party noted that fumigation with phosphine takes approximately 3-5 days, whereas MB fumigation is less than 24 hrs. As a result, when market demands fast turnaround immediately before shipping, methyl bromide treatment, typically a 20h exposure, is still required, according to the Party.

The Party noted that, currently, methyl bromide is the only treatment available to rapidly disinfest California dates at harvest time, when up to a million pounds per day are harvested within a relatively tight timeframe during the fall. These dates are harvested by hand, and growers need to get them to the marketplace in three, or 3-5 days, to meet the demand of a market segment for fresh dates.

MBTOC Interim Assessment in 2103 for 2015:

MBTOC was unable to recommend this nomination because there are technically effective, commercially available alternatives and because the need for a three-day market window for the approximate 25% of the total harvest volume nominated was not substantiated by the Party. MBTOC was unable to determine a justification, technical, economic, market, regulatory or otherwise for the necessity of marketing within three days, as compared for example, to marketing within five days.

In past, MBTOC's text boxes have reported its concern about the length of time the sector is taking to make the logistical changes to enable the use of phosphine or other alternatives. MBTOC's text boxes for the past few years have indicated a need for the date and dried fruit sector to hasten the expansion of its phosphine fumigation capacity.

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015

The California date sector conducts phosphine fumigation in chambers and also conducts fumigation in crates under tarps in the field -- for which it seems there is more than adequate capacity for expansion. By harvest 2015, MBTOC considers there is time to make logistical changes to expand phosphine treatment facilities which would allow for a staged release of sufficient product to meet a market demand for freshly harvested dates.

For example, the use of phosphine generators or cylinderized phosphine (as opposed to solid forms of phosphine) would, for the warmer harvest months of August to October, result in three days or shorter phosphine treatment being effective. Using the example of other commodity marketing, the strongest consumer demand for fresh fruit often occurs in the beginning of the new harvest period. For dates the harvest period begins mid-August, a time of high temperatures in the California date producing region. This means that in the early harvest months the high ambient temperatures will assist to ensure an adequate phosphine treatment within three days.

In California, date harvest continues until mid-December. In the colder months, phosphine treatment without supplemental heat would require four to five days, but if the chamber or bag stack was to be heated to > 25˚C, the treatment time would be closer to three days. (Readers can refer to table below pertaining to the time, temperature and concentration parameters as recommended by the manufacturer for treatment of dried fruit by cylinderized phosphine, although MBTOC would recommend longer exposures).

ALLOWABLE PHOSPHINE DOSAGES FOR $ECO_2FUME^{®}$[1,2,3]

Temperature	PH_3 Concentration Maintained/1000 ft^3 of Area	Rate of $ECO_2FUME^{®}$/1,000 cu. Ft.	Minimum Duration
Below 32ºF (0º C)	Do not fumigate	Do not fumigate	Do not fumigate
32-39º F (0-4º C)	200-1,000 ppm	0.88 – 4.41 lb	6 days
40-53º F (5-12º C)	200-1,000 ppm	0.88 – 4.41 lb	4 days[4]
54-59º F (12-15º C)	200-1,000 ppm	0.88 – 4.41 lb	3 days
60-79º F (16-25º C)	200-1,000 ppm	0.88 – 4.41 lb	2 days
80º F & Above (≥26º C)	200-1,000 ppm	0.88 – 4.41 lb	36 hours
80º F & Above (≥26º C)	500-1,000 ppm	2.20 – 4.41 lb	24 hours

Changing the current methyl bromide treatments to phosphine treatments would interrupt logistics of market once, and only for a couple of days because as new commodity is harvested frequently (or daily), and treatment by phosphine would be staged frequently (or daily), it stands to reason that each day would see the completion of fumigation and the newly treated dates would be then available to meet the market demand for fresh dates.

Phosphine has been commercially adopted to control pests of dried fruit. It has been widely adopted in all dried fruit producing countries. As temperature is an important parameter, this work done in Turkey is helpful. According to Tutuncu et al, 2012, phosphine applications at a concentration of 200 ppm at 15oC gave a complete mortality in all life stages of *C. hemipterus* in 36 h of exposure. Results also showed that complete mortality time of eggs, larvae, pupae and adult stages of *C. hemipterus* was found to be 36 h, 12 h, 24 h, and 16 h, respectively. Complete mortality times of 1- and 2-day-old eggs were 36 h and 20 h, respectively. For 1-, 2- and 3-day-old pupae, total mortalities were obtained after 24 h, 16 h, and 14 h of exposure, respectively.

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015
	MBTOC also notes that the efficacy of heat treatment is both well-known and commercially established in other countries (Navarro et al, 2006.) Compared to phosphine, heat treatment has the added benefit of actually removing the larvae from the fruit because they exit the fruit to escape. The eggs of insects are highly susceptible to heat treatment, dying within a few minutes. Unlike chemical treatments, heat is consistent with organic certification regulations in most countries and often organically certified product obtains a higher price in the marketplace. Heat treatment also allows the treatment and sale of dates while the dates are still attached to small branches; this is a very good-looking fresh product well appreciated by consumers of fresh dates in other countries. There is, however, a need for the California date sector to resolve practical adoption issues for heat treatment. As noted by Finkleman et al, (2010) in Israel, heat treatment with Deglet-Noor (one of the two date varieties included in the US CUN), was not successful because the large crates (200 – 400kg) did not allow for fast enough heat transfer. MBTOC notes that the same crate size is used in the United States. However, as it is clear that heat treatment disinfests dates; it is worth the effort to overcome practicalities by using smaller crates or by using an in-line processing system and doing the needed food quality assessments. As this CUN pertains to MB use in 2015, and having studied the adoption of heat treatment in Israel, MBTOC believes that the logistical and practical issues could be resolved by 2015. **MBTOC Comments on Economics 2012:** Dates: The CUN is largely, but not entirely, based on technical, rather than economic arguments. The Party reports only on the economic comparison of sulfuryl fluoride versus methyl bromide. Sulfuryl fluoride costs less than methyl bromide. The Party did not report on the comparison of methyl bromide versus phosphine. MBTOC believes that phosphine costs considerably less than methyl bromide. **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i)** Emission control: Fumigations are conducted in chambers or under tarps of sufficient gas tightness. • **Dec. IX/6 b(iii)** Research program: Research on dates has been focussed and ongoing. A combination treatment of SF, carbon dioxide and propylene oxide continues to be researched as preliminary results were positive for dried fruits, but the registration approval scenario for this combination treatment indicates it would only be a longer term proposition. • **Dec. IX/6 b(iii)** Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration.												

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015
United States	Cured pork	67.907	40.854	18.998	19.669	18.998	4.465	3.73	3.730	3.730	3.730	**3.240**	**[3.240]**

MBTOC Final Recommendation for 2015:

MBTOC recommends 3.240 tonnes, the amount nominated by the Party for use in US dry cure pork in 2015.

Nomination by the Party:

The Party nominated 3.240 tonnes, a reduction of 13.1% from the amount granted by the Parties for this use in 2014. This reduction has been achieved by improvements in methyl bromide fumigation efficacy.

Circumstances of the Nomination:

Currently there are no commercially effective alternatives to methyl bromide for Southern dry cure pork, a regional, traditional product. The pests of this product are the red-legged ham beetle (*Necrobia rufipes*) and the ham mite (*Tyrophagus putrescentiae*). The US dry cure pork research program has identified the incidence of pests in dry cure pork facilities; 50-60% of plants have reported infestations of the red-legged beetle. The incidence of mites is approximately 60-70 %. (Shilling, in USG response to MBTOC Mar 30, 2010).

Of methods already considered and rejected, heat would alter the product unacceptably, and the only effective dosage of sulfuryl fluoride was three times the legal limit of use before mite eggs were controlled (and therefore not registered). (Phillips, et al., 2008).

There is an ongoing multi-university, multi-state research program which is focused on improving meat processing sanitation, IPM and pest control through a variety of possible fumigants. So, for example, the Party reports processors are now trying to steam clean, use approved disinfectants with acaricidal properties, or both, to sanitize their facilities when the hams are not present and before new hams are introduced.

In addition, prior to the phase-out of methyl bromide this industry tended to fumigate on a monthly basis. Plus processors brought in new hams into aging houses that also contained contaminated hams. This is no longer the case. Processors keep new hams away from the older hams and many have subdivided their aging house space to accomplish this. Southern cured pork processors only fumigate when the pests, or signs of the pests, are present.

MBTOC Interim Assessment in 2013 for 2015:

The US has a robust research program which has investigated, and reported to MBTOC, the progress and results of its investigation of every possible mite-control method suggested by MBTOC in its previous text boxes. More research to find an effective treatment (or combination of treatments), followed by commercial trials need to be conducted before any treatment can be considered an alternative to methyl bromide for treatment of ham mites.

Research is still ongoing with phosphine. The Party released and discussed results of commercial scale trials conducted in winter 2013. Unfortunately, these phosphine tests did not show adequate efficacy against mites. Additionally, problems were experienced such as significant damage to electronic elements of the facility. Further learning would be needed to determine if phosphine treatment parameters could be achieved which might improve efficacy and while avoid facility damage. MBTOC notes that problems in achieving efficacy in phosphine at commercial scale might be overcome by increasing temperature.

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015
	Additionally, the Party has noted that it intends to work on temperature-related control of mites for example, using both heat and cold as control measures. In the face of continued lack of success with what had been considered to be possible alternatives, and after considering the review of the Party's ongoing research, MBTOC's experts suggest a focus on the following aspects. While these steps might not eliminate the pests, it might take longer before hams are infested. These and other IPM steps might allow an increase in the time period between fumigation of the ham storage facilities. To this end, MBTOC agrees with the research being currently conducted by the Party to develop and test methods to quantify if and to what extent sanitation and pest control methods work to reduce mite infestation. 1. A continued focus on protecting the ham from mite infestation during the aging process. The Party's research on dips such as with propylene glycol, hot lard (90°C; with curative and preventive effects), and other substances seems to offer a promising method to prevent infestation of these pests. This kind of protection may also lead to improvement of the final quality of the ham by avoiding excess drying. Another protective measure is a physical barrier against mites. The suggestion is a fine mesh gauze that is wrapped around the ham pieces (Lehms et al, 2012). Data is available on the effectiveness of the size of the mesh to prevent invasion of all stages of Tyrophagus putrescentiae (<30 µm). Following MBTOC's release of this information in its 2012 text box, the Party has already begun testing and resolving practical aspects of implementing this method in the aging process. 2. Encourage measures which reduce pest pressure. Assess if improvements in environmental manipulation would decrease mite population and reduce re-infestation. For example, continue to make improvements outside of the facility to remove pest harborages, and also establish methods to prevent the entrance of mites into the facility by employees and other vectors. It might be possible that doorway shoe sanitization and ensuring employees change from street clothes to sanitized uniforms in the plant might reduce mite invasion. Improvements in the building might be necessary to reduce the ability of mites to survive treatment and then re-infest the facility. For example, changes which make the walls and floors easier to clean might decrease the resident mite population. Cement floors and metal storage racks can be more effectively cleaned by power washing with steam and bleach. 3. Continue to improve gastightness in facilities before fumigation. With improved gastightness, air circulation and temperature can be increased during the fumigation which will improve the effectiveness of the MB at the dosage of 20g/m3. 4. Continue to gather up-to-date information on the use of MB in this sector, by, for example, updating its 2008 survey on frequency of fumigation as it relates to length of ham storage. MBTOC notes that the 2012 survey of facilities was quite useful. Also continue to improve understanding of actual use of MB by facility as this might help benchmark the actions of some better performing facilities to assist the ham sector as a whole. **MBTOC Comments on Economics 2012:** The CUN is not based on economics. **Comments Requested in Dec. XX1/11 (para 9):** • **Dec. IX/6 b(i)** Emission control: Over the years the applicants have made facility improvements to improve gastighness, but this is a traditional meat curing process and some of the facilities are older and unusual. The research program continues to work with the applicants to improve gastightness, IPM and other process improvements which reduce the need for fumigation and result in decreased use of MB. This work needs to continue. Producers have modified their buildings both to make them more gas-tight and to exclude pests.											

Country	Industry	CUE for 2005[1]	CUE for 2006[2]	CUE for 2007[3]	CUE for 2008[4]	CUE for 2009[5]	CUE for 2010[6]	CUE for 2011[7]	CUE for 2012[8]	CUE for 2013[9]	CUE for 2014[10]	CUN for 2015	MBTOC rec. for 2015
	• **Dec. IX/6 b(iii)** Research program: Excellent research effort to date and still ongoing. A multi-state, multi-university research program is ongoing and full reports of research have been made available to MBTOC. • **Dec. IX/6 b(iii)** Appropriate effort: As with all postharvest registration issues, neither the applicant nor the Party mandated with Montreal Protocol nominations has control over pesticide registration. Phosphine is registered for use on processed meats such as cured pork but it has not been shown to be effective against mites.												

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

1.6. Activity Report 2013 and Workplan for 2014

1.6.1. Activity report for 2013

- Initial summarisation of the 2013 CUNs (initial sorting and recording carried out by the Secretariat).
- Preparation of questions for Parties. Assessment of responses received from Parties.
- First MBTOC meeting of MBTOC (in full) 3-5 April 2013 for assessment of CUNs (soils and SC). Further, the QPS sub-committee addressed Decision XXIII/5 and the full committee worked on updating the Handbook for Critical Use Nominations. Bilateral meetings were held by MBTOC-S and MBTOC-SC with the USA.
- Interim recommendations were agreed. The committee prepared the CUN Interim Report and the 2013 Progress Report (including QPS) for consideration by the 32nd OEWG.
- Version 7.1 of the 'Handbook for Critical Use Nominations" was updated to include observations made by the Parties at the 24th MOP.
- MBTOC-QPS prepared their report in response to Decision XXIII/5, which was included as part of the TEAP 2013 Progress Report
- At the 33rd OEWG (Bangkok, 24- 28 June, 2013). Bilateral meetings with USA, the California Strawberry Commission (USA), Australia and Canada were held.
- No second meeting was held in the year. MBTOC-S conducted its re-assessment by an agreed email process. MBTOC –SC prepared an analysis based on the emergency use of MB reported by Canada per the request of the Ozone Secretariat.
- MBTOC-S and MBTOC-SC prepared the final report on the CUNs for consideration by the Parties at their 24th Meeting.
- Three MBTOC members resigned; MBTOC thanked Antonio Bello, Andrea Minuto and Janny Vos for their work.

1.6.2. Work plan and indicative budget for 2013

The following "Actions" and "Indicative Completion Dates" are the "Working procedures of MBTOC relating to the evaluation of nominations for critical uses of methyl bromide", as described in Annex 1 of the 16th Meeting of the Parties. The annual work plan is required to be drawn up by MBTOC (supported by the Ozone Secretariat) in consultation with TEAP, which shall submit it to the Meeting of the Parties each year.

Tasks and actions	Indicative budget needs where applicable	Indicative completion date	Dates of meetings
1. Parties submit their nominations for critical-use exemptions to the Secretariat*	-	24 January 2014	
2. The nominations are forwarded to MBTOC co-chairs for distribution to the subgroups of appointed members	-	7 February 2014	
3. 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	-	28 February 2014	
4. 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 2014	
5. Nominating Party develops and submits its response to the MBTOC co-chairs	-	7 March 2014	

Tasks and actions	Indicative budget needs where applicable	Indicative completion date	Dates of meetings
6. MBTOC Meeting No 1 • Meets as usual 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 (see Annex I of MOP16, Dec XVI/4) • Bilateral meetings • To discuss and finalise the CUN evaluation process proposed by the co-chairs and commented by the MBTOC members • To discussed any new or standard presumptions that MBTOC seeks to apply in its future assessment of critical-use nominations, for approval by the Meeting of the Parties • Any administrative changes to improve the operations of the Committee, within the scope of Decisions that have been agreed by the Parties • Draft the 2012 Progress Report	Funds for travel of 1non-A5 member: US$3,000** Meeting Costs $3,000	March – April 2014	South Africa (tentative)
8. MBTOC provides its draft recommendations on the CUNs to TEAP		April, 2014	
9- TEAP Meeting: To assess the MBTOC report on critical-use nominations and submits the finalised interim report on recommendations and findings to the Secretariat.		April 2014	TBD***
10. The Secretariat posts the finalised report on its web site and circulates it to the Parties	-	May 2014	
11. 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		June - August 2014 (TBD)	TBD
12. The nominating Party submits further clarification for the critical-use nomination requested by MBTOC 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	-	Depending on OEWG date	
13. MBTOC Meeting No 2 or agreed email process (according to feasibility and justification of a second meeting): • Meets to 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 (see Annex I of MOP16, Dec XVI/4) • 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 2013	Funds for travel of 1 non-A5 member**: US$3,000 Meeting costs: $US 3,000	September-October 2014	TBD
14. MBTOC drafts final report considered by TEAP, finalised and made available to Parties through the Secretariat	-	Sept - October 2014 depending on MOP dates	
15. 25th Meeting of the Parties			November 2014
Total budget:	**US $: 12,000*** US$ 6,000 (Travel of Non Article 5 member) Meeting Costs $6,000		

* CUNs from A5 Parties could be submitted

** Travel funds for non A5 members have been requested in the past but not granted

*** TBD – To be determined

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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 - Part A: Trend in MB Preplant Soil Nominations and Exemptions

List of nominated (2005 – 2015) and exempted (2005 – 2014) amounts of MB granted by Parties under the CUE process for each crop.

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Australia	Cut Flowers – field	40.000	22.350										18.375	22.350								
Australia	Cut flowers – protected	20.000											10.425									
Australia	Cut flowers, bulbs – protected Vic	7.000	7.000	6.170	6.150								7.000	7.000	3.598	3.500						
Australia	Strawberry Fruit	90.000											67.000									
Australia	Strawberry runners	35.750	37.500	35.750	35.750	29.790	29.790	29.790	29.790	29.760	29.760	**29.760**	35.750	37.500	35.750	35.750	29.790	29.790	23.840+ 5.95	29.760	29.760	**29.760**
Belgium	Asparagus	0.630	0.225										0.630	0.225								
Belgium	Chicory	0.600	0.180										0.180	0.180								
Belgium	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									

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	Lettuce(& endive)	42.250	22.425										25.190									
Belgium	Nursery	Not Predictable	0.384										0.900	0.384								
Belgium	Orchard pome & berry	1.350	0.621										1.350	0.621								
Belgium	Ornamental plants	5.660											0.000									
Belgium	Pepper & egg plant	5.270	1.350										3.000	1.350								
Belgium	Strawberry runners	3.400	0.900										3.400	0.900								
Belgium	Tomato (protected)	17.170	4.500										5.700	4.500								
Belgium	Tree nursery	0.230	0.155										0.230	0.155								
Canada	Strawberry runners (PEI)	14.792	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.596	5.261	5.261	(a)14.792	6.840	7.995	7.462	7.462	7.462	5.261	5.261	5.261	**5.261**
Canada	Strawberry runners (Quebec)		1.826	1.826									(a)	1.826	1.826							
Canada	Strawberry runners (Ontario)			6.129											6.129							
France	Carrots	10.000	8.000	5.000									8.000	8.000	1.400							
France	Cucumber	85 revised to 60	60.000	15.000									60.000	60.000	12.500							
France	Cut-flowers	75.000	60.250	12.000									60.000	52.000	9.600							
France	Forest tree nursery	10.000	10.000	1.500									10.000	10.000	1.500							
France	Melon	10.000	10.000										7.500	6.000								

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
France	Nursery: orchard, raspberry	5.000	5.000	2.000									5.000	5.000	2.000							
France	Orchard replant	25.000	25.000	7.500									25.000	25.000	7.000							
France	Pepper	Incl in.tomato cun	27.500	6.000										27.500	6.000							
France	Strawberry fruit	90.000	86.000	34.000									90.000	86.000								
France	Strawberry runners	40.000	4.000	35.000									40.000	40.000	28.000							
France	Tomato (and eggplant for 2005 only)	150(all solanaceous)	60.500	33.250									125.000	48.400								
France	Eggplant		27.500	33.250										48.400								
Greece	Cucurbits	30.000	19.200										30.000	19.200								
Greece	Cut flowers	14.000	6.000										14.000	6.000								
Greece	Tomatoes	180.000	73.600										156.000	73.600								
Israel	Broomrape			250.000	250.000	125.000	12.500	12.500							250.000	250.000	125.000	12.500				
Israel	Cucumber - protected new 2007			25.000	18.750		18.750	12.500							25.000	18.750	-	15.937				
Israel	Cut flowers – open field	77.000	67.000	80.755	53.345	42.777	42.554	23.292					77.000	67.000	74.540	44.750	34.698	28.554				
Israel	Cut flowers – protected	303.000	303.000	321.330	163.400	113.821	72.266	52.955					303.000	240.000	220.185	114.450	85.431	63.464				
Israel	Fruit tree nurseries	50.000	45.000	10.000									50.000	45.000	7.500							

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Israel	Melon – protected & field	148.000	142.000	140.000	87.500	87.500	87.500	35.000					125.650	99.400	105.000	87.500	87.500	70.000				
Israel	Potato	239.000	231.000	137.500	93.750	75.000							239.000	165.000	137.500	93.750	75.000					
Israel	Seed production	56.000	50.000			22.400							56.000	28.000			NR					
Israel	Strawberries – fruit (Sharon)	196.000	196.000	176.200	64.125	52.250	47.500	28.500					196.000	196.000	93.000	105.960	42.750					
Israel	Strawberries – fruit (Sharon & Ghaza)																	57.063				
Israel	Strawberry runners (Sharon)	35.000	35.000		20.000	15.800	13.570	13.500					35.000	35.000	28.000	31.900	15.825					
Israel	Strawberry runners and fruit Ghaza				87.875	67.500	67.500	34.000									47.250					
Israel	Strawberry runners (Sharon & Ghaza)																	22.320				
Israel	Tomatoes			90.000											22.750							
Israel	Sweet potato					95.000	20.000	20.000								111.500	95.000	20.000				
Italy	Cut flowers (protected)	250.000	250.000	30.000									250.000	187.000	30.000							
Italy	Eggplant (protected)	280.000	200.000	15.000									194.000	156.000								
Italy	Melon (protected)	180.000	135.000	10.000									131.000	131.000	10.000							

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Italy	Pepper (protected)	220.000	160.000	67.000									160.000	130.000	67.000							
Italy	Strawberry Fruit (Protected)	510.000	400.000	35.000									407.000	320.000								
Italy	Strawberry Runners	100.000	120.000	35.000									120.000	120.000	35.000							
Italy	Tomato (protected)	1300.000	1030.00	418.000									871.000	697.000	80.000							
Japan	Cucumber	88.300	88.800	72.400	68.600	61.400	34.100	29.120	26.162				88.300	88.800	72.400	51.450	34.300	30.690	27.621			
Japan	Ginger – field	119.400	119.400	112.200	112.100	102.200	53.400	47.450	42.235				119.400	119.400	109.701	84.075	63.056	53.400	47.450			
Japan	Ginger – protected	22.900	22.900	14.800	14.800	12.900	8.300	7.770	6.558				22.900	22.900	14.471	11.100	8.325	8.300	7.036			
Japan	Melon	194.100	203.900	182.200	182.200	168.000	90.800	77.600	67.936				194.100	203.900	182.200	136.650	91.100	81.720	73.548			
Japan	Peppers (green and hot)	189.900	200.700	169.400	162.300	134.400	81.100	68.260	61.101				187.200	200.700	156.700	121.725	81.149	72.990	65.691			
Japan	Watermelon	126.300	96.200	94.200	43.300	23.700	15.400	13.870	12.075				129.000	98.900	94.200	32.475	21.650	14.500	13.050			
Malta	Cucumber		0.096											0.127								
Malta	Eggplant		0.128											0.170								
Malta	Strawberry		0.160											0.212								
Malta	Tomatoes		0.475											0.594								
New Zealand	Nursery material	1.085	1.085											0								
New Zealand	Strawberry fruit	42.000	42.000	24.78									42.000	34.000	12.000							

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
New Zealand	Strawberry runners	10.000	10.000	5.720									8.000	8.000	6.234							
Poland	Strawberry Runners	40.000	40.000	25.000	12.000								40.000	40.000	24.500							
Portugal	Cut flowers	130.000	8.750										50.000	8.750								
Spain	Cut Flowers – Cadiz	53.000	53.000	35.000									53.000	42.000								
Spain	Cut Flowers – Catalonia	20.000	18.600	12.840	17 (+Andalucia)								20.000	15.000	43.490 (+Andalucia)							
Spain	Pepper	200.000	155.000	45.000									200.000	155.000	45.000							
Spain	Strawberry Fruit	556.000	499.290	80.000									556.000	499.290	0.0796							
Spain	Strawberry Runners	230.000	230.000	230.000	215.000								230.000	230.000	230.000							
UK	Cut flowers		7.560											6.050								
UK	Ornamental tree nursery	12.000	6.000										6.000	6.000								
UK	Strawberry (& raspberry in 2005)	80.000	63.600										68.000	54.500								
UK	Raspberry nursery		4.400										4.400	54.500								
USA	Chrys. Cuttings/roses	29.412											29.412	0								
USA	Cucurbits – field	1187.8	747.839	598.927	588.949	411.757	340.405	218.032	59.500	11.899			1187.800	747.839	592.891	486.757	407.091	302.974	195.698	59.500		

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	Eggplant – field	76.761	101.245	96.48	79.546	62.789	34.732	21.561	6.904	1.381			76.721	82.167	85.363	66.018	48.691	32.820	19.725	6.904		
USA	Forest nursery seedlings	192.515	157.694	152.629	133.140	125.758	120.853	106.043					192.515	157.694	122.032	131.208	122.060	117.826	93.547			
USA	Ginger	9.2											9.2	0								
USA	Orchard replant	706.176	827.994	405.415	405.666	314.007	226.021	203.591	18.324	6.230			706.176	527.600	405.400	393.720	292.756	215.800	183.232	18.324		
USA	Ornamentals	210.949	162.817	149.965	138.538	137.776	95.204	70.178	48.164	48.164			154.000	148.483	137.835	138.538	107.136	84.617	64.307	48.164		
USA	Nursery stock - fruit trees, raspberries, roses	45.789	64.528	12.684	51.102	27.663	17.954	7.955	1.591	0.541			45.800	64.528	28.275	51.102	25.326	17.363	7.955	1.591		
USA	Peppers – field	1094.782	1498.53	1151.751	919.006	783.821	463.282	212.775	28.366				1094.782	1243.542	1106.753	756.339	548.984	463.282	206.234			
USA	Strawberry fruit – field	2468.873	1918.40	1733.901	1604.669	1336.754	1103.422	1023.471	753.974	531.737	415.067	**373.660**	2052.846	1730.828	1476.019	1349.575	1269.321	1007.477	812.709	678.004	415.067	**415.067**
USA	Strawberry runners	54.988	56.291	4.483	8.838	8.837	7.381	7.381	3.752	3.752			54.988	56.291	4.483	8.838	7.944	4.690 + 2.018	6.036	3.752		
USA	Tomato – field	2876.046	2844.985	2334.047	1840.1	1406.484	994.582	336.191	54.423	10.741			737.584	2476.365	2065.246	1406.484	1003.876	737.584	292.751	54.423		
USA	Turfgrass	352.194	131.600	78.040	52.189	0								131.600	78.04	0						
USA	Sweet potato	224.528			18.144	18.144	18.144	14.515	8.709							18.144	18.144	14.515	11.612			
USA	Research								2.768	2.768												

Annex III - Part B: Trends in MB Structural and Commodity Nominations and Exemptions

List of nominated (2005- 2015) and exempted (2005 - 2014) amounts of MB granted by Parties under the CUE process for each commodity.

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Australia	Almonds	1.900	2.100										1.900	2.100								
Australia	Rice consumer packs	12.300	12.300	10.225	9.200 +1.8	9.2	7.82	5.66	3.653	2.374	1.187	**1.187**	6.150	6.150	9.205	9.200	7.820	6.650	4.870	3.653	1.187	**1.187**
Belgium	Artefacts and structures	0.600	0.307										0.590	0.307								
Belgium	Antique structure & furniture	0.750	0.199										0.319	0.199								
Belgium	Churches, monuments and ships' quarters	0.150	0.059										0.150	0.059								
Belgium	Electronic equipment	0.100	0.035										0.100	0.035								
Belgium	Empty silo	0.050	0.043										0.050	0.043								
Belgium	Flour mill see mills below	0.125	0.072										See mills below	0.072								
Belgium	Flour mills	10.000	4.170										9.515	4.170								
Belgium	Mills	0.200	0.200										0.200	0.200								
Belgium	Food processing facilities	0.300	0.300										0.300	0.300								

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	Food Processing premises	0.030	0.030										0.030	0.030								
Belgium	Food storage (dry) structure	0.120	0.120										0.120	0								
Belgium	Old buildings	7.000	0 .306										1.150	0.306								
Belgium	Old buildings and objects	0.450	0.282										0	0.282								
Belgium	Woodworking premises	0.300	0.101										0.300	0.101								
Canada	Flour mills	47.200	34.774	30.167	28.650	26.913	22.878	14.107	11.020	7.848	5.044	**5.044**	(a)47	34.774	30.167	28.65	26.913	22.878	14.107	11.020	5.044	**5.044**
Canada	Pasta manufacturing facilities	(a)	10.457	6.757	6.067	4.740	4.740	2.084					(a)	10.457	6.757	6.067	4.740	3.529				
Canada	Commodities					0.068																
France	Seeds sold by PLAN-SPG company	0.135	0.135	0.100									0.135	0.135	0.096							
France	Mills	55.000	40.000	8.000									40.000	35.000	8.000							
France	Rice consumer packs	2.000	2.000										2.000	2.000								
France	Chestnuts	2.000	2.000	1.800									2.000	2.000	1.800							
Germany	Artefacts	0.250	0.100										0.250	0.100								

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Germany	Mills and Processors	45.000	19.350										45.000	19.350								
Greece	Dried fruit	4.280	3.081	0.900									4.280	3.081	0.450							
Greece	Mills and Processors	23.000	16.000	1.340									23.000	15.445	1.340							
Greece	Rice and legumes		2.355											2.355								
Ireland	Mills		0.888	0.611										0.888								
Israel	Artefacts	0.650	0.650	0.600									0.650	0.6500								
Israel	Dates (post harvest)	3.444	3.444	2.200	1.800	2.100							3.444	2.755	2.200	1.800	2.100	1.040				
Israel	Flour mills (machinery & storage)	2.140	1.490	1.490	0.800	0.300							2.140	1.490	1.040	0.312	0.300					
Israel	Furniture– imported	1.4220	1.4220	2.0420									1.4220	0								
Italy	Artefacts	5.500	5.500	5.000									5.225	0	5.000							
Italy	Mills and Processors	160.000	130.000	25.000									160.000	65.000	25.000							
Japan	Chestnuts	7.100	6.500	6.500	6.300	5.800	5.400	5.350	3.489	3.317			7.100	6.800	6.500	6.300	5.800	5.400	5.350	3.489		
Latvia	Grains		2.502											2.502								
Netherlands	Strawberry runners post harvest		0.120	0.120		0.120								0	0.120							
Poland	Medicinal herbs & dried mushrooms as dry commodities	4.000	3.560	1.800	0.500								4.100	3.560	1.800	1.800						

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Poland	Coffee, cocoa beans	(a)	2.160	2.000	0.500									2.160	1.420	1.420						
Spain	Rice		50.000											42.065								
Switzerland	Mills & Processors	8.700	7.000										8.700	7.000								
UK	Aircraft			0.165											0.165							
UK	Mills and Processors	47.130	10.195	4.509									47.130	10.195	4.509							
UK	Cereal processing plants		8.131	3.480					(a)					8.131								
UK	Cheese stores	1.640	1.248	1.248									1.640	1.248	1.248							
UK	Dried commodities (rice, fruits and nuts) Whitworths	2.400	1.256										2.400	1.256								
UK	Herbs and spices	0.035	0.037	0.030									0.035	0.037								
UK	Mills and Processors (biscuits)	2.525	1.787	0.479									2.525	1.787								
UK	Spices structural equip.	1.728											1.728	0	0.479							
UK	Spices stored	0.030											0.030	0								
UK	Structures buildings (herbs and spices)	3.000	1.872	0.908									3.000	1.872	0.908							

Party	Industry	Total CUN MB Quantities											Total CUE Quantities									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
UK	Structures, processors and storage (Whitworths)	1.100	0.880	0.257									1.100	0.880	0.257							
UK	Tobacco equipment	0.523											0.050									
UK	Woven baskets	0.770											0.770									
USA	Dried fruit and nuts (walnuts, pistachios, dried fruit and dates and dried beans)	89.166	87.719	91.299	67.699	58.912	19.242	10.041	2.419	0.822	0.740	**0.310**	89.166	87.719	78.983	58.921	45.623	19.242	5.000	2.419	0.740	**0.740**
USA	Dry commodities/ structures (cocoa beans)	61.519	61.519	64.028	52.256	51.002							61.519	55.367	64.082	53.188						
USA	Dry commodities/ structures (processed foods, herbs and spices, dried milk and cheese processing facilities) NPMA	83.344	83.344	85.801	72.693	66.777	37.778	17.365	0.200				83.344	69.118	82.771	69.208	54.606	37.778	17.365			
USA	Smokehouse hams (Dry cure pork products) (building and product)	136.304	135.742	40.854	19.669	19.699	4.465	3.730	3.730	3.730	3.730	**3.730**	67.907	81.708	18.998	19.699	18.998	4.465	3.730	3.730	3.730	**3.730**
USA	Mills and Processors	536.328	505.982	401.889	362.952	291.418	173.023	135.299	74.51	25.334	22.800		483.000	461.758	401.889	348.237	291.418	173.023	135.299	74.510	22.800	**22.800**
USA	Research								0.159	0.159												