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COMMISSION ON PHYTOSANITARY MEASURES

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Report on the Montreal Protocol

Agenda Item 8.3

Montreal Protocol and International Plant Protection Convention – cooperation and areas of mutual concern.

This paper is provided to the Commission on Phytosanitary Measures in part fulfilment of Decision XVIII/14 of the 18th Meeting of the Parties of the Montreal Protocol on Substances that Deplete the Ozone Layer.

1. Montreal Protocol - history, objectives and successes

Montreal Protocol on Substances that Deplete the Ozone Layer is a multilateral environmental agreement to protect the Earth's ozone layer.

The Montreal Protocol was adopted on 16 September 1987. The Protocol has, as its basis, the Vienna Convention on the Protection of the Ozone Layer. This convention established the mechanism for international cooperation on research and science on the ozone layer that protects life on earth from harmful UV radiation. The Vienna Convention was adopted in 1985. This was also the year when the actual discovery of the ozone hole was first announced, confirming the theories about the destruction of the ozone layer by man-made, chlorine-containing chemicals. Pioneering work in 1970s on the stratospheric ozone chemistry by Professors Mario Molina, Sherwood Rowland and Paul Crutzen was recognized world-wide with awarding of the Nobel Prize in Chemistry in 1995.

The Montreal Protocol has been hailed as one of the most successful multilateral environmental agreements. Through a set of agreed control measures on the production and consumption of Ozone-Depleting Substances (ODS), the Protocol aims to eliminate emissions of these ODS to the atmosphere. With near-universal participation (191 Parties), the Montreal Protocol, by 2005, had achieved an overall reduction of approximately 95% of ODS consumption and over 95% of ODS production in terms of Ozone Depleting Potential-weighted tonnes.

A key innovative feature of the Protocol that contributed to its success is the requirement for assessment and review of the control measures. Article 6 of the Protocol provides for review of the adequacy of the control measures on the basis of assessments of scientific, environmental, technological and economic aspects of ozone layer depletion and control of ODSs. Based on the state-of-the-art information provided by the three Assessment Panels, consisting of hundreds of scientists and experts from all over the world, the Parties have adjusted and amended the Protocol to improve the phase-out schedules of ODSs.

The latest report of the Scientific Assessment Panel - *Scientific Assessment of Ozone Depletion: 2006* (WMO 2006) - shows that the total combined abundance of ODSs is now declining not only in the lower atmosphere (troposphere), but also in the stratosphere. The ODS levels peaked during 1992-1994 period in the troposphere and now there are clear indications that peak ODS levels were reached in the stratosphere in the late 1990s. The ozone layer outside of polar regions has shown some initial signs of recovery and the decline of stratospheric ozone seen in the 1990s has not continued. Indeed, the global stratosphere (60°S-60°N) has likely already experienced its highest levels of ozone depletion from man-made ODSs.

An important milestone in the recovery process of the ozone layer is the time when combined stratospheric chlorine and bromine amounts (equivalent effective stratospheric chlorine, EESC) declines to pre-1980 values. The actual recovery of the ozone layer depends on many factors, including natural dynamical variability, volcanic eruptions, solar variations, aerosols (airborne fine particles), and climate change.

The Scientific Assessment Panel Report estimate the timing of 'the ozone layer recovery' as follows:

- The spring Antarctic ozone hole is expected to continue for decades. Ozone levels predicted to return to pre-1980 levels in the 2060 to 2075 time frame.
- Arctic ozone levels are expected to return to pre-1980 levels before 2050. Large ozone depletion is likely to continue to occur in cold Arctic winters during the next 15 years.
- Global ozone levels (60°S-60°N) are expected to recover around 2050.

All of the above estimates assume full compliance with the existing Montreal Protocol controls. The Montreal Protocol is certainly working, but any failure to comply with the Protocol could delay or even prevent the recovery of the ozone layer.

2. Controlled substances under the Montreal Protocol

There are several groups of man-made chemicals that are recognised for their ability to transfer from ground level to the ozone layer in sufficient quantities to cause significant depletion of the ozone layer. Annexes to the Montreal Protocol list these chemicals. They are all subject to control measures leading to eventual phase out of production, with agreed exemptions. Typically Article 5 countries (essentially 'developing' countries) have 10 year grace period compared with non-Article 5 countries in which to achieve complete phaseout. Intermediate steps may be agreed.

Table 1 gives a general overview of the groups of controlled substances under the Protocol. Details of the control measures applicable to each group of substances and of exemptions may be found in the 'Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer' (Ozone Secretariat 2006).

Table 1. Substances controlled under the Montreal Protocol.

Controlled substance	Article of Protocol giving control measures	Full phaseout date for non-A5 Parties
CFCs	2A	1996
Halons	2B	1994
Other fully halogenated CFCs	2C	1996
Carbon tetrachloride	2D	1996
Methyl chloroform	2E	1996
Hydrochlorofluorocarbons	2F	2030
Hydrobromofluorocarbons	2G	1996
Methyl bromide	2H	2005
Bromochloromethane	2I	2002

Production of many controlled substances has now ceased worldwide for developed countries, excepting for uses specifically exempt from phaseout. Exemptions include uses as chemical feedstock and uses agreed as essential. In the unique case of methyl bromide, there are exemptions for feedstock, Quarantine and Pre-shipment (QPS) uses and uses agreed as 'critical'.

3. Areas of mutual concern under IPPC and MP - special case of QPS methyl bromide use.

The Montreal Protocol is for elimination of emissions of substances that deplete the ozone layer, while the IPPC is an international treaty that aims to secure action to prevent the spread and

introduction of pests affecting plants and plant products and to promote appropriate measures for their control.

The substance methyl bromide is of particular concern to both conventions.

As a potent ozone-depleting substance, methyl bromide is a controlled substance under the Montreal Protocol with the aim that anthropogenic emissions of the substance are completely eliminated. Methyl bromide is the only ODS that is in direct, widespread use in agriculture and protection of plants and related products. All the other ozone-depleting substances controlled under the Protocol are industrial chemicals, such as solvents, fire-fighting materials, refrigerants and propellants.

The Parties to the Montreal Protocol first adopted a decision in 2005 (Decision XVI/11) requesting for coordination between the two bodies when concerns mounted over ISPM 15 that required the use of methyl bromide as one of the two specified measures for treatment of wooden packaging material. Since then the Secretariats of Montreal Protocol and IPPC have been cooperating to exchange relevant information.

As stated in the Scientific Assessment Panel Report (WMO 2006), the shorter-lived gases (e.g., methyl chloroform and methyl bromide) continue to provide much of the decline in total combined effective abundances of anthropogenic chlorine-containing and bromine-containing ozone-depleting gases in the troposphere. By 2005, the abundances of the total combined anthropogenic ozone-depleting gases in the troposphere had decreased by 8-9% from the peak value observed in the 1992-1994 time period. Decreased methyl bromide emissions contributed about 40% of that decline. It would be of concern to see the gains achieved from control and phaseout of methyl bromide in one area counteracted by increases in emissions from another, uncontrolled use.

However, methyl bromide fumigation is a well-established measure for control of certain pests on many goods in trade, particularly phytosanitary measures related to presence and control of quarantine pests of plants, plant products and non-plant vectors of these pests - these fall within the coverage of the IPPC.

In the control measures agreed by the Parties to the Montreal Protocol, there is a specific exemption from control of production and consumption of methyl bromide used for Quarantine and Pre-shipment (QPS) purposes. Although exempted from control, in recognition of the ozone-depleting action of emissions from QPS uses, Parties to the Montreal Protocol are urged to adopt alternatives to methyl bromide for QPS purposes, wherever technically and economically feasible (Decisions VII/5(c), XI/13(7)). Where alternatives are not available, Parties are urged to minimise emissions through adoption of recovery and recycling technology.

3.1. Definitions of QPS under Montreal Protocol and equivalent definitions under IPPC.

Decision VI/11 of the Montreal Protocol defines the extent of the QPS exemption for methyl bromide as follows:

“(a) "Quarantine applications", with respect to methyl bromide, are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where:

(i) Official control is that performed by, or authorized by, a national plant, animal or environmental protection or health authority;

(ii) Quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled;

(b) "Pre-shipment applications" are those treatments applied directly preceding and in relation to export, to meet the phytosanitary or sanitary requirements of the importing country or existing phytosanitary or sanitary requirements of the exporting country;

Subsequently Decision XI/12 clarified the meaning of 'Pre-shipment' applications as follows:

"That pre-shipment applications are those non-quarantine applications applied within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of the exporting country. Official requirements are those which are performed by, or authorized by, a national plant, animal, environmental, health or stored product authority;"

The definition of 'quarantine' pest closely follows that of the IPPC, excepting that the under the IPPC definition quarantine pests are '*…pests of potential* economic *importance…*' whereas under the Montreal Protocol refers to '*…pests of potential importance…*'.

The definition of 'official control' is broader under the Montreal Protocol than the IPPC as it refers not only to plant health authorities but also to animal or environmental protection or health authorities.

These two differences extend the concept of quarantine treatments compared with that of the IPPC, but in practice almost all quarantine treatments with methyl bromide are related to plants, plant products and pests thereof.

Some methyl bromide uses for production of certified high health status plants for growing on, considered to be quarantine, may come under the status of regulated non-quarantine pests under IPPC.

The concept of 'Pre-shipment' is unique to the Montreal Protocol and is typically related to control of non-quarantine pests that affect product quality, particularly stored product pests.

4. Uses of methyl bromide for quarantine

4.1. Use of methyl bromide for QPS and other sectors

The 2006 MBTOC Assessment Report, recently published (Ozone Secretariat 2007), provides details of methyl bromide use for both QPS and non-QPS purposes.

Breakdown of use by sector, estimated from reported production statistics, is given in Fig. 1 for 2005. Fig. 2 gives a breakdown of the QPS component by subsector.

Fig. 1. MB production in 2005, by intended purpose as reported by producers (MBTOC 2007).

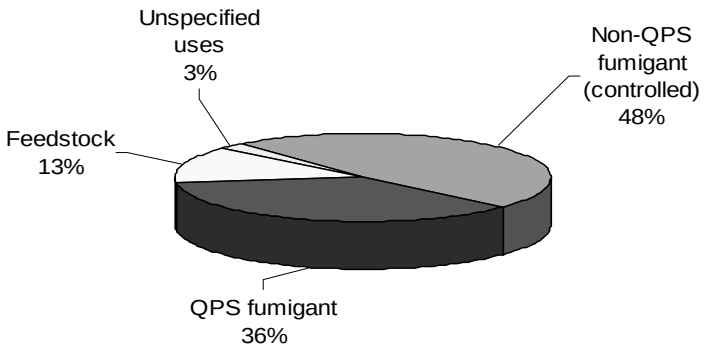
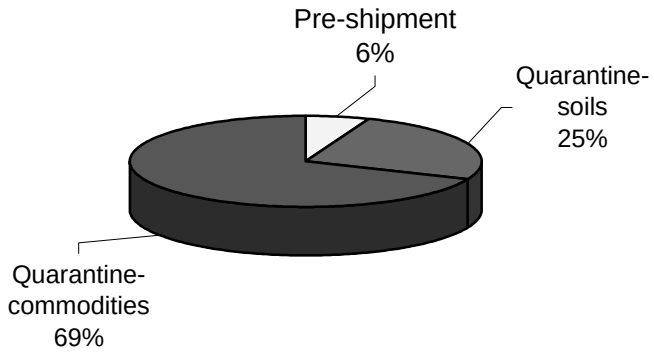


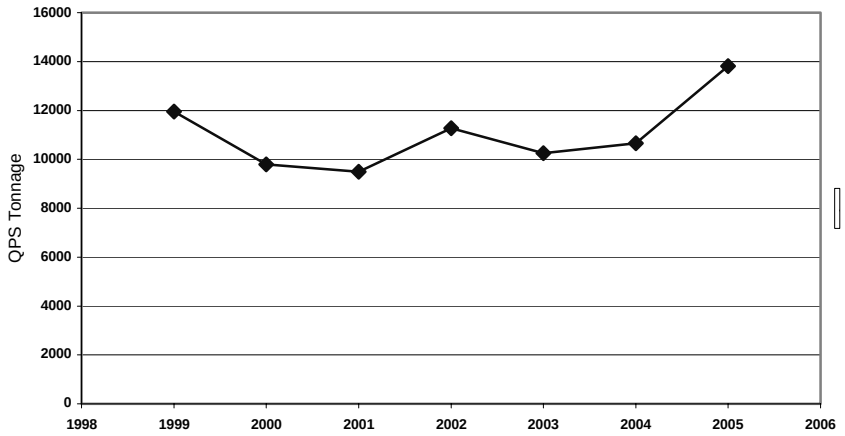
Fig. 2. Approximate global QPS use by general category in 2002-2004 as found by survey



(TEAP 2006).

Both the absolute quantity and proportion of global production of methyl bromide allocated to QPS use is rising, while the non-QPS component is falling steeply as a result of implementation of the control measures agreed under the Protocol. Fig. 3 shows reported production of methyl bromide globally for QPS purposes. The 2005 production was 30% higher than the average of 1999-2004 annual production for QPS.

Figure 3. Reported production of methyl bromide for QPS - 1999 – 2005.



Source: Database of Ozone Secretariat in November 2006

The rise in reported production for QPS coincides with introduction of ISPM 15. ISPM 15 was introduced widely in 2005, with further implementation in 2006. Definitive data on influence of ISPM 15 on production and consumption of methyl bromide is still being collected, but it is expected that there will be a further rise shown when the 2006 data is available.

Recent modifications (IPPC 2006) to the ISPM 15 standard for treatment of solid wooden packaging materials in export trade have set an increased retention of 50 % of the initial standard dosage at the end of an extended fumigation period (24h). While it is possible to meet the standard with good sealing and process, in practice, some fumigators are adding extra MB at the start of the ISPM15 fumigations to compensate for high leakage so that specified minimum concentrations at the end of the exposure are met. This process uses additional MB and may lead to further increases in QPS consumption.

4.2. Consumption of QPS methyl bromide by type of use.

Surveys have been carried out under Protocol Decisions XI/13(4) and XVI/10(4) to ascertain the purposes for which methyl bromide is being used under the QPS exemption, and the quantities used for these purposes. Table 2 summarises results of these surveys. The results are the most recent available on a global basis. The surveys covered about half the global reported consumption for QPS during the survey period. Independent evidence suggested the proportion of QPS fumigation on logs and wooden items may have been underrepresented (TEAP 2006).

Table 2. Reported annual quantity of QPS methyl bromide by category of use.

QPS Use	Quantity (metric tonnes)	% of total
Soil (preplant)	1527	29
Grain and cereals for consumption	1262	24
Wood, including sawn timber	868	16
Fresh fruit and vegetables	722	14
Wooden packaging materials	335	6.4
Whole logs	209	4.0
Dried foodstuffs	160	3.0
Cotton and fibre	91	1.7
Equipment	36	0.68
Cut flowers and branches	32	0.61
Personal effects	19	0.37
Bulbs, corms, tubers and rhizomes	4	0.075
Nursery stock	4	0.072
Hay, straw, fodder	3	0.050
Seeds for planting	1	0.012
Total	5273	

Survey period – 2002-2004. Survey covered about 50% of total QPS consumption, with 32 Parties reporting details of their QPS uses.

Almost all QPS treatments are related to protection of plants and plant products and come within the scope of the IPPC. None of the Parties responding to the surveys reported QPS use for control of any organisms other than plant-related pests and diseases. MBTOC (2007) identified the following treatments as outside the IPPC scope: treatment of shipments of used car tyres against mosquitoes; treatment of personal effects against lice, bedbugs and cockroaches; fumigation of hides and skins; fumigation of beehives against insect and mite pests; fumigation of ships, aircraft

and other transport against rodents and snakes. These non-IPPC uses of QPS methyl bromide are estimated by MBTOC to consume not more than 1% of the total 2005 QPS production of about 13,000 tonnes.

Most QPS uses, by volume and treated materials related to goods in trade, usually are for export trade across international boundaries. There was a small use (by volume) to meet internal quarantine restrictions. Two Parties reported QPS use of methyl bromide on soils used, *in situ*, for growing of plants, specifically for production of certified, high health status propagation material. This use is distinguished from QPS treatment of soil as a commodity, where soils may be moved from one area to another, or QPS treatment of soil as a contaminant of goods in trade.

5. Alternative measures for QPS to avoid MB emissions

5.1. Alternatives to methyl bromide

Alternatives to methyl bromide for both Quarantine and Pre-shipment have been discussed in MBTOC (2007), together with examples of application of alternatives in specific trade. A comprehensive list of commodities that require methyl bromide treatment is not currently available. A substantial proportion of commodity quarantine treatments, by number, for which methyl bromide is specified, also have bilaterally approved non-methyl bromide treatments.

5.2. Recapture of methyl bromide after treatments

Many current methyl bromide QPS uses do not have approved or readily available alternatives. These can be highly emissive uses, with only a low proportion of the added methyl bromide retained by the commodity after treatment as non-volatile material (Table 3). Under the Montreal Protocol, where alternatives are not available for QPS uses, Parties are urged to fit recovery technology to minimise emissions.

Table 3. Estimated proportion of applied dosage of methyl bromide emitted to atmosphere for different categories of enclosed space QPS fumigation (extracted from MBTOC 2007).

Treated commodity	**Estimated emissions**
	%
Durable foodstuffs – grains, dried fruit, nuts	51 - 89
Perishables – fruit, cut flowers, vegetables	85 – 98
Timber, pallets, wooden packaging	88

Several recovery and recapture systems for methyl bromide have recently become available commercially and there are also custom-made installations in some fumigation facilities. These are described in MBTOC (2007) and TEAP (2006). The majority of these systems use absorption on activated carbon to remove methyl bromide from exhaust streams from fumigations.

6. Scope for actions consistent with objectives of both international agreements

In the areas of overlap of concern of the Montreal Protocol and IPPC, there are several activities that may benefit from collaboration at this time. These are:

- continued data gathering on quantities of MB used for QPS by country and particular application, together with identification of where there are feasible and approved alternatives, with quantity of MB replaceable, if these are implemented.

- identification of those quarantine situations for which methyl bromide fumigation is the only phytosanitary measure specified, and encouragement of development and use of alternatives in these situations.
- in situations where MB and an alternative are both recommended for a particular quarantine treatment, development of a statement of preference or other guidance for the non-methyl bromide alternative.
- specification and promotion of best fumigation practice in quarantine treatments with methyl bromide, with emphasis on more efficient methyl bromide use and minimised emissions, while maintaining phytosanitary effectiveness.
- encouragement of the use of methyl bromide recovery and recycling technology, where technically and economically feasible, to reduce emissions of methyl bromide from quarantine treatments without alternatives, until such alternatives are available.
- exchange of documentation between Secretariats and between technical bodies of the two international agreements to minimise duplication of effort and progress mutual aims.
- promotion of joint participation by experts in technical advisory bodies of the Montreal Protocol and IPPC to enhance communication and advice consistent with the aims of both agreements.

The Ozone Secretariat recognises the existing informal collaboration between the MP and IPPC through joint membership that some experts have in technical panels and committees of both conventions. These include the Methyl Bromide Technical Options Committee, the Technical Panel on Phytosanitary Treatments, and the IPPC Experts Working Group for Reduction and Replacement of Methyl Bromide.

The Ozone Secretariat also recognises that there are current activities under IPPC specifically targeted at reduction of emissions of methyl bromide. Notable among these, is the establishment of the Experts Working Group for Reduction and Replacement of Methyl Bromide to identify phytosanitary measures that do not use methyl bromide.

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