

Methyl Bromide: Quarantine and Preshipment Uses



This brochure is jointly prepared by the secretariats of the Montreal Protocol on Substances that Deplete the Ozone Layer and the International Plant Protection Convention to bring together information on the issue of methyl bromide with respect to its application for quarantine (and pre-shipment) purposes which is an area of mutual concern to both multilateral agreements. It is hoped that the brochure will assist the Parties to both agreements in their endeavour to better understand and address those matters. The Parties are invited to provide comments, suggestions and corrections to the brochure to the secretariats.



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Introduction and Background

Methyl bromide as a fumigant is recognised as an important tool for the control of some pests and diseases, particularly quarantine pests of plants and plant-derived materials. In some cases, the quarantine use of methyl bromide is critical for preventing spread of plant pests that could have huge economic and/or environmental consequences. Methyl bromide is also a potent ozone-depleting gas. As a result of these properties, methyl bromide is of particular concern in two Multilateral Agreements – the Montreal Protocol on Substances that Deplete the Ozone Layer and the International Plant Protection Convention (see Box 1).



Damage to timber packaging material, showing presence of quarantine pests at import. Treatment with methyl bromide or alternatives required (AQIS, Australia)

The International Plant Protection Convention (IPPC) aims at “securing common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control” (see further details in Box 1). It is governed by the Commission on Phytosanitary Measures that works in co-operation with national and regional plant protection organisations operating within the framework of the IPPC. One component of IPPC activities is the development of international standards, International Standards for Phytosanitary Measures (ISPMs), which are recognised by the World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement). In practice, the IPPC focuses primarily on quarantine issues related to plants.

The Montreal Protocol aims “to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations and bearing in mind the developmental needs of developing countries”. Typically, this is being achieved through agreed controls on production and consumption of all ozone-depleting substances.

Methyl bromide was recognised as an ozone-depleting substance under the Montreal Protocol and control measures for the chemical was included in the Copenhagen Amendment in 1992 under Article 2H of the Protocol. Agreed control measures required Parties to phase out the production and consumption of methyl bromide by 1 January 2005 for developed countries and 1 January 2015 for developing countries. Most countries that use methyl bromide are Parties to the Copenhagen Amendment.

Three categories of methyl bromide use are exempted from phase-out under the control measures: use as a chemical feedstock, uses that the Parties to the Montreal Protocol deem ‘critical’ under Decision IX/6 of the Parties to the Protocol subsequent to complete phase-out, and use for quarantine and pre-shipment (QPS) (see Box 2).

Under the Beijing Amendment (1999), Parties to the Montreal Protocol are required to provide the Ozone Secretariat statistical data on the annual amount of methyl bromide used for QPS purposes. Parties are also urged to implement procedures to monitor the uses of methyl bromide for QPS purposes by commodity and quantity (Decision XI/13(6)).

This brochure explains the QPS exemption and its limitations under the Montreal Protocol and sets out the role of the IPPC and the regional and national plant protection organisations in helping to reduce emission of methyl bromide for QPS use, considering the necessity of its use where no alternative exists and its effect on the ozone layer.

Box 1: International Plant Protection Convention (IPPC)

The International Plant Protection Convention is a multilateral treaty for cooperation on plant protection and health. Article I, paragraph 1 of the Convention defines its purpose as "...securing common and effective action to prevent the spread and introduction of pests of plants and plant products." Adopted in 1951, it entered into force in 1952 and has since then been amended twice. The first amendment to the Convention (1979) came into force in 1991 and the second (1997) in 2005. The Convention is deposited with the Food and Agriculture Organization of the United Nations (FAO) and is implemented through the cooperation of member State Governments and regional plant protection organizations. FAO established the Convention secretariat in 1992. As of August 2007, the Convention had 164 contracting parties.

The Convention plays a prominent role in the Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) under the General Agreement on Tariffs and Trade (GATT) of the World Trade Organization (WTO). Its role is to encourage international harmonization and elaborate international standards to help ensure that phytosanitary measures are not used as unjustified barriers to trade. The latest amendment to the Convention (1997) reflects its contemporary role, particularly with respect to the relationship of the Convention to the SPS Agreement, and addresses cooperation and the exchange of information toward the objective of global harmonization and the establishment and use of international standards for phytosanitary measures (ISPMs).

Box 2: Intent of the QPS exemption

At the time that methyl bromide control measures under Article 2H were introduced in Copenhagen in 1992, the Parties to the Montreal Protocol understood that there were no alternatives to methyl bromide for the diverse range of treatments carried out with methyl bromide for QPS. The Parties recognised that although QPS consumption was over 15% of global methyl bromide consumption at the time, this volume was nevertheless very significant in allowing inter- and intra-country trade in commodities treated with methyl bromide in the absence of site-specific alternatives. Unless tested, approved site-specific alternatives to methyl bromide were available for QPS in both developed and developing countries, international trade could be severely disrupted if the exemption for QPS was not available, and economic and environmental consequences could be significant. For many countries, methyl bromide-treated commodities that they export generate a significant proportion of their income. The exemption was also considered important as it specifically avoided '...new non-tariff barriers to trade...' that could be introduced if such an exemption were not in place.

The Technology and Economic Assessment Panel's 1999 Progress Report, in vol.2, summarises discussions leading to the development of the QPS concepts under the Montreal Protocol.

Cooperation between the Montreal Protocol and the International Plant Protection Convention (IPPC)

The Fifth Session of the Interim Commission on Phytosanitary Measures (ICPM) in 2003 agreed to several recommendations which recognise the need to retain methyl bromide for critical quarantine treatments until suitable alternative phytosanitary treatments or procedures are available. The ICPM called on to its members to take the necessary and possible actions to minimize the use of methyl bromide.

At their Seventh Meeting in 1995, the Parties to the Montreal Protocol, while recognising the need for exempting the use of methyl bromide for quarantine and pre-shipment purposes, urged all countries "to refrain from use of methyl bromide and to use non-ozone-depleting technologies wherever possible" and further urged the Parties "to minimize emissions and use of methyl bromide through containment and recovery and recycling methodologies to the extent possible".

The Parties to the Montreal Protocol at their Sixteen Meeting in 2004, requested the Ozone Secretariat to the United Nations Environment Program make contact with the IPPC Secretariat. The Parties wished to stress their commitment to the reduction of methyl bromide with specific reference to the International Standard for Phytosanitary Measures (ISPM) No.15 (*Guidelines for regulating wood packaging material in international trade*), and to exchange information with a view to encouraging the development of alternatives to methyl bromide as a treatment for wood packaging material. ICPM-7 in 2005 noted this decision and several points related to the use of methyl bromide and stressed the importance

of cooperation between the Montreal Protocol and the IPPC. Several ICPM members requested that the work on the development of alternatives to methyl bromide be accelerated. The ICPM also encouraged countries to liaise with their appropriate research organizations and to stress the importance and urgency in developing alternatives to methyl bromide for use for quarantine purposes.



Modified containers (Kilquick, Brisbane) used for heat treatment to ISPM No. 15 (J. Banks)

At the Second Session of the Commission on Phytosanitary Measures (CPM-2) of the IPPC in 2007, the Ozone Secretariat, pursuant to the request of the Parties to the Montreal Protocol to advance the cooperation with IPPC, submitted a paper on cooperation and areas of mutual concern between the two agreements. The Parties to the IPPC participating at CPM-2 took a decision to continue and enhance cooperation and coherence with the Montreal Protocol.

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 methyl bromide used for QPS by country and particular application, together with identification of where there are feasible and approved alternatives, with quantity of methyl bromide 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 methyl bromide 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.

Informal collaboration between the Montreal Protocol and IPPC through joint membership that some experts have in technical panels and committees of both treaties is encouraged in particular for the Methyl Bromide Technical Options Committee, the Technical Panel on Phytosanitary Treatments, and the IPPC Expert Working Group for Reduction and Replacement of Methyl Bromide.

There are current activities under IPPC specifically targeted at reduction of emissions of methyl bromide. Notable among these, is the draft ISPM that was sent for member consultation in 2007 on *Developing a strategy to reduce or replace the use of methyl bromide for phytosanitary purposes*. The Parties to the Montreal Protocol have been informed about the ongoing consultation to enable national level coordination on the further development of the ISPM.

Definitions of Terms for the Two International Agreements

Definitions under the Montreal Protocol



Giant African Snail. A quarantine pest for many countries, Queen Victoria Museum and Art Gallery, Tasmania

Most methyl bromide, by volume, that is used under the QPS exemption, involves quarantine treatments targeting quarantine pests. The scope of these treatments is carefully defined by regulatory authorities. The definition of “quarantine” under the Montreal Protocol includes control of “quarantine pests”.

Decisions VI/11, VII/5 and XI/12 of the Montreal Protocol explain the terms “quarantine” and “pre-shipment” and how they relate to the QPS exemption under the Protocol. In summary:

- “(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 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;”

Quarantine pests: Pine Wood Nematode (copyright Ministry of Agriculture, Forestry and Fisheries, Japan, with permission)

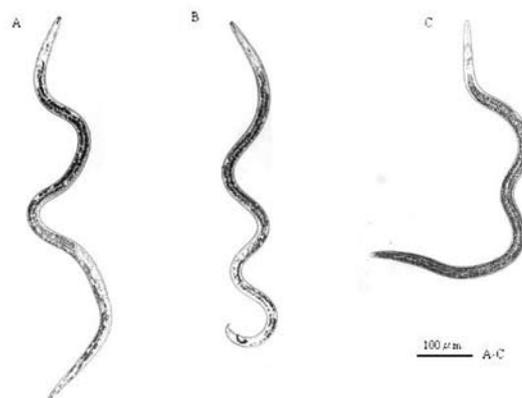


Fig. *Bursaphelenchus xylophilus*. A. Adult female, B. Adult male, C. Dispersal third-stage larva

Definitions of 'Quarantine' under the IPPC

The Convention works with the following definitions relevant to quarantine:

- "quarantine pest" – a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled;...
- "regulated non-quarantine pest" – a non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party;...
- "regulated pest" – a quarantine pest or a regulated non-quarantine pest;...
- "official control" – The active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests;...
- "phytosanitary measure" (agreed interpretation) - any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests.

Coherence and Differences between the Montreal Protocol and International Plant Protection Definitions

Almost all uses of methyl bromide falling within the QPS exemption under the Montreal Protocol cover areas of quarantine use within the scope of the IPPC. About 1% of use by volume relate to control of quarantine uses related to environmental protection, or animal or human health. The area of 'pre-shipment' is unique to the Montreal Protocol and falls outside the scope of the IPPC.

The definition of quarantine pest under the Montreal Protocol differs from that under the IPPC by one word, "economic": the Montreal Protocol refers to "pests of potential importance" while the Convention definition refers to "pests of potential economic importance". However, under the IPPC, it has been clarified in a supplement to ISPM No. 5 that "economic" includes environmental considerations.

The Montreal Protocol's definition covers environmental and other pests that might endanger a region without direct quantifiable economic loss. The use of methyl bromide in a quarantine treatment may only be for pests that are officially recognised as quarantine pests and must be officially authorized by a competent authority and not a commercial organisation. Under the Montreal Protocol definitions, "competent authorities" include not only national plant protection organisations but also national animal or environmental protection authorities or national official health authorities.



Dead longicorn larva (quarantine pest) in methyl bromide-treated wood (AQIS, Australia)

The IPPC deals with pests of plants, and not of livestock, which would have potential economic impact, again including environmental considerations. The scope of the IPPC covers the protection of cultivated plants in agriculture (including horticulture and forestry), uncultivated/unmanaged plants, wild flora, habitats and ecosystems. The IPPC definition of a quarantine pest relates to official control, which means established, authorized or performed by a national plant protection organisation.

QPS treatments under the Montreal Protocol relate not only to official phytosanitary treatments but may also apply to "sanitary" treatments, e.g., against human or animal pathogens and vectors, covered by multilateral agreements such as the World Animal Health Organisation (OIE) and World Health Organization (WHO).

Pre-shipment treatments target non-quarantine pests that may be present in both the exporting and importing country. These pests are usually ones that affect storage or end-use quality of the exported commodities, and are outside the scope of the IPPC. Exceptionally, these commodities may be seeds for planting.



Export grain silos that use methyl bromide for pre-shipment (I. Porter)

Determining if a Methyl Bromide Treatment Falls within the QPS Exemption under the Montreal Protocol

If a quarantine pest of the importing country is present in a consignment, or it is determined officially that there is a risk that it could be present, then, under the Quarantine provisions of the QPS exemption, the consignment of goods may be treated with methyl bromide to control that pest.

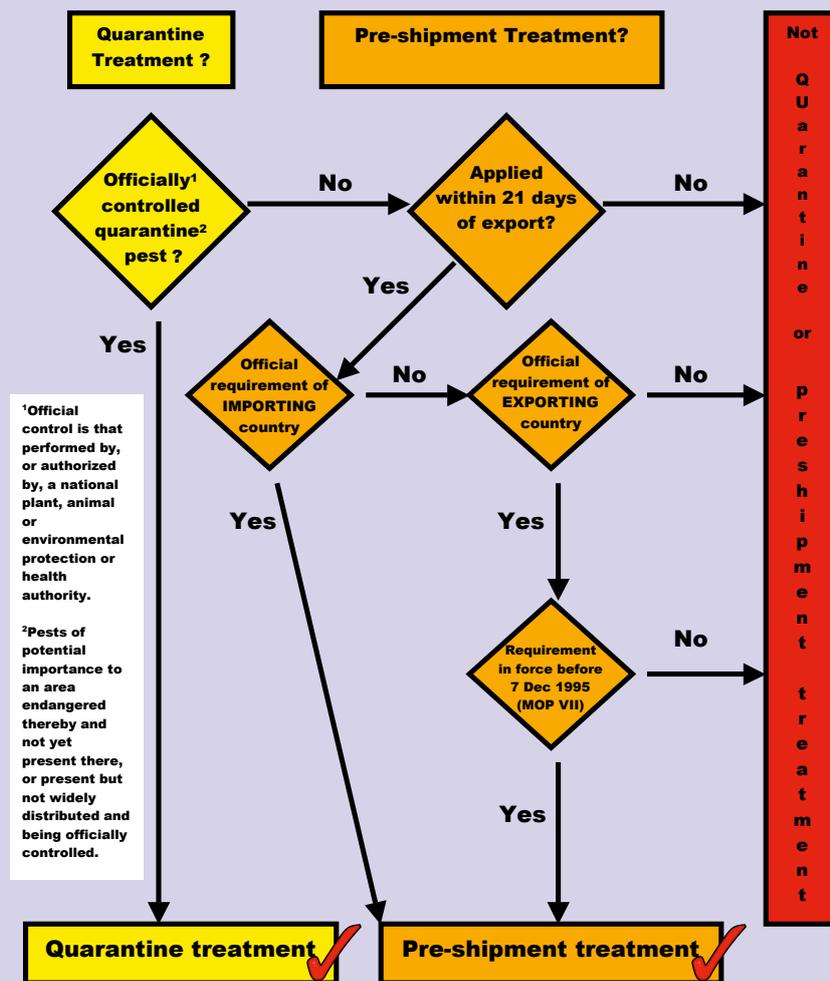
If the pests that may be present in an exported consignment are not quarantine pests and treatment is carried out within 21 days of export, as required by certain official bodies of the exporting or importing country (as specified), then, under the Montreal Protocol, methyl bromide treatment may come under the Pre-shipment provisions of the QPS exemption.

In both cases, countries are urged to use alternatives where they are technically and economically feasible, even if a methyl bromide treatment would be permitted under the QPS exemption.

A logic diagram to assist in determining whether a treatment with methyl bromide falls under the QPS exemption is provided in Box 3 below.

Box 3: Logic diagram

QPS Logic Diagram to assist in determining whether a treatment should be categorised as a 'quarantine' treatment, 'pre-shipment' treatment or neither.



Examples that May Assist in Categorising 'Quarantine' and 'Pre-shipment'

The examples are taken mostly from Technology and Economic Assessment Panel (TEAP) 1999, Progress Report (volume 2, pp. 27–32) and TEAP 2002 Progress Report (volume 1, pp. 142–147). Further examples have been added and refinements made. (See Box 4 for information about TEAP.)

Examples that May Fall under Quarantine Use

Official treatment in country of origin

A methyl bromide treatment required by official phytosanitary requirements of an importing country against a quarantine pest known to infest a particular commodity.

- **Example:** Treatment of packed commodities subject to infestation by the khapra beetle (such as rice, spices, or materials packed in straw and/or wooden crates) for shipment from a country where the khapra beetle is known to be established to a country free from the pest.
- **Reasoning:** The khapra beetle is a quarantine pest in a number of importing countries. Typically methyl bromide is specified for its control.
- **Example:** Methyl bromide treatment in the USA of oak logs to control oak wilt fungus. The logs are destined for Europe where the fungus is not established.
- **Reasoning:** Oak wilt fungus is a quarantine pest for the European Union.
- **Example:** Methyl bromide fumigation of wood packaging material to ISPM No. 15 for containerised cargo from China to USA.
- **Reasoning:** Methyl bromide is one of two treatment options approved in ISPM No. 15 for the treatment of wood packaging material to help control the spread of quarantine pests, such as Asian longhorn beetle, in the USA.

Official treatment on arrival

Official treatment of imported consignment where a quarantine pest is detected.

- **Example:** Methyl bromide treatment of grapefruit from Florida found to be infested with Caribbean fruit fly on arrival in Japan.
- **Reasoning:** The Caribbean fruit fly is a quarantine pest for Japan and methyl bromide is specified as a control measure.

Official treatment within a country

Official treatment of a commodity transported within a country from an area where a quarantine pest is present to an area where it is not present or not widely distributed, and under official control.

- **Example:** MB treatment of fresh fruit, e.g. citrus, shipped into Western Australia from Queensland as a precaution against Queensland fruit fly (*Bactrocera tryoni*), which is a pest established in Queensland, Australia.
- **Reasoning:** the fruit fly is not present in Western Australia and is under official control as a quarantine pest.

Eradication of a quarantine pest from an area

Treatment of an established quarantine pest with a view to its control and eventual eradication from a country.

- **Example:** Methyl bromide treatment of dry wood termites in houses and in other structures in Southern Queensland, Australia.
- **Reasoning:** Dry wood termites are quarantine pests established in a few small regions of Australia and subject to official control.



Applying methyl bromide under sheets to imported logs as a quarantine treatment (Ministry of Agriculture, Forestry and Fisheries, Japan)



Examples that May Fall under Pre-shipment Use

Under the IPPC framework, phytosanitary measures (e.g. the requirement for a methyl bromide treatment) should only be put in place for regulated pests (quarantine and regulated non-quarantine pests). Pre-shipment control with methyl bromide, e.g. for cosmopolitan and/or stored product pests, would not be considered a phytosanitary measure, unless the targeted pests are also regulated pests in either the country of export or import.

If the official phytosanitary measures require that a methyl bromide treatment of a consignment against a quarantine pest be carried out prior to shipment, then this would not be categorized under QPS as pre-shipment use but as quarantine use.

Pre-shipment treatment of exports in country of origin

Treatment of a cargo prior to shipment to meet the official requirements of the importing country or existing official requirements of the exporting country.

- **Example:** Methyl bromide treatment of wheat shipments destined for Kenya. The treatments against cosmopolitan grain pests are carried out in the seven day period prior to export.
- **Reasoning:** This is categorised as a pre-shipment application because treatment with methyl bromide (or phosphine) is an official import requirement of the Kenyan Government for wheat imported into Kenya. It is carried out within 21 days of export. Although Kenyan authorities recognise phosphine as an alternative to methyl bromide for this application, the existence of an alternative does not invalidate the exemption.

In-transit fumigation of freight containers loaded on a train and subsequently exported by ship.

- **Example:** Methyl bromide fumigation of bagged milled rice in freight containers at the rice mill some distance from a port. Subsequent transfer to port and export by ship within 21 days of treatment.
- **Reasoning:** This would be categorised as a pre-shipment treatment if it were carried out directly prior to export to meet official requirements.

Box 4: Technology and Economic Assessment Panel (TEAP)

The Montreal Protocol has been strengthened several times to speed up the phase-out schedule and to add new chemicals under its control. An important basis for such decisions by the Parties is the independent, authoritative and up-to-date information provided by the Assessment Panels of the Montreal Protocol through major assessment every four years and annual progress reports. The three Panels assess scientific, technological and economic aspects of ozone layer depletion and its environmental effects. The Technology and Economic Assessment Panel (TEAP) has six committees under it – one of them is the Methyl Bromide Technical Options Committee (MBTOC). The key tasks undertaken by MBTOC include regularly assessing alternatives to methyl bromide and evaluating critical uses of methyl bromide.

Examples that May Not Fall within the QPS Exemption

- *Pre-shipment treatments carried out at greater than 21 days prior to export.*
- *Treatments carried out for contractual reasons, not officially required or authorised.*
- *Treatment of land that will grow a crop for export with the land free of quarantine pests recognised at the export destination*

Alternatives and Emission Control

Although exempted from control measures leading to phase-out under the Montreal Protocol, the methyl bromide used in QPS applications still will affect the ozone layer if it leaks out to the air during a fumigation or is vented after the treatment.



Experimental application of a methyl bromide alternative (sulphuryl fluoride/methyl isothiocyanate mixture) to timber, potentially for ISPM No. 15 (Ministry of Agriculture, Forestry and Fisheries, Japan)

When considering the definitions of 'quarantine' and 'pre-shipment' the Parties to the Montreal Protocol decided: *"In applying these definitions, all countries are urged to refrain from use of methyl bromide and to use non-ozone-depleting technologies wherever possible. Where methyl bromide is used, Parties are urged to minimize emissions and use of methyl bromide through containment and recovery and recycling methodologies to the extent possible;"*

In many QPS situations for which methyl bromide can be used, there are also approved and feasible non-methyl bromide alternatives.

For quarantine purposes, there are currently only two internationally-adopted phytosanitary treatments. These treatments are both for wood packaging material in ISPM No. 15 (*Guidelines for regulating wood packaging material in international trade*) and are a methyl bromide treatment and an alternative which is a heat treatment.

Most treatments are specific to particular quarantine pest in commodities from a given origin. Often alternative treatments are given. However it is also recognised for certain pests and/or commodities no viable and approved alternative treatment to methyl bromide currently exists.

In 2007, a draft international standard (ISPM) entitled *"Developing a strategy to reduce or replace the use of methyl bromide for phytosanitary purposes"* was developed and sent out for member consultation. This draft recognises that methyl bromide is needed in certain cases but it also outlines many ways in which national plant protection organisations can work together to help reduce emission of methyl bromide into the environment including the reduction of use, the use of alternatives and the recycling and recapture of the fumigant.

When methyl bromide has to be used, it is important to adopt 'best practice' procedures in carrying out the fumigations. This includes minimising emissions of methyl bromide gas through leakage by ensuring good sealing of the fumigation enclosure and adjusting dosages, where permitted, to the lowest that can achieve the level of quarantine security sought.

There are several training courses and manuals that aim to provide skills in best practice fumigation with methyl bromide including the FAO publications: *"Manual of fumigation for insect control"* (Bond, 1984) and *"International Plant Quarantine Manual"* (Stout, 1983) and the FAO fumigation guide at <http://www.fao.org/inpho/content/documents/vlibrary/ad416e/TopFrameset.htm?IntroductionFrameset.htm~rightFrame>. In addition, the IPPC Technical Panels on Phytosanitary Treatments and on Forest Quarantine are both in the process of developing guidelines for the safe and efficient use of fumigants which would include methyl bromide.

Recapture and recycling or destruction technologies are available commercially. These systems, coupled with effective containment, can reduce emissions of methyl bromide to the atmosphere very substantially.



Recapture of methyl bromide on a freight container (Nordiko)

Treated Materials

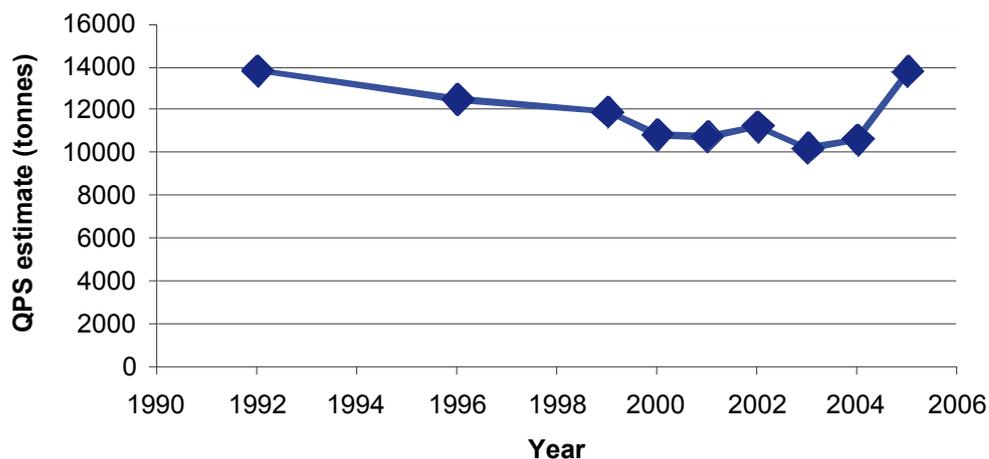
A wide variety of commodities are treated at present with methyl bromide for QPS purposes, though many have viable, approved alternatives.

Over 95% of consumption of methyl bromide for treatment of commodities for QPS purposes is for:

- Export logs and sawn timber
- Wooden packaging materials, dunnage and pallets
- Export fruit and vegetables
- Some export grains, pulses and oilseeds, and derived products
- Dried foodstuffs

One country categorises some treatments of soil for propagation stock (e.g. strawberry runners, nursery stock) as 'quarantine.'

Worldwide production of methyl bromide for QPS use (MBTOC and UNEP data)



QPS applications, worldwide, are a major and increasing source of methyl bromide emissions.

For Further information Contact:

The Ozone Secretariat

P.O. Box 30552-00100 Nairobi, Kenya

Tel: (254 20) 762 3885 / 48

Fax: (254 20) 762 4691 / 2 / 3

E-mail: ozoneinfo@unep.org

Web: <http://ozone.unep.org> or
www.unep.ch/ozone

www.unep.org

United Nations Environment Programme
P.O. Box 30552, Nairobi 00100, Kenya
Tel: +254-(0)20-762 1234
Fax: +254-(0)20-762 3927
Email: unep@unep.org
web: www.unep.org

