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CRS Report for Congress

Methyl Bromide and Stratospheric Ozone Depletion

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Summary

Methyl Bromide (MeBr), a widely used pesticide in agriculture, is regulated for its potential ozone-depleting effects in the Earth's stratosphere. Controls on production, emissions, and trade are mandated internationally under the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (the Protocol) and domestically under Title VI of the U.S. Clean Air Act. A ban on production for *nonessential* uses occurred on December 31, 2004, but the Protocol still regulates post-2004 production for *critical uses*. U.S. agribusinesses have sought exemptions from the Environmental Protection Agency (EPA) to produce MeBr for certain critical uses after the ban. Exemptions are resisted by some Protocol parties and environmental advocates who seek a rapid, definitive ban on production *and* use. Chemical companies maintain that they cannot foresee development of effective chemical substitutes for all uses of MeBr in the near term, and agricultural producers indicate they may have to rely on less economical and less effective treatments. Production allowances for MeBr for 2005-2008 have since been approved under the Protocol, and the EPA has approved allocations for registered U.S. users. Due to declining production of manufactured MeBr, the EPA would permit commercial trade of pre-2005 inventories. This report will be updated as warranted.

Introduction

Methyl Bromide (MeBr) plays an important role in international agriculture because of its effectiveness in killing insects and plant pathogens. MeBr is used extensively for "pre-planting" and "post-harvest" treatment of crops. It also is used for "quarantine and pre-shipping (QPS)" treatment of agricultural commodities and containers used in international importing and exporting of agricultural goods.

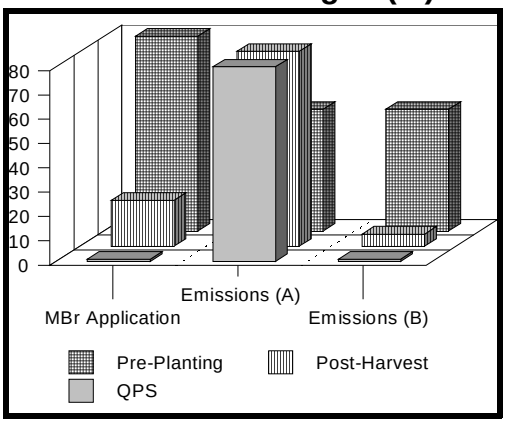
In the mid-1980s, a group of atmospheric scientists discovered that when gaseous emissions of MeBr rise into the upper atmosphere, they are decomposed by sunlight. Bromine oxide (BrO), a powerful ozone-depleting substance (ODS), is released as a

byproduct.[1] After BrO rises to the stratosphere ozone layer (between 9-22 miles above Earth's surface), it is highly chemically reactive and causes the density of ambient ozone (O_3) to thin. This thinning increases exposure to different wavelengths of ultraviolet (UV) radiation at the surface. The ozone layer traps most harmful forms of short-wave UV-B radiation from space. Biologists warn that exposure to UV-B can be genetically damaging to life forms at the cellular level.[2] Conversely, UV-A radiated from the sun can penetrate the ozone layer and reach the Earth's surface. Although less harmful than UV-B exposure, UV-A can cause some forms of fatal skin cancers and blindness in humans.[3]

MeBr Use and Emissions

As a pesticide, MeBr is proven effective at killing molds, other fungi, insects, and worm (nematode) infestations of crops. In 1991, 66,000 metric tons (Mt) of MeBr were produced globally, and predominantly for agricultural uses.[4] That tonnage became the baseline from which a stepped-down phaseout was scheduled under the Protocol and the 1990 CAA amendments. U.S. production of MeBr in 1991 was about 25,500 Mt.

Figure 1. Methyl Bromide Use by Application and Emissions Per Unit Discharged (%)



Source: Produced by CRS using U.N. Environmental Program (UNEP) global baseline data for 1991for tonnage produced and emissions resulting from its various uses.

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[1] David Fahey, National Oceanic and Atmospheric Administration Aeronomy Lab, reprinted as *Scientific Assessment of Ozone Depletion: 2002*, "Twenty Questions and Answers About the Ozone Layer," U.N. World Meteorological Organization, Geneva, March 2003.

[2] Ozone Secretariat, U.N. Environmental Program (UNEP), "Environmental Effects of Ozone Depletion: 1998," published in *Journal of Photo Chemistry and Photobiology*, vol. 46, nos. 1-3, October 1998. UV radiation is classified by its wavelength.

[3] U.N. World Meteorological Organization (WMO), U.N. Environmental Program (UNEP), *Scientific Assessment of Ozone Depletion: 1994*, Ch. 10, "Methyl Bromide," [Global Ozone Research and Monitoring Project — Report No. 37].

[4] A metric ton (Mt) is about 1.1 U.S. tons.

Figure 1, shows that in agricultural uses, typically about 80% of manufactured MeBr is for fumigating soils prior to planting to prevent root damage. Another 20% is used as a pesticide to treat post-harvested commodities such as fruits, vegetables, dried foodstuffs, stored grains, cut flowers, and timber. It is also used in this capacity to treat wooden crates and shipping palettes and to fumigate crop storage facilities. About 1% of total is used for quarantine and pre-shipment (QPS) treatments in global agricultural trade.

The profile of emissions differs for various uses. About 50% of MeBr is emitted into the atmosphere during controlled pre-planting applications.[5] Post-harvest and QPS applications can result in up to 80% of emissions discharged if not conducted in a contained environment (*emissions scenario A*). Contained uses may still account for 5% and 1% losses to the atmosphere, respectively (*emissions scenario B*).

Critical Use Allowances (CUAs)

U.S. agribusinesses and small farm owners alike are concerned about a possible future ban of MeBr production. They anticipate higher costs of doing agricultural business because of diminishing supplies, lack of viable or economically feasible alternatives (for some uses), and possible future restrictions on international trade of U.S. agricultural products if treatment with MeBr were to be prohibited. In the spring of 2003, the United States was among 13 countries that petitioned the Protocol parties for Critical Use Allowances (CUAs) to produce MeBr after its post-2004 ban of *nonessential* uses.[6]

Critical Stock Allowances (CSAs). CSAs, were since approved under the Protocol to supplement declining production and diminishing supplies of manufactured MeBr for agricultural use. The EPA and similar agencies on behalf of industrialized countries petitioned Protocol parties to allow trading inventories of "pre-phaseout" floor stocks of MeBr. Only countries that are party to the Protocol are permitted CSAs to acquire inventories from other parties with surpluses. Additionally, parties acquiring MeBr floor stocks have to remain beneath an overall annual cap that includes annual *consumption* (i.e., CUAs approved for new production of MeBr for domestic use or MeBr imported from other parties) *and* CSAs. The annual cap is a percentage of 1991 global production approved for interested parties by the Protocol. On December 13, 2005, the EPA had issued a notice of a proposed rulemaking to permit trade of preexisting stocks of MeBr and to allocate supplemental Critical Stock Allowances (CSAs).[7] In January 2006, the EPA announced a *notice-and-comment* period for U.S. CSAs. It also updated a schedule of registered U.S. MeBr producers and users that could be eligible to trade pre-2005 manufactured floor stocks.[8]

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[5] U.S. Department of Agriculture, Agricultural Research Service, "Methyl Bromide, Fumigation," [http://www.ars.usda.gov/Research/docs.htm?docid=10408&page=15], accessed Sept. 15, 2006.

[6] Ozone Secretariat, Draft Decisions IX/1, *Further Adjustments and Amendments to the Montreal Protocol*; IX/2, *Critical-use Exemptions for Methyl Bromide* (UNEP/OzL.Pro.9/6, 6/10/1997).

[7] EPA, Rules and Regulations, "Protection of Stratospheric Ozone; Process for Exempting Critical Uses of Methyl Bromide for the 2005 Supplemental Request," *Federal Register*, vol. 70, Dec. 13, 2005: 73604.

[8] EPA, "Fact Sheet - Final Rule to Create a Critical Use Exemption to the Phaseout of Methyl (continued...)

U.S. Steps Taken to Acquire CUAs of MeBr

In 1992, methyl bromide (MeBr) became regulated under the 1987 Montreal Protocol as an ozone-depleting substance (ODS). A stepped-down phaseout of global production was scheduled for December 31, 2004. The CAA Amendments of 1990 authorized EPA to regulate MeBr under schedule H of Class-I of ODS in the CAA and in 1993, A U.S. phaseout of MeBr was scheduled under Title VI, "Protection of Stratospheric Ozone."[9]

In early 2003, the agricultural community urged the EPA to secure critical use exemptions (CUEs) of MeBr for production in a post-2004 regulatory regimen. They noted that this could be achieved in three ways: (1) by U.S. authority granted under the Montreal Protocol; (2) deregulation of Protocol-approved quantities by the EPA; and (3) congressional legislation to codify such actions. In March 2003, the EPA solicited comments on a proposed rule to establish "exemptions for farmers' critical uses of MeBr."[10] Anticipating that Congress might approve implementing legislation, pressure was put on the EPA by U.S. and international environmental groups who sought a ban on production of MeBr for *all* U.S. uses by December 31, 2004. Instead, the EPA filed a notice of proposed rulemaking, reiterating a decision made at an interim meeting of Protocol parties that the action sends a "clear market signal" to U.S. chemical industries and agribusinesses to pursue chemical substitutes or alternative treatments by 2015.[11]

In May 2003, the EPA initiated a Nomination for Critical Use Exemptions (NCUEs) to produce MeBr after December 24, 2004. It received 57 petitions from commercial growers who foresaw no economically feasible substitutes or alternative treatments for certain agricultural applications in the near term. The petitions were either approved, returned for additional information, or rejected outright. The EPA concluded that about 11,500 Mt of MeBr would be needed for the 2005 growing season alone.[12] It submitted final NCUEs for 2005 and 2006 to the U.N. Ozone Secretariat, requesting combined CUAs of 17,383 Mt for those two years.[13]

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[8] (...continued)
Bromide for the Year 2006,"at [http://www.epa.gov/ozone/mbr/FR2006CUE_Factsheet.html].

[9] The EPA listed MeBr as a "Class-I ODS" under the Clean Air Act, when it was determined to have an Ozone Depletion Potential (ODP) of 0.75 (i.e., >0.2). (CFCs-11/12 have an ODP of 1.00).

[10] EPA, "Process for Exempting Critical Uses of Methyl Bromide ... Proposed Rule," *Federal Register*, vol. 69, Aug. 25, 2004: 52366-52402.

[11] UNEP, March 2004, Adoption of Decisions, Decision Ex.I/1. Further adjustments relating to the controlled substance in Annex E, Decision 81, Preamble, "Noting that, by 1 February 2006, non-Article 5 Parties will submit national management strategies which will send a clear signal on the phase-out of critical uses of methyl bromide."

[12] BNA, Inc., "Methyl Bromide Production for Export Can Continue Until 2005 under EPA Rule," *Daily Environmental Report*, vol. 82, Apr. 29, 2002, p. A-6.

[13] EPA, Notice, "Request for Applications for Essential Use Exemptions to the Production and Import Phaseout of Ozone Depleting Substances Under the Montreal Protocol for the Years 2006 and 2007," *Federal Register*, vol. 69, Oct. 6, 2004: 59918-5990.

The Protocol parties as a whole have not always agreed with U.S. submissions for CUAs. During international negotiations on production allowances for the 2005 growing season, some Protocol parties had challenged the EPA's submission for NCUEs. Because of uncertainty about future supplies of MeBr for U.S. agricultural businesses, President Bush and some Members of Congress considered withdrawal from the international treaty.[14] In the wake of U.S. concerns, and some compromises by DOS negotiators, it had appeared to some observers that the U.S. position had gained greater support among Protocol parties during negotiations for the 2006 growing season. When submitting U.S. Nominations for Critical Use Exemptions (NCUEs) for 2007 to the Protocol Secretariat, the EPA stated that future U.S. demands for MeBr would likely decline due to introduction of promising alternatives for some applications in the marketplace.[15]

U.S. Negotiations under the Montreal Protocol. At the 15th Meeting of Parties to the 1987 Montreal Protocol (MOP) held in November 2003 in Nairobi, Kenya, the Department of State (DOS) had negotiated NCUEs approved by the EPA for the 2005-2006 growing seasons. To manufacture MeBr for those NCUEs, the EPA recommended CUAs of 39% of 1991 baseline production levels for 2005 and 37% for 2006. (See **Table 1**, below.) The U.S. request was the largest among industrialized country parties.[16] During negotiations, some delegates questioned whether, "for the United States, what was being sought was truly essential."[17] Decisions about final MeBr production allowances for industrialized countries were deferred until the 16th MOP held in Prague, The Czech Republic in November 2004. Parties awaited "needs analysis" by the U.N. Environmental Program (UNEP) Methyl Bromide Technical Options Committee (MBTOC) that would estimate total international tonnage of MeBr needed for 2005-2006.

An "Extraordinary MOP" (EMOP/1) held in February 2004 in Montreal, Canada, authorized U.S. CUAs for 2005 at 37.5% of 1991 tonnage level, or 9,562 Mt. This amount included a supplemental CUA of 2.5%, or 638 Mt and came closer to what the United States had originally sought for 2005. However, U.S. negotiators were warned that CUAs could be reduced to 27% of 1991 baseline, or 6,900 Mt, for the 2006 growing season. Protocol parties at a second meeting (EMOP/2), held in July 2005 in Montreal, Canada approved final U.S. CUAs for 2006 at 32%, or 8,160 Mt. At the 17th MOP, held in December 2005 in Dakar, Senegal Protocol parties approved U.S. CUAs of 26.3%, or

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[14] The Senate Committee on Foreign Relations considered Treaty Doc. 106-32, decided Oct. 2, 2002, which restricted international trade of MeBr among Montreal Protocol parties except by exporting and importing licenses approved by Protocol parties. U.S. withdrawal from the treaty would mean a loss of exporting privileges with other industrialized and Article 5(1) parties.

[15] EPA, "Methyl Bromide for U.S. 'Critical Uses' Continues Steady Decline Under International Ozone Layer Protection Treaty," *EPA Newsroom* (online), Nov. 13, 2006, available at [http://yosemite.epa.gov/opa/admpress.nsf/4d84d5d9a719de8c85257018005467c2/9cd6a77b0cdfc7eb85257225005a88ae!OpenDocument], accessed Dec. 6, 2006.

[16] EPA, "U.S. Government Nominates Critical Use Exemptions for Methyl Bromide: Materials Submitted to the Ozone Secretariat of the United Nations, [EPA] *Environmental News*, Feb. 7, 2003, at [http://www.epa.gov/spdpublc/mbr/], accessed Sept. 18, 2006.

[17] Andrew Revkin, "U.S. Seeks Exemptions for Pesticide, European Union Leads Critics as Ozone Talks Open in Nairobi," *New York Times*, Nov. 11, 2003, p. 3.

6,749 Mt for 2007 growing season, or about 91% of EPA's request.[18] This amount included 5,100 Mt, or 20% of baseline, for new production and imports (CUAs), and 1,658 Mt, or 6.25%, authorized for CSAs.[19] The Parties also approved a supplemental request of 0.03% of U.S. baseline tonnage, or 7.7 Mt for 2006 uses. At the 18th MOP in November 2006 in New Delhi, India, the United States was authorized 21% of baseline, or 5,355 Mt: CUAs were 18% of base line, or 4,595 Mt, and CSAs of 760 Mt. The EPA submitted NCUEs to the Ozone Secretariat and a combined request of CUAs of 25% of baseline for 2008-2009. Protocol parties are reviewing NCUEs submitted for 2009.

Table 1. Requested and Allocated U.S. CUAs/CSAs for 2005-2008
(Tonnage/% 2001 U.S. baseline of 25,528 Mt)

	2001 Base	2005	2006	2007	2008
EPA Nominated	—	9,960 Mt 39%	8,889 Mt 37%	7,403 Mt 29%	6,385 Mt 25%
Protocol Approved	25,528 Mt 100%	9,553 Mt 37%	8,082 Mt 32%	6,749 Mt 26%	5,355 Mt 21%

Source: EPA data, 2006, at [http://www.epa.gov/ozone/mbr/], accessed December 11, 2005.

Congressional Legislation. On February 15, 2006, Representative Radanovich introduced H.R. 1257 to authorize U.S. production of MeBr proposed by EPA for the 2006-2007 growing seasons. The bill was referred to the House Committee on Energy and Commerce, and to the Subcommittee on Energy and Air Quality.[20] No further legislative action occurred. Agricultural producers argued for annual production allowances for MeBr through 2015. With continued access to MeBr, they stated, trade in agricultural commodities would be on "a level playing field in the global marketplace." Under the Protocol, Mexico, Brazil, and China (Article 5(1) developing countries) can use MeBr at agreed upon levels for domestic needs through 2015. Opponents of the bill were mostly environmental interests who would ban U.S. production of MeBr in the near term. Further, they have urged the EPA to ban *all* domestic uses of MeBr by 2015.[21]

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[18] EPA, Notice of Proposed Rulemaking: The 2007 Critical Use Exemption from the Phaseout of Methyl Bromide, July 26, 2006 [Public Hearing, Docket No.: 2005-0538], at [http://www.epa.gov/ozone/mbr/0721crit.html], accessed Sept. 12, 2006.

[19] U.S. CSAs were first discussed at a hearing. See U.S. Congress, House Committee on Energy and Commerce, Subcommittee on Energy and Air Quality, *Methyl Bromide: Update on Achieving the Requirements of the Clean Air Act and the Montreal Protocol*, Hearing, [Serial No. 108-118] July 21, 2004 (Washington: GPO, 2004).

[20] U.S. Congress, House Committee on Government Reform, Subcommittee on Energy and Resources, *Methyl Bromide: Are U.S. Interests Being Served by the Critical Use Exemption Process?* Oversight Hearing, [Briefing Memorandum] Feb. 15, 2006, at [http://reform.house.gov/ER/Hearings/EventSingle.aspx?EventID=39507].

[21] U.S. Congress, House Committee on Energy and Commerce, Subcommittee on Energy and Air Quality, *Status of Methyl Bromide under the Clean Air Act and the Montreal Protocol*, Hearing [Serial No. 108-55], June 3, 2003, (Washington: GPO, 2004).