



# ChemicalWatch Factsheet

## Methyl Bromide

First registered in 1961, methyl bromide is registered as a restricted use pesticide (RUP) for use as a broad spectrum fumigant as an acaricide, antimicrobial, fungicide, herbicide, insecticide, nematocide, and vertebrate control agent for pre- and post-harvest treatment of commodities, durable goods, and structural fumigation. It is not currently registered for residential uses.<sup>1</sup> Methyl bromide is primarily used in soil to control fungi, nematodes, and weeds; in space fumigation of food commodities (e.g., grains); and in storage facilities (such as mills, warehouses, vaults, ships, and freight cars) to control insects and rodents.

### Toxicity

Methyl bromide is a colorless, odorless gas. Exposure to methyl bromide may occur during fumigation activities. According to the U.S. Environmental Protection Agency (EPA), methyl bromide is highly toxic. As a restricted-use pesticide, methyl bromide can only be applied by certified applicators, and there are significant human health risks posed to both workers and bystanders from inhalation exposure. Symptoms of significant exposure to methyl bromide include throat and eye irritation, skin lesions, weakness, despondency, headache, nausea, and vomiting. Later, numbness, defective muscular coordination, tremor, muscle spasms, lack of balance, extreme agitation, coma, and convulsions may occur. High levels of exposure can result in central nervous system failure, respiratory failure, and death.<sup>2</sup>

Methyl bromide is absorbed well by the lungs and to some degree through intact

skin.<sup>3</sup> Studies in humans indicate that the lung may be severely injured by the acute (short-term) inhalation of methyl bromide.

*Montreal Protocol on Ozone Depleting Substances* and control measures for the chemical were included in the Copenhagen Amendment in 1992 under Article 2H of the Protocol.<sup>8</sup> It is also controlled in the U.S. under the Clean Air Act (CAA). The Montreal Protocol, which aims to control the production and trade of ozone-depleting substances, is legally binding on all signatories to the treaty, including the U.S. The protocol mandates the substance to be completely phased out, according to a precise schedule, by January 1, 2005, and by 2015 for developing countries.<sup>9</sup> According to the schedule, methyl bromide production and import levels were to be frozen to 1991 baseline levels by 1993, and a 70% reduction

from baseline levels was to be achieved by 2003/4, allowing for a complete phase-out by 2005.

### Continued Use Under Critical Use Exemptions

Critical use exemptions (CUEs) are permitted under Section 604(d) of the CAA and the Montreal Protocol.<sup>10</sup> Due to the CUE loophole, methyl bromide continues to be used for “critical use” applications in the U.S. once users petition that there are “no feasible alternatives.” According to EPA, each year the agency solicits applications for CUEs from methyl bromide users. After reviewing the applications, authorization for those uses from the Parties to the Montreal Protocol is requested. “Critical uses” and the amount of methyl bromide for those “critical uses” are then approved. As a result of CUE uses, application rates of methyl bromide in the U.S. have remained elevated.

### ChemicalWATCH Stats:

**CAS Registry Number:** 74-83-9

**Trade Names:** Meth-O-Gas, Terr-O-Gas, Pic-Brom, Tri-Con, Mebrom.

**Chemical Class:** Halogenated organic.

**Use:** Pre-plant soil fumigant, post-harvest treatment of commodities, durable goods, and structural fumigation. Not registered for residential uses.

**Toxicity rating:** Highly toxic.

**Signal Word:** DANGER.

**Long-term Health Effects:** Neurological damage, developmental toxicity.

**Environmental Effects:** Ozone depleting chemical.

According to EPA, “acute and chronic (long-term) inhalation of methyl bromide can lead to neurological effects in humans. Neurological effects have also been reported in animals. Degenerative and proliferative lesions in the nasal cavity developed in rats chronically exposed to methyl bromide by inhalation. Chronic inhalation exposure of male animals has resulted in effects on the testes at high concentrations.”<sup>4</sup> EPA has classified methyl bromide as Group D, “Not classifiable as to human carcinogenicity.”<sup>5</sup> It is also listed as a chemical known to cause developmental toxicity on California’s Proposition 65 list.<sup>6</sup> Methyl bromide is considered moderately toxic to birds and mammals, and slightly to moderately toxic to fish by acute exposure and to aquatic invertebrates.<sup>7</sup>

### Global Phase-out

Methyl bromide was recognized as an ozone-depleting substance under the *Mon-*

There are no CUEs for residential uses, but methyl bromide has CUEs for use as a pre-plant soil fumigant and in the post-harvest treatment of commodities and structural (food storage sites) fumigation. CUEs for 2014 and 2015 included pre-plant use on strawberries and post-harvest use for California storage facilities for walnuts, dried plums, figs, raisins, and dates.<sup>11,12</sup> Other CUEs exist for dry cured pork products, rice millers, and pet food manufacturing facilities. As a result of methyl bromide's continued use on crops, food tolerances for inorganic bromide residues resulting from fumigation with methyl bromide on nearly 90 commodities, as well as a tolerance for methyl bromide on cotton are in effect.<sup>13</sup>

### Strawberry Production

The use of methyl bromide in strawberry production has been a controversial one. Currently, conventionally grown California strawberries can still be treated with methyl bromide under a CUE. According to a 2014 report by the Center for Investigative Reporting entitled "Dark Side of Strawberry," California growers' use of methyl bromide "dropped 60 percent between 1991 and 2012. But the state still has used nearly a million pounds of the chemical this year, while other strawberry-producing countries like Spain and Japan have used none."<sup>14</sup> An investigative report published in 2011 found that use of methyl bromide in California in 2009 was still at nearly 50% of levels from ten years prior.<sup>15</sup> Counties that produce a high volume of strawberries saw an even smaller decline over that decade. Monterey County saw a drop of only 24%, while use in Santa Cruz County declined by 41%. The County of San Luis Obispo actually saw an increase over the ten year period, from 110,000 pounds applied in 1999 to 125,000 pounds in 2009.

In strawberry production, methyl bromide is usually used in conjunction with other toxic fumigants including 1,3-dichloropropene (1,3-D) and chloropicrin—both of which have also been linked to serious human health impacts, including kidney/liver damage and cancer.<sup>16</sup> Growers have tried to substitute other fumigants for methyl bromide; however, these substitutes can also have

### Alternatives to Methyl Bromide

The continued existence of CUEs for methyl bromide in agriculture is alarming, especially due to the fact that viable alternatives do already exist. For instance, when it comes to strawberries, alternatives to methyl bromide include selecting more resilient varieties and improved cultivars of strawberries, as well as incorporating traditional cultural practices such as crop rotation, cover crops, and physical methods such as soil solarization and anaerobic disinfestation. Despite these alternatives, strawberries continue to make up a large proportion of methyl bromide use in the U.S. Other countries, such as the European Union, has already banned methyl bromide and proven the efficacy of a number of alternative products, evidence the U.S. has ignored while manufacturing more of the chemical and building large stockpiles.

severe negative health and environmental impacts. For instance, sulfuryl fluoride was also put forward as an alternative, but due to concerns of fluoride overexposure, EPA cancelled sulfuryl fluoride use on stored food products in 2011. The highly controversial methyl iodide, which was also put forward as an alternative, is known to cause miscarriages, thyroid dysfunction, and cancer. It was approved by California state pesticide regulators in 2010, but the manufacturer eventually agreed to stop producing the chemical in 2013. A 2013 report by the California Department of Pesticide Regulation laid out an "Action Plan" to reduce farmer's reliance on toxic soil fumigants. This report expressed concern about the continued use of methyl bromide, but concluded, "Even with full commitment to implement this action plan, the strawberry industry will need to continue its use of fumigants for years to remain viable in California."<sup>17</sup>

### Registration Review

Methyl Bromide is registered under the *Federal Insecticide Fungicide and Rodenticide Act (FIFRA)*. In 2013, EPA initiated the registration review for methyl bromide, which is expected to be completed in 2020.<sup>18</sup> The last registration assessment was completed in 2006, with amendments in 2008 and 2009. Product label changes have been made for all soil fumigants requiring users to prepare a site-specific fumigation management plan (FMP) before application begins in attempt to increase protections for agricultural workers and bystanders.<sup>19</sup> Site-specific FMPs must contain certain ap-

plication information including, a tarp plan, a map showing the application block location and dimensions, buffer zone, property lines, roadways, rights-of-ways, sidewalks, etc., soil conditions, emergency response plan, air monitoring, and information on the certified applicator, among others. According to EPA's preliminary workplan for methyl bromide, a provision was added to allow applicators in California to follow certain requirements specified in California's methyl bromide commodity manual, such as buffer distances, re-entry restrictions, respirator requirements, etc., instead of the EPA label to simplify the application process in California.

In 2010, the members of the Methyl Bromide Industry Panel signed a "Memorandum of Agreement" with EPA that resulted in the continued use of certain applications, e.g., fresh market tomatoes and peppers grown in California (use allowed until December 31, 2012), Vidalia onions grown in Georgia (use allowed until December 31, 2012), ginger grown in Hawaii (use allowed until December 31, 2012), golf courses and athletic/recreational fields for resurfacing/replanting of turf (use allowed until December 31, 2013), caneberries (use allowed until December 31, 2014), and tobacco seedling trays (use allowed until December 31, 2014).<sup>20</sup> These uses were not eligible for reregistration, and the limited time uses allowed for users to transition to other pest controls. FIFRA Section 18 emergency exemptions also currently exist for methyl bromide despite regulatory action to phase out the chemical.



## Endnotes

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7. U.S. EPA. Reregistration Eligibility Decision for Methyl Bromide (soil and nonfood structural uses), 2008. Available at: [http://www.epa.gov/opp00001/chem\\_search/reg\\_actions/reregistration/red\\_PC-053201\\_9-Jul-08.pdf](http://www.epa.gov/opp00001/chem_search/reg_actions/reregistration/red_PC-053201_9-Jul-08.pdf).
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12. U.S. EPA. 2015 Critical Use Exemption Nominations from the Phaseout of Methyl Bromide. [http://www.epa.gov/ozone/mbr/2015\\_nomination.html](http://www.epa.gov/ozone/mbr/2015_nomination.html).
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