

August 6, 2019

## NCDEQ-EMC Log Fumigations Rule Comment

<https://deq.nc.gov/about/divisions/air-quality/air-quality-rules/rules-hearing-process>

Patrick Knowlson  
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Dear Mr. Knowlson,

Medical Advocates for Healthy Air (MAHA) is a statewide network of over 700 nurses, physicians, pharmacists, and other health professionals who educate and advocate for healthy air policies. This statement respectfully asks the Environmental Management Commission (EMC) to establish an Ambient Air Level (AAL) no higher than 0.005 mg/m<sup>3</sup> for methyl bromide in the proposed rule “Control of Emissions from Log Fumigation Operations” (15A NCAC 02D.1800) for the following reasons:

1. Inhalation exposure to methyl bromide is proven highly toxic based on findings from human experience and use history.<sup>1</sup>
2. Acute and chronic exposure of methyl bromide in the air can cause health risks such as respiratory irritation and severe effects on the lungs, skin, eyes, and nervous system.<sup>1</sup>
3. Methyl bromide contributes to stratospheric ozone depletion and has an estimated atmospheric lifetime of 0.8 years.<sup>2</sup>
4. The US Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) program set the Inhalation Reference Concentration (RfC) for methyl bromide at 0.005 milligrams per cubic meter (mg/m<sup>3</sup>) as an estimate of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. This RfC is based off a study that gives the EPA confidence to believe that at exposures greater than this, there is an increase in potential risks for adverse health conditions.<sup>3</sup>

MAHA recognizes that there are currently no regulations within North Carolina governing concentrations of methyl bromide in the air. It is a significant step in the right direction for the North Carolina Department of Environmental Quality (DEQ) to establish a cap on ambient air levels of this toxic pollutant. The rule proposes an AAL range of 0.005 mg/m<sup>3</sup> to 0.078 mg/m<sup>3</sup>. While understanding that any cap within these levels will improve air quality and health outcomes, MAHA urges the DEQ to set the AAL for methyl bromide at the lowest possible value.

The RfC established by the EPA Department of Air Quality is set at 0.005 mg/m<sup>3</sup>. This value is identified to be an appropriate AAL based on the most recent research studying the personal health impacts of airborne releases of methyl bromide from log fumigation operations.<sup>4</sup> Clean Air Carolina suggests that DEQ takes into consideration the most recent and up-to-date research, following suit of the EPA, to set the AAL at 0.005 mg/m<sup>3</sup>.

## Impacts on Health

Methyl Bromide is a fumigant listed as a Hazardous Air Pollutant (HAP) by the EPA, and its use is banned in several countries around the world because of its harmful impacts to the ozone layer and human health. In 1999, the EPA, per the Clean Air Act and Montreal Protocol, agreed to a complete phaseout of its use by 2005 with the exemption of emergency and critical use for quarantine and pre-shipment processes.<sup>5</sup> With the exemption, Methyl Bromide is used currently to control pests in agriculture, specifically berry farming, and shipping. However, there is a concern that the substance can cause severe health issues upon exposure to those who live and work miles from industries that use the chemical.

Current practices of pesticide treatment in log fumigation involve using plastic tarps, tents, or shipping containers to confine the gas for generally 60 to 72 hours. Once complete, the tarp is removed or the container doors are opened, releasing nearly all the gas into the air.<sup>4</sup> Methyl Bromide particles can remain in the atmosphere for up to 10 months and can travel miles outside the site of release.<sup>2</sup> This can cause a health risk to workers at the site, as well as workers and residents in the surrounding area.

When an individual breathes in Methyl Bromide, about half of it will be absorbed through the lungs and enter the bloodstream.<sup>6</sup> The speed at which it affects an individual can depend on a variety of factors, from the dose, duration, frequency, or route of exposure, to age, sex, diet, family traits, and state of health.<sup>6</sup> Inhalation of low levels of exposure to Methyl Bromide causes headaches, weakness, sore throat, nausea, and neurological effects.<sup>4</sup> High exposure can damage the eyes, skin, lungs, kidneys, and central nervous system (CNS). Symptoms of overexposure include visual disturbance, abdominal pain, incoordination, tremors, convulsions, mental confusion, pulmonary edema, and irritation of the respiratory system.<sup>7</sup> Levels of about 1,600 ppm and higher can lead to coma or death from respiratory or cardiovascular failure.<sup>6</sup>

Methyl Bromide toxicity is proven to strongly affect the respiratory tract and CNS following inhalation exposure based on available data in humans and animals. Data from animal studies show the margin of safety between no-effect and lethal values is small.<sup>8</sup> A study done by the National Academy of the Sciences assigned Methyl Bromide to Level 2 and Level 3 of Acute Exposure Level Guidelines, meaning all levels (mg/m<sup>3</sup>) of the substance in the air can cause irreversible or other serious, long-lasting adverse health effects (AEGL-2), or with increased exposure levels, can cause life-threatening health effects or death (AEGL-3). Recovery is possible but with lasting neurological problems.<sup>7</sup>

## Cases of accidental exposure

Most cases of accidental exposure to Methyl Bromide involve activities from manufacturing or packaging operations, use of fire extinguishers containing the substance, or fumigation activities. During fumigation activities, exposure to high concentrations of Methyl Bromide can occur when the substance is first released into the environment after fumigation ends or when poor or improper ventilation is used in the fumigation area. Because of its lack of odor, color, and immediate irritating properties at low levels, and because signs of exposure are often delayed, Methyl Bromide is considered an “insidiously-acting chemical.”<sup>7</sup>

Persons working and residing within miles of a log fumigation site may be at risk of accidental exposure to the hazardous substance. Though exposure may consist of short durations on a daily basis, brief but frequent inhalation is enough to cause both acute or chronic effects.<sup>4</sup>

## The validity of the most recent research

The EPA IRIS program established the RfC of Methyl Bromide at 0.005 mg/m<sup>3</sup>. This RfC is identified by both the EPA’s Department of Air Quality and the Secretaries’ Scientific Advisory Board (SAB) as “the most appropriate and scientifically valid human health value to provide protection for the long-term health of persons in North Carolina, including sensitive subpopulations that may live adjacent to a log fumigation facility that repeatedly releases methyl bromide to the ambient air during operations.” SAB, made up of a panel of experts on human health impacts, provides technical assistance and advice on ways North Carolina can better address issues related to chemicals in the environment. Released in 2018, this is the most up-to-date and relevant research on toxicity and health hazards of chemicals.<sup>4</sup> The 0.078 mg/m<sup>3</sup> value proposed by the EMC comes from older, outdated research. It is imperative that, for the health of our most sensitive subpopulations including children, the elderly, and many other vulnerable populations, the DEQ considers the value established by the most recent data and the most current human health risk assessment methods.

## Conclusion

By setting the 24-hour NC AAL of Methyl Bromide at 0.005 mg/m<sup>3</sup>, the NCDEQ will be securing better health outcomes for workers and residents, especially those of sensitive subpopulations, within the areas of release of the substance. The NCDEQ will also be following the RfC established by the EPA IRIS program and endorsed by SAB in the “Risk Analysis and Acceptable Ambient Level Recommendation for Methyl Bromide”. Both the EPA and SAB outlined the most recent and relevant research in its reports to support the recommended AAL of Methyl Bromide. It is evident that daily inhalation can occur in and around a fumigation area and can present acute and chronic effects over time. Clean Air Carolina urges the DEQ to set the lowest possible AAL of Methyl Bromide to reduce its harm to human health.

Sincerely,



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## References

1. Sheet GF. Methyl Bromide. *Occup Environ Med*. 2008;2(1):49-50. doi:10.1136/oem.2.1.49-a
2. Ozone Layer - Our World in Data. <https://ourworldindata.org/ozone-layer>
3. Environmental Protection Agency. Methyl Bromide (Bromomethane). <https://www.epa.gov/sites/production/files/2016-09/documents/methyl-bromide.pdf>. Published 2018. Accessed March 29, 2018.
4. Secretaries' Scientific Advisory Board. Risk Analysis and Acceptable Ambient Level Recommendation for Methyl Bromide. 2019:1-64.
5. Environmental Protection Agency. Protection of Stratospheric Ozone: Incorporation of Montreal Protocol Adjustment for a 1999 Interim Reduction in Class I, Group VI Controlled Substances. 1999;64(104):29240-29245.
6. Fay M, Brattin WJ, Donohue JM. Public Health Statement. *Toxicol Ind Health*. 1999;15(8):652-654. doi:10.1177/074823379901500802
7. National Academy of Sciences. *Acute Exposure Guideline Levels for Selected Airborne Chemicals Volume 3 Subcommittee on Acute Exposure Guideline Levels Committee on Toxicology Board on Environmental Studies and Toxicology Division on Earth and Life Studies*. Vol 12.; 2003. <http://www.nap.edu>.
8. ATSDR. Toxicological Profile for Bromomethane - Health Effects. *ATSDR's Toxicological Profiles*.