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Background Document
On Proposed Amendments to
Ambient Air Quality Standards for the Commonwealth of Massachusetts

310 CMR 6.00

Regulatory Authority:
M.G.L. c. 111, Section 142D

January 11, 2019

A. SUMMARY

The Massachusetts Department of Environmental Protection (MassDEP) is proposing to amend 310 CMR 6.00 *Ambient Air Quality Standards for the Commonwealth* in accordance with Governor Baker's Executive Order 562 to align the standards with federal Clean Air Act standards. The proposed amendments would update the Massachusetts air quality standards to be consistent with the current National Ambient Air Quality Standards (NAAQS) and update definitions for monitoring methods.

Under Sections 108 and 109 of the federal Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established NAAQS (40 CFR Part 50) for six pollutants considered harmful to public health and the environment. These are ozone, particulate matter, carbon monoxide, lead, nitrogen dioxide, and sulfur dioxide (collectively known as the "criteria pollutants"). For each of these pollutants, EPA sets "primary" standards to protect public health and "secondary" standards to protect public welfare. EPA is required to review the standards once every five years to determine whether revisions to the standards are appropriate. States are required to ensure that their air quality meets the NAAQS.

Each of the NAAQS is defined by four basic elements: indicator, averaging time, level, and form. Using ozone as an example, the indicator defines the pollutant to be measured in the ambient air for the purpose of determining compliance with the standard (i.e., ozone). The averaging time defines the time period over which air quality measurements are to be obtained and averaged or cumulated, considering evidence of effects associated with various time periods of exposure (i.e., 8 hours). The level of a standard defines the air quality concentration used in determining whether the standard is achieved (i.e., 0.070 parts per million). The form of the standard defines the air quality statistic that is compared to the level of the standard in determining whether an area attains the standard (i.e., annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years).

MassDEP operates a statewide air monitoring network that shows that the ambient air in Massachusetts meets the NAAQS. This is the result of the many air pollution control programs Massachusetts, upwind states, and EPA have implemented over the years, including controls on power plants and industrial sources, requirements for cleaner cars and gasoline, enhanced vehicle inspection and maintenance, controls on gasoline distribution and fueling infrastructure, initiatives to promote clean energy and energy efficiency, requirements for lower volatile organic compounds in consumer products, and regional nitrogen oxide "cap and trade" programs.

MassDEP's regulations at 310 CMR 6.00 contain ambient air quality standards for the six criteria pollutants for which EPA has established NAAQS. MassDEP's regulation is authorized by M.G.L. c. 111, Section 142D, which states, "…the department may adopt, and from time to time amend, after public hearings, ambient air quality standards…" Section 142D also directs MassDEP to periodically review the standards and amend them so as to minimize economic costs associated with meeting the standards, provided that any amended standards must be no less stringent than EPA's NAAQS.

MassDEP originally set the ambient air standards in 310 CMR 6.00 equal to the NAAQS in effect at the time. However, since MassDEP last updated the standards in 1994, EPA has revised the NAAQS to be more stringent for ozone, particulate matter, lead, sulfur dioxide, and nitrogen dioxide. EPA also has revoked some of the older NAAQS. Therefore, to comply with M.G.L. c. 142D, which requires that the Massachusetts standards are no less stringent than the NAAQS, and to make the regulations easier for the regulated community to understand and implement, MassDEP is proposing to amend the regulations so that the Massachusetts standards match the current NAAQS. To the extent possible, MassDEP is

proposing to use the same text that is found in EPA's NAAQS regulations (40 CFR Part 50) to avoid confusion by the regulated community.

B. DESCRIPTION OF THE PROPOSED REGULATIONS

In addition to the brief description of each NAAQS below, a table of the current NAAQS including links to tables showing historical changes to the NAAQS is available on EPA's website at https://www.epa.gov/criteria-air-pollutants/naaqs-table.

Sulfur Dioxide

Short-term exposures to sulfur dioxide ($SO_{2)}$ can harm the human respiratory system and make breathing difficult. Children, the elderly, and those who suffer from asthma are particularly sensitive to effects of SO_2. In addition, SO_2 emissions can lead to the formation of other sulfur oxides, which can react with other compounds in the atmosphere to form fine particulate matter ($PM_{2.5}$). SO_2 and other sulfur oxides also can contribute to acid rain that can harm sensitive ecosystems.

In 1971, EPA established SO_2 NAAQS at 0.14 ppm (24-hour, primary and secondary) and 0.03 ppm (annual, primary and secondary). Apart from revoking the secondary annual standard in 1973, the standards were not revised until 2010 when EPA established a new 1-hour standard of 75 parts per billion (ppb); EPA also revoked the primary annual and 24-hour standards at that time. In December 2017, EPA designated all areas in Massachusetts as attainment/unclassifiable[1] of the 1-hour SO_2 standard.

MassDEP's 310 CMR 6.00 regulations currently reflect the 1971 SO_2 NAAQS levels. To match EPA's current SO_2 NAAQS, MassDEP is proposing to replace the existing primary standards with the 2010 revision that added a 1-hour SO_2 NAAQS level of 75 ppb, and with the same form and averaging time.

Particulate Matter

Standards for particulate matter (PM) have changed over the years as new studies have demonstrated the health effects of various particle sizes. The trend has been to set stricter standards for smaller size particulates, as studies have linked exposure to smaller particles with adverse health effects.

In 1970, EPA set a particulate matter standard based on Total Suspended Particulates (TSP). In 1987, EPA replaced the TSP standard with a 24-hour PM_{10} standard of 150 micrograms per cubic meter ($\mu g/m^3$) and an annual PM_{10} standard of 50 $\mu g/m^3$. For both the 24-hour and annual standards, the primary and secondary NAAQS were the same. PM_{10} refers to particulate matter 10 microns or less in diameter.

Subsequent health studies showed a significant association between exposure to fine particles (particulate matter 2.5 microns or less in diameter, or $PM_{2.5}$) and adverse health effects. Fine particles can aggravate heart and lung diseases and have been linked to effects such as cardiovascular symptoms, cardiac arrhythmias, heart attacks, respiratory symptoms, asthma attacks, bronchitis, and premature death. These effects can result in increased emergency room visits, hospital admissions, absences from

[1] "Attainment/unclassifiable" is the term EPA uses as a designation for a geographic area that meets or is cleaner than the NAAQS.

school or work, restricted activity days, and premature death. Individuals who may be particularly sensitive to fine particle exposure include people with heart or lung disease, older adults, and children.

In 1997, based on the health studies that demonstrated the need to better protect public health, EPA established a fine particulate matter ($PM_{2.5}$) NAAQS, setting primary and secondary annual standards at 15 $\mu g/m^3$, and 24-hour standards at 65 $\mu g/m^3$.

In 2006, based on additional health studies demonstrating the need for a more stringent standard, EPA lowered the $PM_{2.5}$ NAAQS 24-hour standards (primary and secondary) from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, but did not change the 15 $\mu g/m^3$ annual standards. EPA also retained the existing 24-hour PM_{10} standards of 150 $\mu g/m^3$, but revoked the annual PM_{10} standard. The changes to the $PM_{2.5}$ and PM_{10} standards applied to both the primary and secondary standards.

In 2012, EPA lowered the primary annual $PM_{2.5}$ standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$. EPA retained the secondary annual $PM_{2.5}$ standard of 15 $\mu g/m^3$, as well as the 24-hour 35 $\mu g/m^3$ standards (primary and secondary), and the 24-hour PM_{10} standards (primary and secondary).

EPA has designated all areas in Massachusetts as unclassifiable/attainment for the current $PM_{2.5}$ and PM_{10} NAAQS based on air quality monitoring data collected by MassDEP. MassDEP's 310 CMR 6.00 regulations currently reflect the 1987 PM_{10} NAAQS. To match EPA's current particulate matter standards, MassDEP is proposing to add standards for $PM_{2.5}$ at the same level as the current NAAQS (24-hour standard of 35 $\mu g/m^3$, annual primary standard of 12 $\mu g/m^3$, annual secondary standard of 15 $\mu g/m^3$), retain the 24-hour PM_{10} standard of 150 $\mu g/m^3$, and remove the annual PM_{10} standard of 50 $\mu g/m^3$.

Carbon Monoxide

Carbon monoxide (CO) binds with hemoglobin in the blood, reducing the amount of oxygen carried to organs and tissues. Symptoms of high CO exposure include shortness of breath, chest pain, headaches, confusion, and loss of coordination. The health threat is most severe for those with cardiovascular disease. Motor vehicle emissions are the largest source of CO, which is produced from incomplete combustion of carbon in fuels. Industrial processes and non-transportation fuel combustion (e.g., boilers, lawn and garden equipment) also are sources of CO.

In 1971, EPA established CO NAAQS at 35 parts per million (ppm) measured over 1-hour (primary and secondary) and 9 ppm measured over 8-hours (primary and secondary). EPA reviewed the NAAQS in 1985, 1994, and 2011 without revision.

Massachusetts was initially designated in nonattainment for the CO NAAQS, but met the standards beginning in 1987. EPA has designated all areas in Massachusetts as unclassifiable/attainment for the current CO NAAQS based on air quality monitoring data collected by MassDEP.

MassDEP is not proposing to change the CO standards since they currently match the NAAQS. However, MassDEP is proposing to amend its regulations to adopt the same text in EPA's regulations for the NAAQS describing the standards and how CO is measured.

Ozone

Ground-level ozone (O_3) forms when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) interact in the presence of sunlight. Sources of these pollutants include cars and trucks, power plants, large industrial facilities, consumer products, and some natural sources. Breathing ozone can irritate air passages, reduce lung function, aggravate asthma, and inflame and damage the cells lining the lungs. It also may aggravate chronic lung diseases like emphysema and bronchitis, reduce the immune system's ability to fight off bacterial infections in the respiratory system, or cause permanent lung damage.

In 1971, EPA established a 1-hour ozone NAAQS at 0.08 parts per million (ppm), measured over one hour. In 1979, EPA revised the 1-hour ozone standard to 0.12 ppm. Based on air monitoring data provided by MassDEP, EPA designated Massachusetts as severe non-attainment of the 1979 ozone standard. Massachusetts has since attained the 1-hour ozone standard. In 2005, EPA revoked the 1-hour ozone standard.

Subsequent studies showed that the 1-hour ozone standard was inadequate for protecting public health since ozone can have adverse health effects at lower levels and over longer exposure times than one hour. In 1997, EPA established 8-hour ozone standards set at 0.08 ppm averaged over eight hours (primary and secondary). Based on air monitoring data provided by MassDEP, EPA designated Massachusetts as moderate non-attainment of the 8-hour ozone standards with two non-attainment areas, Eastern and Western Massachusetts. Massachusetts subsequently attained the 1997 ozone standards by the 2010 attainment deadline.

In 2008, based on additional health studies demonstrating the need for a more stringent standard, EPA strengthened the primary and secondary ozone standards to 0.075 ppm averaged over eight hours. Based on air monitoring data provided by MassDEP, EPA designated Dukes County as marginal nonattainment of the ozone standards and designated the remainder of Massachusetts as unclassifiable/attainment. Dukes County subsequently attained the 2008 ozone standard by the 2015 attainment deadline.

In October 2015, EPA lowered the 8-hour standards to 0.070 ppm (primary and secondary). In September 2016, Massachusetts recommended to EPA that all areas in Massachusetts be designated as attainment of the 2015 standards based on 2013-2016 monitoring data. In November 2017, EPA designated all counties in Massachusetts as attainment/unclassifiable, except for Berkshire, Hampden, and Worcester Counties. In April 2018, EPA designated Berkshire, Hampden, and Worcester Counties as attainment/unclassifiable.

MassDEP's 310 CMR 6.00 regulations currently reflect the 1979 1-hour ozone NAAQS. To match EPA's current ozone NAAQS, MassDEP is proposing to replace the 1-hour ozone standard with 8-hour ozone standards at the same level as the current NAAQS (0.070 ppm) with the same form and averaging time.

Nitrogen Dioxide

Exposure to nitrogen dioxide (NO_2) can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms such as coughing, wheezing or difficulty breathing. Longer exposures to elevated concentrations of NO_2 may contribute to the development of asthma and potentially increase

susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO_2. NO_2, along with other nitrogen oxides, reacts with other chemicals in the air to form ozone and $PM_{2.5}$.

In 1971, EPA established an annual NO_2 NAAQS at 53 ppb (primary and secondary). EPA reviewed and retained the NO_2 NAAQS without revision in 1985 and in 1996. In 2010, EPA added a 1-hour NO_2 standard of 100 ppb.

EPA has designated all areas in Massachusetts as unclassifiable/attainment for the current NO_2 NAAQS based on air monitoring data collected by MassDEP.

MassDEP's 310 CMR 6.00 regulations currently reflect the 1971 NO_2 NAAQS. To match EPA's current NO_2 NAAQS, MassDEP is proposing to add a 1-hour NO_2 standard at the same level as the current NAAQS (100 ppb) with the same form and averaging time.

Lead

In 1978, EPA established a lead (Pb) NAAQS at 1.5 $\mu g/m^3$ measured over one calendar quarter. Scientific evidence from health studies subsequently showed that adverse effects from exposure to lead occur at much lower levels of lead in blood than previously thought. Children are particularly vulnerable to the effects of lead. Exposure to low levels of lead early in life have been linked to effects on IQ, learning, memory, and behavior.

Based on the evidence of adverse health effects at lower levels of lead exposure, in 2008 EPA revised the primary and secondary lead standards to 0.15 $\mu g/m^3$ measured over a rolling three month period. In 2016, EPA completed its most recent review of the lead NAAQS and retained the 2008 NAAQS without revision.

EPA has designated all areas in Massachusetts as unclassifiable/attainment for the current lead NAAQS based on air monitoring data collected by MassDEP.

MassDEP's 310 CMR 6.00 regulations currently reflect the 1978 lead NAAQS. To match EPA's current lead NAAQS, MassDEP is proposing to set the lead standards at the same level as the 2008 NAAQS (0.15 $\mu g/m^3$) with the same form and averaging time.

ECONOMIC IMPACTS

The proposed amendments will have no economic impacts because Massachusetts already is subject to the NAAQS under the federal Clean Air Act and EPA regulations, which are the same standards MassDEP is proposing to adopt.

IMPACTS TO CITIES AND TOWNS

Pursuant to Executive Order 145, state agencies must assess the fiscal impact of new regulations on the Commonwealth's municipalities. The proposed amendments do not impose additional requirements on municipalities and have no practical impact on municipalities because Massachusetts already is subject to the NAAQS under the federal Clean Air Act and EPA regulations.

MASSACHUSETTS ENVIRONMENTAL POLICY ACT (MEPA)

The proposed amendments are exempt from the "Regulations Governing the Preparation of Environmental Impact Reports," 301 CMR 11.00, in that no MEPA review threshold set forth in 301 CMR 11.03 is met or exceeded. In addition, these proposed amendments do not reduce standards for environmental protection, nor do they reduce opportunities for public participation in review processes or public access to information generated or provided in accordance with the regulations. [See MEPA review threshold pertaining to promulgation of regulations at 301 CMR 11.03(12)].

PUBLIC HEARINGS AND COMMENT

MassDEP will hold a public hearing and comment period in accordance with M.G.L. Chapter 30A. The hearing notice and proposed amendments are available on MassDEP's website at: www.mass.gov/eea/agencies/massdep/news/comment/. For further information, please contact Marc Wolman at 617-292-5515 or marc.wolman@state.ma.us.