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**Background Information And Technical Support Document
For Proposed Amendments To**

310 CMR 7.00 et seq.

310 CMR 7.18

Volatile and Halogenated Organic Compounds

Solvent Metal Degreasing

Regulatory Authority:
M.G.L. Chapter 111, §§ 142A through 142N

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I. INTRODUCTION

The Massachusetts Department of Environmental Protection (MassDEP) proposes to amend its regulations for Volatile and Halogenated Organic Compounds, 310 CMR 7.18 (hereinafter referred to as the “proposed amendments”) to further reduce emissions of volatile organic compounds (VOCs) from solvent metal degreasing operations. These proposed amendments are part of Massachusetts’ strategy to reduce ground-level ozone in order to meet the national 8-hour ozone air quality standard, for which Massachusetts is currently in nonattainment. This document provides background information on the proposed amendments.

Solvent metal degreasing operations emit a significant amount of VOCs. VOCs contribute to the formation of ground-level ozone, or smog, which adversely affects public health and damages forests and vegetation. Many VOCs also are toxic and, at sufficient concentrations and exposure, are known to cause cancer or other serious health effects (such as reproductive effects or birth defects) and adverse environmental effects.

Reducing VOC emissions from solvent metal degreasing operations will substantially benefit public health and the environment by reducing ground-level ozone and reducing worker exposure to toxic chemicals. To achieve this public health and environmental benefit, the proposed amendments lower the permissible vapor pressure of solvents used in cold degreasing operations. The proposed amendments are based on similar control measures that several other New England states already have adopted.

II. BACKGROUND

A. Ozone and Ozone Precursors

Ground-level ozone is a photochemical oxidant that can cause lung dysfunction and eye, nose and throat irritation. Ozone is formed when volatile organic compounds (VOCs) react with oxides of nitrogen (NO_x) in the presence of sunlight and heat. Unhealthy concentrations of ozone occur most frequently during hot summer months.

Ozone irritates the respiratory system and may cause coughing and shortness of breath. It also can exacerbate respiratory illness and reduce resistance to infection. Ozone is of particular concern for children, people with asthma and other chronic respiratory diseases, and people exercising and working outdoors for prolonged periods of time. Ozone also damages forests and other vegetation, agricultural crops, and natural and synthetic materials.

B. Massachusetts Ozone Non-Attainment Status

Pursuant to the federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has established health-based National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone; nitrogen dioxide; particulate matter; carbon monoxide; sulfur dioxide; and lead. Massachusetts is in attainment with all of the NAAQS except the 1997 8-hour ozone standard¹. Massachusetts has two ozone non-attainment areas. The western Massachusetts non-attainment area encompasses Hampden, Hampshire, Franklin and Berkshire counties. The eastern Massachusetts non-attainment area encompasses the remainder of the state. Both areas were classified as moderate non-attainment areas under the 1997 8-hour ozone standard. Due to transport, emissions in Massachusetts also contribute to violations of the 8-hour standard in southern New Hampshire and Maine.

Massachusetts submitted to EPA a State Implementation Plan (SIP) that demonstrates how it will attain the 1997 8-hour ozone standard statewide by 2010. The proposed amendments are part of MassDEP’s

¹ EPA promulgated the 8-hour ozone standard in 1997 to update the previous 1-hour ozone standard, which EPA revoked in 2005. In March 2008 EPA revised the 8-hour ozone standard from 0.08 parts per million (ppm) to 0.075 ppm. Massachusetts must submit a recommendation to EPA by March 2009 regarding attainment status relative to the new revised ozone standard.

efforts to reduce emissions of ozone precursors in order to attain the 8-hour ozone standard by 2010, and the emission reductions from these amendments are reflected in the attainment modeling demonstration in MassDEP's SIP submittal. These emission reductions, combined with emission reductions achieved in upwind states, are designed to bring Massachusetts into attainment with the 8-hour ozone standard.

C. Existing Massachusetts and Federal Regulations

Massachusetts adopted its solvent metal degreasing regulation, 310 CMR 7.18(8), on December 31, 1980 as one of many control programs designed to address nonattainment with the 1-hour ozone standard that was in effect at that time. The regulation sets specific operation and maintenance standards to reduce emissions from solvent metal degreasing operations and is based on the Control Technique Guidelines (CTG) published by EPA for this sector. These degreasing operations include cold cleaning degreasing, vapor degreasing, and conveyORIZED degreasing.

EPA regulates vapor degreasing operations that use halogenated organic compounds that are considered hazardous air pollutants (HAPs, also referred to as air toxics), through its Maximum Achievable Control Technology (MACT) standards. Some halogenated HAPs also are VOCs. Therefore, the MACT standards also result in some VOC reduction from vapor degreasing operations.

D. Ozone Transport Commission Model Rule

The Ozone Transport Commission (OTC)² developed a solvent cleaning model rule in 2001, for use by states, to address 1-hour ozone nonattainment throughout the OTC region. The OTC model rule establishes equipment, solvent, and operational requirements for metal solvent degreasing, and is based on EPA's MACT standards for chlorinated solvent vapor degreasers. (The MACT standards address use of chlorinated solvents, some of which are classified as VOCs, but they do not address use of all VOCs in degreasers.) The OTC model rule establishes a higher level of control than those suggested in EPA's Control Technique Guidance (CTG) for this industry (i.e., the EPA guidelines for degreasers that use VOCs).

MassDEP's existing solvent metal degreasing regulation, 310 CMR 7.18(8), is similar to the OTC solvent cleaning model rule in many respects and contains many of the emission controls and reporting requirements of the OTC model rule. Massachusetts did not need additional VOC reductions from solvent metal degreasing sector to address its attainment goals for the 1-hour ozone standards. However, as part of its 8-hour ozone SIP, MassDEP committed to adopting those additional requirements of the model rule that provide the greatest VOC emission reduction benefits.

According to an OTC report³, most of the emission reduction benefits that can be achieved from implementation of the OTC's solvent cleaning model rule are attributed to use of low-volatility cold cleaning solvents. Therefore, MassDEP is proposing to adopt only the OTC model rule's vapor pressure requirement for cold cleaning solvents rather than the model rule in its entirety. MassDEP believes that the costs associated with retrofitting existing vapor degreasers with all of the OTC model rule requirements outweighs the minimal VOC emission reduction benefits that would result. In addition, MassDEP believes that the existing Massachusetts rule contains sufficient reporting and recordkeeping requirements, and that imposing additional administrative requirements contained in the OTC model rule is unnecessary.

² Section 184(a) of the CAA established the Northeast Ozone Transport Region (OTR) and the Ozone Transport Commission (OTC). The OTR is comprised of the District of Columbia, a portion of Northern Virginia, and the states of Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, and Maryland. The CAA requires the OTC to assess the degree of interstate transport of ozone and its precursors throughout the OTR and recommend strategies that would help states in the OTR meet the NAAQS for ozone.

³ E. H. Pechan and Associates, *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*, prepared for the Ozone Transport Commission, March 31, 2001. The report states that emission reductions achieved due to vapor cleaning and other cold cleaning operational requirements are minimal. The report quantifies only the VOC emission reductions due to use of low-volatility cold cleaning solvents.

III. SUMMARY OF PROPOSED AMENDMENTS

The proposed amendments to 310 CMR 7.18(8) apply to any person who owns, operates, leases, or controls any solvent metal degreasing facility in Massachusetts. The proposed amendments require that the vapor pressure of the solvent used in a cold cleaning degreaser that is able to hold more than 1 liter of solvent not exceed 1.0 millimeter of mercury at 20 degrees Celsius. The proposed amendments provide an exemption in the following cases:

- a. cold cleaning degreasers used in special and extreme solvent metal cleaning; or
- b. cold cleaning degreasers for which the owner or operator receives an approval from MassDEP that use of a compliant solvent will result in unsafe operating conditions; or
- c. cold cleaning degreasers that are located in a permanent total enclosure having control equipment that is designed and operated with an overall VOC control efficiency of 90 percent or greater.

The existing regulation, which will be replaced by the proposed amendments, requires that the solvent is kept at a temperature below 50 degrees Celsius or that the vapor pressure of the solvent does not exceed 33 millimeters of mercury at 38 degrees Celsius for cold cleaning degreasers that have a remote solvent reservoir and have no covers. It also requires that the opening of the sink-like area in such degreasers be less than 100 square centimeters.

Under 310 CMR 7.18, the definition of VOC includes specific halogenated organic compounds (HOC), including methylene chloride, perchloroethylene (tetrachloroethylene), CFC-11 (trichlorofluoromethane), CFC-12 (dichlorodifluoromethane), CFC-22 (chlorodifluoromethane), FC-23 (trifluoromethane), CFC-114 (dichlorotetrafluoro- ethane), and CFC-115 (chloropentafluoroethane). Therefore, these HOC also would be subject to the 1.0 millimeter vapor pressure requirement for cold cleaning degreasers. Since the vapor pressure of some of the HOCs exceeds 1.0 millimeter of mercury (e.g., methylene chloride), these HOCs could not be used in cold cleaning degreasers except in those that hold less than 1 liter of solvent or that are exempt as described above. MassDEP believes that in general there is little use of these toxic HOCs in cold degreasers, but seeks comment on the effect of the inclusion of HOCs in this proposed amendment.

IV. EMISSION REDUCTIONS

MassDEP has used the same methodology⁴ that OTC used for its model rule to estimate VOC emission reductions that would be achieved from implementation of the proposed amendments. The existing MassDEP regulation for cold solvent degreasing reduces the uncontrolled emissions from this category by half⁵. Implementation of the proposed amendments will result in a 32 percent emissions reduction from the currently regulated level in Massachusetts. This amounts to a total emissions reduction of 66 percent from the uncontrolled level⁶.

MassDEP's statewide VOC emissions inventory for 2002 shows VOC emissions from cold degreasing operations to be 5,712 tons per year (or 22 tons per summer day), which amounts to approximately 2 percent of the entire VOC emissions inventory in 2002 (or 3 percent of total VOC emissions on a typical summer day)⁷. MassDEP estimates that implementation of the proposed regulations will reduce VOC

⁴ E. H. Pechan and Associates, *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*, prepared for the Ozone Transport Commission, March 31, 2001, pp. 18-21.

⁵ According to EPA's CTG guidance document, which MassDEP used in estimating Massachusetts' emissions for this sector.

⁶ E. H. Pechan and Associates estimated a 66 percent reduction in emissions from uncontrolled levels after implementation of the OTC model rule. See *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*, pp. 19.

⁷ Seasonally uniform emissions and a 5-day workweek were assumed.

emissions from this category by 1,828 tons per year (or 7 tons per summer day)⁸ in 2009 compared to the currently regulated levels (i.e., a decrease of 32 percent in VOC emissions).

V. ECONOMIC IMPACTS

Low-vapor pressure compliant cold cleaning solvents are readily available on the market at comparable costs and are currently used in many cold cleaning degreasers. Many OTC states already have adopted regulations similar to those that MassDEP is proposing. Compliance with this requirement is not expected to pose a significant technical or economic burden on the regulated community. Maryland and California's South Coast Air Quality Management District, which have required use of low-volatility solvents in their regulations, determined that a significant segment of the solvent cleaning industry had already switched to solvents that meet the 1.0 millimeter of mercury vapor pressure requirement limit due to other regulatory requirements such as hazardous waste transport. Consequently, a significant portion of the costs associated with switching to a low-volatility solvent has already been incurred, or may be imposed by other requirements. Additionally, many industries that can use aqueous cleaning systems already have converted or likely will convert to such systems because these systems are cost effective and benefit health and safety.

As a worst-case scenario, the OTC used a cost analysis for implementing the OTC model rule based on California's South Coast Air Quality Management District's cost estimates for its degreasing rule (Rule 1122)⁹. According to this analysis, a cost of \$1,400 per ton of VOC reduced was estimated for compliance with the rule, which corresponds to the capital costs for aqueous cleaning systems for batch-loaded cold cleaners.

Replacement of cold solvent degreasers with aqueous cleaning systems in Massachusetts would result in an average cost of \$ 2.6 million in 2009¹⁰. This would translate to a cost of \$2.16 per Massachusetts resident in 2009. These costs represent a worst-case scenario for compliance with the proposed regulations and are comparable to compliance costs for other regulations for reducing VOCs. The actual compliance costs are expected to be significantly lower because compliance is expected to be achieved by replacing high-volatility solvents with low-volatility compliant solvents rather than with aqueous cleaning systems.

VI. IMPACT ON OTHER MASSDEP PROGRAMS

A. Air Toxics

Air toxics are a group of chemical air contaminants, defined by EPA, that have been associated with wide-ranging and significant adverse health effects, including cancer and other serious health effects such as reproductive effects or birth defects, or adverse environmental effects. The Clean Air Act requires EPA to promulgate source-specific controls based on Maximum Achievable Control Technologies (MACT) for air toxics. MassDEP implements certain MACT standards as EPA promulgates them. In addition, MassDEP controls air toxics through reduction of criteria pollutants and its Toxics Use Reduction Program. For example, many air toxics are VOCs, which are regulated as ozone precursors.

The proposed amendments to 310 CMR 7.18 will decrease VOC emissions from solvent metal cleaning operations, and because many VOCs also are air toxics, the proposed amendments will decrease the emissions of air toxics.

⁸ The 2002 emissions were based on employment activity factors for this sector, but the 2009 projections were based on employment growth factors.

⁹ E. H. Pechan and Associates, *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*, prepared for the Ozone Transport Commission, March 31, 2001, pp. 20.

¹⁰ Estimates are in 2000 dollars.

B. Toxics Use Reduction

Toxics use reduction is defined as in-plant or in-process practices that reduce or eliminate the use and emissions of toxic materials into the environment. Implementation of toxics use reduction, when possible, is a MassDEP priority. The amendments to 310 CMR 7.18 will reduce VOC emissions from the cold cleaning operations and will also result in toxics use reduction because many of the VOCs used in cleaning operations are toxic.

VII. AGRICULTURAL IMPACTS

Pursuant to M.G.L. C. 30A, §18, state agencies must evaluate the impact of proposed programs on agricultural resources within the Commonwealth. The proposed amendments to control VOC emissions from degreasing operations are expected to have positive impacts on agricultural production in Massachusetts. VOCs are precursors to ground-level ozone, which adversely affects vegetation and some crops. Therefore, a reduction in VOC emissions will have a positive impact on agriculture.

VIII. IMPACT ON MASSACHUSETTS MUNICIPALITIES

Pursuant to Executive Order 145, state agencies must assess the fiscal impact of new regulations on the Commonwealth's municipalities. MassDEP expects that municipal facilities will comply with the proposed amendments using alternative solvent formulations available at approximately the same price as solvents currently in use. Therefore, MassDEP expects the proposed amendments to impose minimal or no direct costs, recordkeeping, reporting, or other requirements on local governments.

IX. MASSACHUSETTS ENVIRONMENTAL POLICY ACT (MEPA)

The proposed amendments are "categorically exempt" from the "Regulations Governing the Preparation of Environmental Impact Reports," 301 CMR 11.00, because the proposed amendments will result in an overall decrease in emissions.

X. PUBLIC HEARINGS AND COMMENT

MassDEP plans to submit the final 310 CMR 7.18(8) regulations to EPA as part of its 8-hour ozone State Implementation Plan (SIP). Public hearings on the proposed 310 CMR 7.18(8) amendments will be conducted under the provisions of M.G.L. Chapter 30A.