

CP-33 / Assessing and Mitigating Impacts of Fine Particulate Matter Emissions

New York State Department of Environmental Conservation

DEC Policy

Issuing Authority: Erin M. Crotty

Date Issued: 12/29/2003

Latest Date Revised:

I. Summary: Certain projects regulated by the Department of Environmental Conservation have the potential to emit fine particulate matter, or PM_{2.5}, in quantities that could have a potential for significant adverse health and/or environmental impacts. The methodology set forth in this policy is consistent with the State Environmental Quality Review Act, represents a correct interpretation of its mandates, provides guidance on the project-specific assessment of fine particulate matter impacts and details when mitigation of such impacts may be necessary.

II. Policy: In the review of an application for a permit or major permit modification under the State Environmental Quality Review Act (SEQRA), Department staff shall evaluate the potential for significant adverse impacts resulting from the emission of fine particulate matter during the operation of the proposed project. If the operation of the proposed project will result in the emission of fine particulate matter above certain de minimis thresholds, Department staff shall require an air quality impact assessment of those emissions in accordance with the terms of this policy. If any required air quality impact assessment demonstrates that the PM_{2.5} emissions of the proposed project will have a potentially significant adverse environmental impact, the Department, when lead agency, will require the applicant to prepare an environmental impact statement to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the PM_{2.5} impacts of the source to the maximum extent practicable. In addition to providing guidance on how to determine whether a particular source's emissions (or emissions from sources associated with a specific project) will have a potentially significant adverse impact, this policy outlines possible ways to minimize those impacts. The Department shall use the procedures described in this policy in a manner consistent with existing federally-approved permitting programs, as such programs are revised or amended.

III. Purpose and Background: This policy provides interim direction to Department staff for evaluating the impacts of fine particulate matter emissions from proposed facilities that require one or more permits from the Department.¹ Specifically, this guidance provides a mechanism for complying with the provisions of the State Environmental Quality Review Act (SEQRA) as it relates to the impact of emissions of fine particulate matter. The

¹The implementation of the United States Environmental Protection Agency's (EPA) final revised National Ambient Air Quality Standards (NAAQS) for fine particulate matter, or PM_{2.5}, is ongoing in New York State with the validation and review of the requisite ambient air quality monitoring data to establish which areas in the state are in attainment with the new standards. Until the Department proposes a State Implementation Plan to address compliance with the new PM_{2.5} standards, EPA's Office of Air Quality Planning and Region II have indicated that the states have no further obligations under the Clean Air Act concerning PM_{2.5}. This policy seeks to address impacts from PM_{2.5} emissions until such time as DEC adopts a State Implementation Plan covering PM_{2.5}.

guidance recommends methods for the assessment of the impacts of the emission of fine particulate matter that can serve as a reference for applicants preparing environmental assessments in support of an application for a permit, and details how Department staff should determine whether the PM_{2.5} impacts of a particular project are significant. This policy shall apply until the PM_{2.5} National Ambient Air Quality Standards (NAAQS) are fully implemented in the State of New York, and the policy will be revised from time to time to ensure consistency with the Department's implementation of its State Implementation Plan (SIP) under the federal Clean Air Act (CAA).

A. Particulate Matter Defined

“Particulate matter” (PM) is a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles (liquid droplets or solids) over a wide range of sizes. For regulatory purposes, particulate matter has been classified in terms of the particle's aerodynamic diameter. PM_{2.5} is particulate matter with an aerodynamic diameter of 2.5 microns or less. PM₁₀, which is already regulated pursuant to federal and New York's permitting programs, includes all particulate matter with an aerodynamic diameter of 10 microns or less. Thus, PM_{2.5} is, by definition, a subset of PM₁₀. In general, the term “fine particulate matter” is used to describe PM_{2.5}, while “coarse” particulate matter describes particulate matter with an aerodynamic diameter of greater than 2.5 microns and equal to or less than 10 microns.

B. History of PM Regulation

The body of research on the health impacts associated with elevated levels of particulate matter in the atmosphere dates back to the early 1970s and continues to grow. Over the past several decades, as new information has emerged regarding the health impacts associated with particulate matter emissions, the National Ambient Air Quality Standards for particulate matter were revised. Thus, in the 1980s, when a growing body of evidence indicated that particulate matter with an aerodynamic diameter of less than 10 microns was better correlated with specific health risks than that from particulate matter in general, the NAAQS for total suspended particulate was replaced by the NAAQS for PM₁₀.

Similarly, an expanding body of research indicating that fine particulate matter, or PM_{2.5}, presents unique adverse health risks distinct from those associated with coarse particulate matter led to EPA's 1997 promulgation of the NAAQS standard for PM_{2.5}. In 1997, EPA revised the primary NAAQS for particulate matter to include two new PM_{2.5} standards consisting of both long-term (annual) and short-term (24-hour) components. The annual standard was set at 15 micrograms per cubic meter (F g/m³), and the 24-hour standard at 65 F g/m³.² These standards were established to meet the statutory dictate of the Clean Air Act that NAAQS be set with a margin of safety adequate to protect human health.

²A determination that a particular area is in attainment with the annual PM_{2.5} standard is based on the three-year average of annual arithmetic mean concentrations from single or multiple community oriented monitors. Compliance with the 24-hour standard is to be based on the three-year average of the ninety-eighth (98th) percentile of the 24-hour concentrations of each population-oriented monitor in an area. In allowing for spatial averaging from monitors and relying on more robust three year averages, the EPA Administrator placed great weight on consistency with the underlying body of health effects evidence.

Elevated levels of PM_{2.5} in the atmosphere have been linked to serious health conditions in humans. Exposure to PM_{2.5} has been closely associated with increased hospital admissions and emergency room visits for heart and lung disease, increased incidence of respiratory disease, including asthma, decreased lung function and premature death. Sensitive groups that appear to be at greatest risk of such effects include the elderly, individuals with existing cardiopulmonary disease, and children.³

C. Direct PM_{2.5} Emissions

PM_{2.5} can be emitted as a primary pollutant directly from stationary and mobile sources. Sources of primary PM_{2.5} include: stationary and mobile sources that burn fossil fuels; some industrial processes such as smelting; road and ocean salt; unpaved roads; construction and agricultural operations; and non-anthropogenic sources such as biogenic material and wild fires. Direct PM_{2.5} emissions are comprised of such things as black carbon, metals, salt and soil dust, though the precise speciation of the emissions of PM_{2.5} by a particular source is not yet possible.

D. Secondary PM_{2.5} Formation

Fine particulate matter may also form in the ambient air, a process called secondary formation, from or as a direct result of the emission of PM_{2.5} precursors from stationary and mobile sources. Secondary particles are formed from gases through chemical reactions in the atmosphere involving atmospheric oxygen, water vapor, ozone, hydroxyl and nitrate radical; and pollutants such as sulfur dioxide, nitrogen oxides and organic gases. Thus any given ambient particle may contain PM from many sources. Potential sources of secondary PM_{2.5} precursors include: fossil fuel combustion sources; surface coating operations; certain industrial processes; and mining and agricultural operations. Secondary particulate formation is a long term process which can take hours and days and is, therefore, an important component of the long range transport contribution to ambient PM_{2.5} levels in a particular area.

E. Limitations

The Department recognizes that the state of the science regarding direct PM_{2.5} emissions and secondary formation continues to evolve. Whereas, in general, there is a consensus that elevated ambient levels of PM_{2.5} present certain health risks, there is much less certainty about what sources contribute to ambient concentrations and how.⁴ This uncertainty presents a challenge when assessing the impacts of the emissions from an individual source or multiple sources that make up a proposed project. The Department expects knowledge in these areas to grow considerably over the next few years as implementation of EPA's NAAQS for PM_{2.5} proceeds. Until such time as DEC incorporates its plan for attainment of the PM_{2.5} NAAQS within the State, this interim policy will provide guidance on the assessment and mitigation of potentially

³EPA maintains extensive information on particulate matter on its website at <http://cfpub.epa.gov/ncea/cfm/partmatt.cfm>.

⁴There is no scientific consensus, for example, as to the extent that PM_{2.5} transport contributes to the ambient concentrations in a particular area of the country, or as to the precise causes of temporal and spatial variability in ambient PM_{2.5} concentrations. There are numerous other areas of uncertainty in relation to project-specific PM_{2.5} (and precursor) emissions and the impacts of those emissions on ambient concentrations.

significant PM_{2.5} impacts using current knowledge.

IV. Responsibility: The responsibility for interpretation of this document and periodic updating thereof shall reside with the Division of Air Resources.

V. Procedure:

A. Applicability

This policy shall apply when the Department is the lead agency conducting a SEQRA review of any project or action under 6 NYCRR Part 617. This policy should also guide Department staff in its participation in proceedings held pursuant to Article X of the Public Service Law.⁵ This policy shall apply to the review of any project for which the Department has not issued a notice of complete application prior to the date this final policy is issued.⁶

B. Existing Ambient Air Concentrations

Assessment and minimization of PM_{2.5} impacts shall be required for all projects that trigger identified thresholds, irrespective of the project's location. This interim policy does not distinguish between areas on the basis of monitored ambient PM_{2.5} concentrations.⁷ As such, observed ambient concentrations are not a determining factor in analyzing PM_{2.5} impacts for the specific purposes defined hereunder.

C. Assessing the Project's Primary Emissions

The Department staff shall require that applicants for a permit hereunder quantify emissions of PM₁₀ from a proposed project and assume that all measured or estimated PM₁₀ emissions are

⁵The Board on Electric Generation Siting and the Environment is the final decision-making body in Article X cases. Department staff is a statutory party to all Article X proceedings and is required to provide expert testimony on areas within its expertise. See PSL §166(1)(b). This policy shall guide Department staff in that participation. Article X expired on January 1, 2003, but will continue to apply to projects with respect to which an application was filed prior to that date. See Chapter 519 of the Laws of 1992.

⁶This policy does not address regionally significant projects, as defined in 6 NYCRR Part 240. While the Department recognizes that such projects may impact air quality by affecting local PM_{2.5} ambient air quality concentrations, those impacts are most effectively addressed through the interagency consultation process established in Section 240.6.

⁷This policy takes the approach of treating all locations similarly irrespective of attainment status. Statewide PM_{2.5} monitoring data are available for the full calendar years 2000, 2001 and 2002. Attainment designations are to be made after these data are validated and analyzed. The DEC PM_{2.5} monitoring locations and data are available at <http://www.dec.state.ny.us/website/dar/baqs/pm25mon.html>.

PM_{2.5}.⁸ Where an applicant demonstrates that a reasonably accurate measure of the PM_{2.5} fraction of a source's particulate matter emissions is available, Department staff may, in its reasonable discretion, assess potential impacts using the PM_{2.5} fraction.

If primary PM₁₀ emissions from the project do not equal or exceed 15 tons per year,⁹ then the PM_{2.5} impacts from the project shall be deemed insignificant and no further assessment shall be required under this policy.

D. Addressing Potential Impacts Arising from Secondary Formation

For projects with an annual potential to emit PM₁₀ of 15 tons or more, calculated under Section V.C. above, Department staff shall require that the potential consequences of secondary formation of PM_{2.5} be analyzed as part of the environmental assessment for proposed projects, as follows:

- (1) provide a quantitative measure of potential PM_{2.5} precursor emissions and qualitatively discuss potential secondary PM_{2.5} formation (e.g. transformation products expected to be formed from precursor emissions); and
- (2) demonstrate that the project will comply with all state and federal regulations and programs applicable to the emissions of PM_{2.5} precursor pollutants.

E. Modeling Approach

For projects with an annual potential to emit PM₁₀ of 15 tons or more, calculated under Section V.C. above, the Department shall require modeling analyses of PM_{2.5} air quality impacts for both stationary and mobile sources attributable to the project consistent with the Department's existing practice for PM₁₀ modeling. The Department shall require prior approval of an applicant's stationary and mobile source modeling protocol before the analysis is conducted. See Air Guide-26. Where impact mitigation is being proposed or required, such mitigation shall be included in the modeling conducted to demonstrate the net air quality impacts of the project together with the proposed mitigation.

The results of the air quality impact analyses must include a reasonably accurate measure of the project's expected contribution to annual and 24-hour ambient air concentrations in the area where the project is proposed to be built, both in micrograms per cubic meter and as a fraction of the annual and 24-hour NAAQS standards. The project's overall maximum impacts and receptor location should be provided. In addition, Department staff may require that community-wide impacts be provided using isopleths showing expected concentrations at various distances modeled from the source. These incremental impacts shall be used by staff in determining

⁸EPA has indicated that this is a conservative approach to analyzing impacts from a stationary source, and the Department will apply the same conservative approach to mobile source emissions in analyzing project impacts.

⁹15 tons per year is the existing de minimis threshold for PM₁₀ in attainment areas, as well as the Significant Source Project threshold in non-attainment areas (6 NYCRR Subpart 231-2, Section 231-2.13). This threshold relates to PM₁₀ emissions and not PM_{2.5} emissions even in cases where the Department determines that PM_{2.5} emissions are specifically quantifiable and could be lower.

whether the project's PM_{2.5} emissions have a potential for significant adverse environmental impacts.

F. Thresholds for Determining Potential Significance

EPA established the PM_{2.5} NAAQS to be protective of human health with an adequate margin of safety. In analyzing the potential impacts of a project's PM_{2.5} emissions hereunder, Department staff shall use the federal PM_{2.5} NAAQS as the relevant health benchmark. The values are:

Annual	15 Fg/m ³
24 Hour	65 Fg/m ³

A project with an annual potential to emit PM₁₀ of 15 tons or more, calculated under Section V.C. above, will be deemed to have a potentially significant adverse impact if the project's maximum impacts are shown to constitute more than two percent (2%) of the annual NAAQS standard of 15 Fg/m³, i.e., 0.3 Fg/m³, or more than 5 Fg/m³ on a 24-hour basis.¹⁰ Projects that exceed either the annual or 24-hour threshold will be required to prepare an Environmental Impact Statement (EIS) to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the PM_{2.5} impacts of the source to the maximum extent practicable.

A project with an annual potential to emit PM₁₀ of 15 tons or more, calculated under Section V.C. above, that is shown to have maximum PM_{2.5} air quality impacts equal to or less than two percent (2%) of the annual NAAQS standard of 15 Fg/m³, or 0.3 Fg/m³, and equal to or less than 5 Fg/m³ on a 24-hour basis, will be considered to have insignificant impacts.

G. Assessing the Need for Mitigation

For any project Department staff determines will have a potentially significant adverse impact, as provided in Section V.F., the Department shall seek to ensure that impacts are minimized to the maximum extent practicable, in order to make its findings under SEQRA.

1. Stationary Sources. For stationary sources, mitigation may include any one or more of the following, or such other mitigation as is practicable under the circumstances:
 - (a) implementation of an emission level compatible with the concept of the Lowest Achievable Emissions Rate (as outlined in 6 NYCRR 231-2) for PM_{2.5}; and/or
 - (b) obtain reductions in emissions from other existing sources to offset the project's emissions; and/or
 - (c) limits on the hours of operation or fuel used at the proposed project to minimize annual impacts.

¹⁰No PSD significance levels or increments have been established for PM_{2.5}. The two percent value is identical to the relationship between the established Significant Impact Level for PM₁₀ under the federal Prevention of Significant Deterioration (PSD) air permitting program and the annual NAAQS for PM₁₀. The 5 Fg/m³ value is identical to the 24-hour significance level for PM₁₀.

2. Mobile Sources. For mobile sources, mitigation may include any one or more of the following mitigation measures, or such other mitigation as is practicable under the circumstances:
 - (a) transportation demand reduction measures;
 - (b) off-peak delivery schedules;
 - (c) choice of fuel;
 - (d) encourage car pooling; or
 - (e) employer-subsidized public transportation.

Applicants should be encouraged to propose creative source specific mitigation measures for review by Department staff on a case by case basis.

RELATED REFERENCES: *Articles 3, 8 and 19 of the Environmental Conservation Law Title 6 of the New York Codes, Rules & Regulations Parts 200, 201, 617 & 621.*