CERTIFICATION OF VERMONT STATE IMPLEMENTATION PLAN (SIP) ADEQUACY REGARDING CLEAN AIR ACT SECTIONS 110(a)(1) AND (2) FOR THE 2012 FINE PARTICULATE MATTER ($PM_{2.5}$) NATIONAL AMBIENT AIR QUALITY STANDARD (NAAQS)

State of Vermont
Department of Environmental Conservation
Air Quality and Climate Division

February 6, 2017

VERMONT

ENCLOSURE 1

PUBLIC NOTICE OF INTENT TO REVISE THE STATE IMPLEMENTATION PLAN FOR AIR QUALITY

Vermont Agency of Natural Resources
Air Quality and Climate Division
Notice of Intent to Revise Vermont's State Implementation Plan (SIP)

Notice is hereby given that the Vermont Air Quality and Climate Division (AQCD) is providing the opportunity for interested persons to request a public hearing and provide comment on proposed revisions to the Vermont Infrastructure State Implementation Plan (SIP) elements that will be submitted to the US Environmental Protection Agency (EPA).

The Vermont AQCD is proposing revisions to the Vermont Infrastructure SIP elements to address federal requirements of the Clean Air Act (CAA) Sections 110(a)(1) and 110(a)(2) with respect to the National Ambient Air Quality Standards (NAAQS) for fine particulate matter ($PM_{2.5}$). Under Sections 110(a)(1) and (2) of the CAA, Vermont is required to submit plans (i.e., SIPs) to provide for the implementation, maintenance and enforcement of the primary NAAQS and to address basic SIP requirements, including emissions inventories, monitoring, and modeling to assure attainment and maintenance of the standards. By statute, SIPs meeting the requirements of Sections 110(a)(1) and (2) are to be submitted by states within 3 years after promulgation of new or revised standards. The primary annual standard for $PM_{2.5}$ was revised on December 14, 2012.

The proposed infrastructure SIP element revisions are available on the AQCD website at http://dec.vermont.gov/air-quality/planning/sip or at the AQCD offices located in the Davis Building, Second Floor, 1 National Life Drive, Montpelier, VT 05620. You may also request a copy of the proposed infrastructure SIP element revisions using the contact information listed below.

If the AQCD receives a request for a hearing, the hearing will be held on March 15, 2017 at 3:00pm in the Catamount Room, N215, in the Davis Building located at One National Life Drive in Montpelier, Vermont.

Those requesting a hearing must call (802) 828-1288. The deadline to submit a request for a hearing is March 10, 2017 by 4:30pm. If no request for a hearing is received prior to this date, the hearing will be cancelled and a Notice of Cancellation will be posted on March 13, 2017 on the AQCD website at http://dec.vermont.gov/air-quality/planning/sip. Interested persons may also call (802) 828-1288 to determine if the public hearing has been cancelled.

If requested, a hearing will be held to receive comments from interested persons regarding the proposed revisions. Attendance at the hearing is not necessary to submit written comments on the proposed SIP revisions. Written comments on the proposed SIP revisions must be received by the AQCD by 5:00pm on March 22, 2017.

All written comments must be mailed or emailed to:

Corie Dunn
Air Quality and Climate Division
Davis Building – 2nd Floor
1 National Life Drive
Montpelier, Vermont 05620
Email: corie.dunn@vermont.gov

ENCLOSURE 2

CERTIFICATION PURSUANT TO 40 CFR § 51.102 AND APPENDIX V OF 40 CFR PART 51

CERTIFICATION PURSUANT TO 40 CFR § 51.102 & APP. V OF 40 CFR PART 51 REGARDING REVISIONS TO VERMONT'S STATE IMPLEMENTATION PLAN (SIP)

<<Placeholder for certification that Vermont DEC followed all required public notice and hearing requirements>>

ENCLOSURE 3

LIST OF WITNESSES, COMMENTS RECEIVED, AND VERMONT'S RESPONSE TO COMMENTS

RESPONSIVENESS SUMMARY

The comments below apply to Vermont's proposed Infrastructure State Implementation Plan (SIP) for 2012 Particulate Matter Standards. On February 6, 2017 Vermont posted a draft of its proposed $PM_{2.5}$ Infrastructure SIP revisions for public comment and to the U.S. Environmental Protection Agency (EPA) for review.

<<Placeholder for comments and responses>>

ENCLOSURE 4

Vermont's Compliance with CAA Section 110(a)(1) and (2) requirements for the 2012 $PM_{2.5}$ NAAQS

Vermont's Compliance with CAA Section 110(a)(1) and (2) requirements for the 2012 $PM_{2.5}$ NAAQS

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
110(a)(2)(A) Emission limits and other control measures	Include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this chapter.	**10 V.S.A. § 554** authorizes the Secretary of the Agency of Natural Resources to "[a]dopt, amend and repeal rules, implementing the provisions" of Vermont's air pollution control laws set forth in 10 V.S.A. chapter 23. **10 V.S.A. § 556** requires permits for the construction or modification of air contaminant sources. **10 V.S.A. § 558** authorizes the Secretary "to establish emission control requirements . . . necessary to prevent, abate, or control air pollution." **10 V.S.A. § 585** provides standards for the sulfur content of heating oil. **The sections of the Vermont Air Pollution Control Regulations (VT APCR) that specify or are used to establish emission limits related to the control of $PM_{2.5}$ and its precursors (SO_2 and NO_x) include:** **§ 5-201** Open Burning Prohibited **§ 5-203** Procedures For Local Authorities To Burn Natural Wood **§ 5-204** Outdoor Wood Fired Boilers **§ 5-211** Prohibition of Visible Air Contaminants **§ 5-221** Prohibition of Potentially Polluting Materials in Fuel **§ 5-231** Prohibition of Particulate Matter **§ 5-241** Prohibition of Nuisance and Odor **§ 5-251** Control of Nitrogen Oxides Emissions **§ 5-252** Control of Sulfur Dioxide Emissions **§ 5-261** Control of Hazardous Air Contaminants **§ 5-271** Control of Air Contaminants from Stationary Reciprocating Internal Combustion Engines **§ 5-302** Sulfur Oxides (Sulfur Dioxide) **§ 5-304** Particulate Matter $PM_{2.5}$

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
		§ 5-306 Particulate Matter PM_{10} **§ 5-309** Nitrogen Dioxide **§ 5-501** Review of Construction or Modification of Air Contaminant Sources **§ 5-502** Major Stationary Sources and Major Modifications **§ 5-701** Maintenance and Removal of Control Devices **§ 5-702** Excessive Smoke Emissions from Motor Vehicles **Subchapter IV.** Operations and Procedures **Subchapter VIII. (§ 5-801 - § 5-806)** Registration of Air Contaminant Sources
110(a)(2)(B) Ambient air quality monitoring/ data system	Provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to (i) monitor, compile, and analyze data on ambient air quality, and (ii) upon request, make such data available to the Administrator.	**10 V.S.A. § 554** authorizes the Secretary to "conduct studies, investigations and research relating to air contamination and air pollution" and "[d]etermine by appropriate means the degree of air contamination and air pollution in the state and the several parts thereof." The most recent (2016) annual air monitoring network plan is available on the AQCD website.[1] Data collected by network monitors are required to be reviewed, validated, and sent to the EPA air quality system no later than 90 days after the end of a calendar quarter. Review of air quality monitoring data from 2010-2012 showed no violations of the 2012 $PM_{2.5}$ standards in any areas of VT, or contributions to any nearby area.[2] All areas of Vermont have continued to attain the 2012 $PM_{2.5}$ standards.
110(a)(2)(C) Program for enforcement, PSD and NSR	Include a program to provide for the enforcement of the measures described in subparagraph (A), and regulation of the modification and construction of any stationary source within the areas covered by the plan as	**10 V.S.A. § 557** authorizes inspections of air contaminant sources. **10 V.S.A. § 568** establishes penalties for violating air pollution control laws and regulations or making false statements. **10 V.S.A Chapter 201 "Administrative Environmental Law Enforcement" and 10 V.S.A Chapter 211 "Civil Enforcement"** provides the Secretary with the

[1] http://dec.vermont.gov/sites/dec/files/aqc/monitoring/documents/Vermont%202016%20Air%20Monitoring%20Network%20Plan%20Final%20.pdf
[2] EPA Regional Administrator H. Curtis Spalding. Letter to Gov. Peter Shumlin. August 19, 2014. United States Environmental Protection Agency, Boston, MA http://www3.epa.gov/pmdesignations/2012standards/eparesp/01_VT_120resp.pdf

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
	necessary to assure that national ambient air quality standards are achieved, including a permit program as required in parts C and D.	authority to enforce, including the authority to assess civil and criminal penalties, Vermont's air pollution control laws and regulations. **10 V.S.A § 556, VT APCR § 5-501, Review of Construction or Modification of Air Contaminant Sources, and § 5-502, Major Stationary Sources and Major Modifications,** set forth the requirements for permits to construct, modify or operate major air contaminant sources. Specifically, § 5-501 and § 5-502 provide for nonattainment and prevention of significant deterioration (PSD) permitting for major sources under Vermont's more expansive definition of major stationary source. Section 5-502(4)(c) states that "… the increase in allowable emissions, in conjunction with all other applicable emissions increases or reductions, will not cause or contribute to any increase in ambient concentrations exceeding the remaining available prevention of significant deterioration (PSD) increment for the specified air contaminants…" Subchapter V also includes Vermont's PSD[3] program that applies to sources that emit greenhouse gases (GHG) in accordance with EPA's Tailoring Rule. **VT APCR § 5-501(7)** provides for public notification as well as notification of officials and agencies of states or areas that may be affected by the construction or modification being permitted in Vermont. Please see section 110(a)(2)(J) of this document for Vermont's PSD measures.

[3] Vermont submitted changes to its SIP on July 25, 2014. Some of these changes are within the context of PSD permitting authority and have not yet received approval from EPA. Vermont is also in the process of amending the Vermont Air Pollution Control Regulations to make further changes to the regulations in the context of PSD permitting authority.

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
110(a)(2)(D)(i)(I) Contribute to nonattainment/ interfere with maintenance of the standard (prongs 1 and 2 or "Transport SIP")	Include provisions prohibiting any source or other type of emissions activity in one state from contributing significantly to nonattainment, or interfering with maintenance, of the NAAQS in another state.	No source or sources within Vermont have been identified as contributing significantly to nonattainment or maintenance in any other state or are the subject of an active finding under section 126 of the CAA with respect to $PM_{2.5}$ or any other air pollutant. Please see Enclosure 5: Vermont's Good Neighbor SIP for the 2012 $PM_{2.5}$ NAAQS addressing CAA § 110(a)(2)(D)(i)(I).
110(a)(2)(D)(i)(II) PSD (prong 3)	Include provisions prohibiting any source or other type of emissions activity within the state from contributing significantly to nonattainment, or interfering with PSD measures in another state.	**10 V.S.A § 556, VT APCR § 5-501 Review of Construction or Modification of Air Contaminant Sources, and § 5-502, Major Stationary Sources and Major Modifications,** set forth the requirements for permits to construct, modify or operate major air contaminant sources. Specifically, § 5-501 and § 5-502 provide for nonattainment and prevention of significant deterioration (PSD) permitting for major sources under Vermont's more expansive definition of major stationary source. Please see section 110(a)(2)(J) of this document for Vermont's PSD measures.
110(a)(2)(D)(i)(II) Visibility Protection (prong 4)	Include provisions prohibiting any source or other type of emissions activity within the state from interfering with protection of visibility in another state.	**Vermont's Regional Haze SIP** demonstrates that Vermont sources do not significantly impact visibility in any downwind Class I area.
110(a)(2)(D)(ii) Interstate	Provide adequate provisions to prevent endangerment of public	Vermont has no pending obligations under section 126 of the Clean Air Act.

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
Pollution Abatement	health due to interstate transport of pollutants.	
110(a)(2)(D)(i) International Pollution Abatement	Provide adequate provisions to prevent endangerment of public health due to international transport of pollutants.	Vermont has no pending obligations under section 115 of the Clean Air Act.
110(a)(2)(E) Adequate personnel, funding and authority	Provide for adequate personnel, funding and legal authority under state law to carry out the SIP, and demonstrate adherence to conflict of interest requirements.	**3 V.S.A. § 2822** provides the Secretary with the authority to assess air permit and registration fees which fund state air programs. **10 V.S.A. § 553** designates the Agency of Natural Resources as the air pollution control agency of the state. **10 V.S.A § 554** provides the Secretary with the power to "[a]ppoint and employ personnel and consultants as may be necessary for the administration of this chapter" and "[a]dopt, amend and repeal rules, implementing the provisions" of Vermont's air pollution control laws set forth in 10 V.S.A. chapter 23 and "[a]ccept, receive and administer grants or other funds or gifts from public and private agencies, including the federal government, for the purposes of carrying out any of the functions of this chapter." In addition to Federal funding, and permit and registration fees, the VT AQCD receives state funding to implement its air programs. The Vermont Agency of Natural Resources, Department of Environmental Conservation is the sole authority implementing the SIP and does not rely on local or regional governments, agencies, or any external permit review or enforcement boards or bodies to carry out this responsibility. **Vermont Executive Order 09-11 (2011)** (Executive Code of Ethics) contains

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
		strict ethical rules prohibiting all Vermont executive branch employees (including the ANR Secretary) from taking "any action in any particular matter in which he or she has either a conflict of interest or the appearance of a conflict of interest, until such time as the conflict is resolved." Vermont previously submitted this Executive Order to EPA for incorporation into the Vermont SIP in its November 2, 2015 I-SIP submission for the 2008 Ozone, 2010 NO_2, and 2010 SO_2 NAAQS.
110(a)(2)(F*)* Stationary source monitoring and reporting	Require the installation, maintenance, and replacement of equipment to monitor emissions from stationary sources and to submit periodic emissions reports and correlate such reports with any emission limitations or standards, which shall be available at reasonable times for public inspection.	**VT APCR § 5-402, Written Reports When Requested,** authorizes the Air Pollution Control Officer to request written reports on the nature and amount of emissions and other emissions-related data. **VT APCR § 5-404, Methods for Sampling and Testing of Sources,** authorizes the Air Pollution Control Officer to require stack testing when there is reason to believe that emission limits are being violated by an air contaminant source. **VT APCR § 5-405, Required Air Monitoring,** authorizes the Air Pollution Control Officer to require any air contaminant source "to install, use and maintain such monitoring equipment and records, establish and maintain such records, and make such periodic emission reports as the Officer shall prescribe." The Vermont SIP provides for correlation by VT DEC of emissions reports by sources with applicable emission limitations or standards, as required by CAA § 110(a)(2)(F)(iii). VT DEC receives emissions data through its annual registration program, which requires all air contaminant sources emitting more than 5 tons annually to report their annual emissions to VT DEC. Currently VT DEC analyzes a portion of these data manually to correlate a facility's actual emissions with permit conditions, NAAQS, and hazardous air contaminant action levels (if applicable). VT DEC is in the process of setting up an integrated electronic database that will merge all air contaminant source information across permitting, compliance and registration programs, so that information concerning permit conditions, annual emissions data, and compliance data will be accessible in one location for a particular air contaminant source. In the future, the database will be

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
		capable of correlating certain emissions data with permit conditions and other applicable standards electronically where feasible. This will allow VT DEC to complete this correlation more efficiently and accurately.[4] **VT APCR § 5-802, Requirement for Registration,** requires that "[e]ach operator of a source which emits more than five tons of any and all air contaminants per year shall register the source with the Secretary, and shall renew such registration annually." **1 V.S.A. § 315-320** provides for the free and open examination of public records, including emissions reports. **10 V.S.A. § 563**, requires the Agency to make public all emissions and emissions monitoring data submitted to the Agency by owners and operators of air contaminant sources, with the exception of that which qualifies as a trade secret pursuant to 1 V.S.A. §317(c)(9). [5] Nothing in Vermont's State Implementation Plan precludes the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements, if the appropriate performance or compliance test or procedure had been performed.
110(a)(2)(G) Emergency episodes	Provide for authority to address activities causing imminent and substantial endangerment of public health, including contingency plans to implement	**10 V.S.A. § 560** authorizes actions to order the immediate discontinuation of air emissions causing imminent danger to human health or safety. **10 V.S.A. § 8009** authorizes the issuance of an emergency administrative order when a violation presents or an activity will or is likely to result in an immediate

[4] This paragraph was originally submitted to the EPA Region 1 in a November 21, 2016 letter from Vermont DEC, Re: Additional information and clarification in support of infrastructure State Implementation Plan submittals addressing requirements of Clean Air Act Sections 110(a)(1) and (2).

[5] On April 19, 2016, Vermont amended 10 V.S.A. §563 to address the Section 110(a)(2)(F)(iii) requirement that emissions data be made available to the public. The revised 10 V.S.A. §563 was attached to the November 21, 2016 letter to EPA Region 1 for incorporation into the Vermont SIP.

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
	the emergency episode provisions of the SIP.	threat to public health or the environment. Vermont DEC's authority meets the requirements of CAA § 303 through 10 V.S.A. § 8009, which allows the Secretary of the Agency of Natural Resources to issue an emergency administrative order when an activity will or is likely to result in a violation, or when a violation presents an immediate threat of substantial harm to the environment or an immediate threat to public health. While a violation of many provisions of the APCR could be cause for such an order to be issued, the provision with the most general applicability is § 5-407. Section 5-407 prohibits any person from emitting such quantities of air contaminants that will result in a condition of air pollution. "Air pollution" is defined in § 5-101 as "the presence in the outdoor atmosphere of one or more air contaminants in such quantities, and duration as is or tends to be injurious to human health or welfare, animal or plant life, or property, or would unreasonably interfere with the enjoyment of life, or property. Such effects may result from direct exposure to air contaminants, from deposition of air contaminants to other environmental media, or from alterations caused by air contaminants to the physical or chemical properties of the atmosphere." Vermont DEC interprets these two pieces of authority as allowing the Secretary to issue an emergency administrative order when air pollution is causing an imminent threat to public health, welfare, or the environment, thus meeting the requirements of CAA § 303.[6]
110(a)(2)(H) Future SIP revisions	Provide for SIP revisions in response to changes in the NAAQS, availability of improved methods for attaining the NAAQS, or in response to an EPA finding that the SIP is substantially inadequate.	**10 V.S.A § 554** provides the Secretary with the power to "[p]repare and develop a comprehensive plan or plans for the prevention, abatement and control of air pollution in this state" and "[a]dopt, amend and repeal rules, implementing the provisions" of Vermont's air pollution control laws set forth in 10 V.S.A. Chapter 23.

[6] Vermont committed to adopting APCR § 5-407 in the November 21, 2016 letter to EPA Region 1. APCR § 5-407 has since been adopted and took effect December 15, 2016.

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
110(a)(2)(I) Nonattainment area plan or plan revision Under Part D	Each plan shall […] in the case of a plan or plan revision for an area designated as a nonattainment area, meet the applicable requirements of part D of this subchapter (relating to nonattainment areas).	According to EPA guidance, states are not expected to address element 110(a)(2)(I) in the context of an infrastructure SIP submission.
110(a)(2)(J) Consultation with government officials	Provide a process for consultation with local governments and Federal Land Managers carrying out NAAQS implementation requirements pursuant to section 121 relating to consultation.	**10 V.S.A § 554** specifies that the Secretary shall have the power to "[a]dvise, consult, contract and cooperate with other agencies of the state, local governments, industries, other states, interstate or interlocal agencies, and the federal government, and with interested persons or groups." See also Vermont ANR notification requirements under 110(a)(2)(D).
110(a)(2)(J) Public notification	Requires states to notify the public if NAAQS are exceeded in an area and enhance public awareness of measures that can be taken to prevent exceedances.	**10 V.S.A § 554** authorizes the Secretary to "[c]ollect and disseminate information and conduct educational and training programs relating to air contamination and air pollution." **Vermont DEC Air Quality and Climate Division website** includes near real-time air quality data, and a record of historical data. Air quality forecasts are distributed daily via email to interested parties. Air quality alerts are sent by email to a large number of affected parties, including the media. Alerts include information about the health implications of elevated pollutant levels and list actions to reduce emissions and to reduce the public's exposure. [7] **Air Quality Data Summaries** summarizing the year's air quality monitoring results are issued annually and posted on the Vermont DEC Air Quality and Climate Division website.

[7] http://dec.vermont.gov/air-quality

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
110(a)(2)(J) PSD and visibility protection	Meet the applicable requirements of part C relating to prevention of significant deterioration of air quality and visibility protection.	**VT APCR § 5-501, Review Of Construction or Modification of Air Contaminant Sources and § 5-502, Major Stationary Sources and Major Modifications,** specifies requirements for PSD and visibility protection. Sections 5-501 and 5-502 provide for nonattainment and prevention of significant deterioration (PSD) permitting of major stationary sources. Section 5-502(4)(c) states that "… the increase in allowable emissions, in conjunction with all other applicable emissions increases or reductions, will not cause or contribute to any increase in ambient concentrations exceeding the remaining available prevention of significant deterioration (PSD) increment for the specified air contaminants…"[8] Section 5-502(4)(e) additionally requires that any proposed source demonstrate that it will not adversely impact visibility or any other "Air Quality Related Value" in any Federal Class I area. EPA has fully approved Vermont's Regional Haze SIP (77 FR 30212; May 22, 2012). EPA has interpreted the CAA Section 110(a)(2)(J) provision on visibility as not being "triggered" because visibility requirements in Part C are not changed by new NAAQS.
110(a)(2)(K) Air quality modeling/data	Provide for air quality modeling for predicting effects on air quality of emissions from any NAAQS pollutant and submission of such data to EPA upon request.	**VTAPCR § 5-502, Major Stationary Sources and Major Modifications,** requires the submittal of an air quality impact evaluation or air quality modeling to demonstrate impacts of new and modified major sources. **VT APCR § 5-406, Required Air Modeling,** specifies that "[t]he *Air Pollution Control Officer* may require the owner or operator of any proposed *air contaminant* source . . . to demonstrate that operation of the proposed source . . . will not directly or indirectly result in a violation of any *ambient air quality standard*, interfere with the attainment of any *ambient air quality standard*, or violate any applicable prevention of significant deterioration increment . . ."

[8] Vermont submitted changes to its SIP on July 25, 2014. Some of these changes are within the context of PSD permitting authority and have not yet received approval from EPA. Vermont is also in the process of amending the Vermont Air Pollution Control Regulations to make further changes to the regulations in the context of PSD permitting authority.

CAA Section	110(a) Requirement	Corresponding Vermont Requirements
110(a)(2)(L) Permitting fees	Require each major stationary source to pay permitting fees to cover the cost of reviewing, approving, implementing and enforcing a permit.	**10 V.S.A § 556** provides for the assessment of application fees from air emissions sources for permits for the construction or modification of air contaminant sources. **3 V.S.A § 2822(j)** sets forth the permit fees for air emissions sources. VT APCR Subchapter X: Operating Permits sets forth Vermont's approved Title V permit program. (66 FR 59535)
110(a)(2)(M) Consultation/ participation by affected local entities	Provide for consultation and participation in SIP development by local political subdivisions affected by the SIP.	**10 V.S.A § 554** authorizes the Secretary to "[a]dvise, consult, contract and cooperate with other agencies of the state, local governments, industries, other states, interstate or interlocal agencies, and the federal government, and with interested persons or groups." See also Vermont ANR notification requirements under 110(a)(2)(D).

ENCLOSURE 5

Vermont Good Neighbor SIP for the 2012 $PM_{2.5}$ NAAQS

Vermont Good Neighbor SIP for the 2012 $PM_{2.5}$ NAAQS

Supplement to the Vermont Infrastructure SIP for the 2012 $PM_{2.5}$ NAAQS to Address the Interstate Transport Provision under Clean Air Act Section 110(a)(2)(D)(i)(I)

February 2017

Prepared by
State of Vermont
Department of Environmental Conservation
Air Quality and Climate Division
dec.vermont.gov/air-quality

Introduction

This state implementation plan (SIP) revision addresses the interstate transport provision under Clean Air Act (CAA) Section 110(a)(2)(D)(i)(I), otherwise known as the "Good Neighbor" provision, for the 2012 fine particulate matter ($PM_{2.5}$) national ambient air quality standards (NAAQS). Section 110(a)(2)(D)(i)(I) of the CAA requires that states provide adequate provisions prohibiting emissions from sources within the state in amounts which will contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to the NAAQS. Based on a weight-of-evidence analysis, the Vermont Department of Environmental Conservation (DEC) concludes that the existing limits and controls in the Vermont SIP are sufficient to ensure that emissions from sources within Vermont will not significantly contribute to nonattainment in, or interfere with maintenance by, any area relating to the 2012 $PM_{2.5}$ NAAQS.

Background

The Environmental Protection Agency (EPA) promulgated the most recent annual $PM_{2.5}$ NAAQS on December 14, 2012 (78 FR 3086). The primary annual standard was revised from 15.0 micrograms per cubic meter ($\mu g/m^3$) to an annual average concentration of 12.0 $\mu g/m^3$ averaged over three years. The primary 24-hour standard of 35 $\mu g/m^3$, last revised in 2006, was retained.

Final area designations for the 2012 annual $PM_{2.5}$ NAAQS were issued on December 18, 2014, with additional designations and revised initial designations issued in March 2015 and August 2016.[1] The closest designated nonattainment area to Vermont is Delaware County, PA, about 230 miles southwest of Vermont's closest border, followed by Lebanon County and Allegheny County, PA. More distant nonattainment areas include Cleveland, OH, West Silver Valley, ID, and several counties in southern California.

Infrastructure SIPs addressing CAA § 110(a)(1) and (2), certifying the adequacy of the SIP with respect to the revised standard, were due December 14, 2015. The EPA provided guidance in a March 17, 2016 memorandum which described a framework for addressing interstate transport

[1] 80 FR 2205, 80 FR 18535, 81 FR 61136

and reviewed relevant modeling results and air quality projections with respect to the 2012 $PM_{2.5}$ NAAQS.[2] In accordance with EPA guidance, this technical review of modeling results, monitoring data, emissions data, and existing rules and controls supports Vermont's negative declaration in relation to its contribution to nonattainment or maintenance of the 2012 $PM_{2.5}$ NAAQS in any other area.

Vermont Contribution to Downwind Receptors

The framework adopted to address the "Good Neighbor" provision, and previously used in several federal rulemakings, involves first identifying receptors that are projected to be unable to attain or maintain the NAAQS in the future analysis year, then identifying states contributing to downwind nonattainment or maintenance receptors in amounts that warrant further analysis.

In order to first identify problem receptors for $PM_{2.5}$, EPA modeling to support the proposed Cross State Air Pollution Rule (CSAPR) Update and the Regulatory Impact Assessment (RIA) for the final 2015 ozone NAAQS was used with additional post-processing to project 2017 and 2025 annual $PM_{2.5}$ design values nationwide. The March 17, 2016 memorandum identified 19 potential nonattainment and maintenance receptors for the 2012 $PM_{2.5}$ NAAQS in 2017 and 2025. Seventeen of the receptors were in California, one was in Idaho, and one was in Pennsylvania. The Allegheny County, PA receptor was the only eastern U.S. receptor projected to have either maintenance or nonattainment concerns in 2017 or 2025. By 2017, Allegheny County was projected to be a Maintenance area (based on an average projected design value below the standard) and in Attainment by 2025 (based on a maximum projected design value below the standard). Attachment 1 of the memo interpolated a maximum design value between 2017 and 2025 for the Moderate nonattainment area deadline in 2021 of 11.91 $\mu g/m^3$, indicating that depending on the timing and location of emissions reductions, the site would attain the standard in 2021. The Allegheny County receptor, approximately 380 miles from the southwest border of Vermont, was the closest identified receptor to Vermont with current or projected $PM_{2.5}$ attainment concerns.

EPA has not conducted a contribution analysis for the purposes of the 2012 $PM_{2.5}$ NAAQS, however a previous contribution analysis done in support of the 1997 and 2006 $PM_{2.5}$ standards, as well as the 1997 ozone standard, demonstrated minimal contribution from Vermont sources.[3] Contributions to annual $PM_{2.5}$ sulfate and nitrate, based on 2011 National Emissions Inventory (NEI) estimates of sulfur dioxide (SO_2) and nitrogen oxides (NO_x), respectively, were analyzed for a 2012 base case from each source state to each monitoring site. A significant contribution was defined as one percent of the standard, or 0.15 $\mu g/m^3$ and 0.35 $\mu g/m^3$ for the 2006 annual and 24-hour $PM_{2.5}$ NAAQS, respectively. Vermont was not identified as having a significant contribution to any downwind receptor, and was found to contribute 0.002 $\mu g/m^3$ of annual $PM_{2.5}$ to monitoring sites in Allegheny County, PA. Considering the one percent threshold for significant contribution has been used by EPA in several federal rulemakings applied to multiple

[2] Information on the Interstate Transport "Good Neighbor" Provision for the 2012 Fine Particulate Matter National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I). Memorandum from Stephen D. Page, Director, EPA OAQPS to Regional Air Division Directors, Regions 1-10. March 17, 2016. https://www.epa.gov/sites/production/files/2016-08/documents/good-neighbor-memo_implementation.pdf

[3] CSAPR Final Rule, 76 FR 48208 (August 8, 2011).

pollutants,[4] it is reasonable to apply this threshold method to the 2012 annual $PM_{2.5}$ NAAQS, which suggests a significant contribution is greater than 0.12 µg/m^3. Vermont's 2012 base case contribution is far below the one percent threshold at 0.017% of the 2012 standard. The highest estimated contribution of $PM_{2.5}$ from Vermont to any county outside Vermont was to Sullivan County, New Hampshire (an area not projected to be a potential nonattainment or maintenance area) at 0.049 µg/m^3, or 0.04% of the standard. Furthermore, Vermont's contribution to $PM_{2.5}$ in downwind areas is likely lower than described due to emissions reductions that have occurred since 2011 (see Vermont Emissions Related to $PM_{2.5}$, below).

Considering the non-significant contribution to nearby and downwind areas such as New Hampshire, and to areas that are not generally considered downwind of Vermont based on prevailing winds, such as Allegheny County, PA, it is reasonable to assume that Vermont emissions also do not contribute to nonattainment in, or interfere with maintenance by, areas in western states, including California and Idaho.

Ambient Air Quality Monitoring Trends of $PM_{2.5}$

Average annual fine particulate matter concentrations monitored across Vermont have been below the 2012 $PM_{2.5}$ NAAQS for at least the past fifteen years. Design values for three population centers (Burlington, Rutland, and Bennington) and a rural area (Underhill) show a declining trend well below the standard (**Figure 1**).

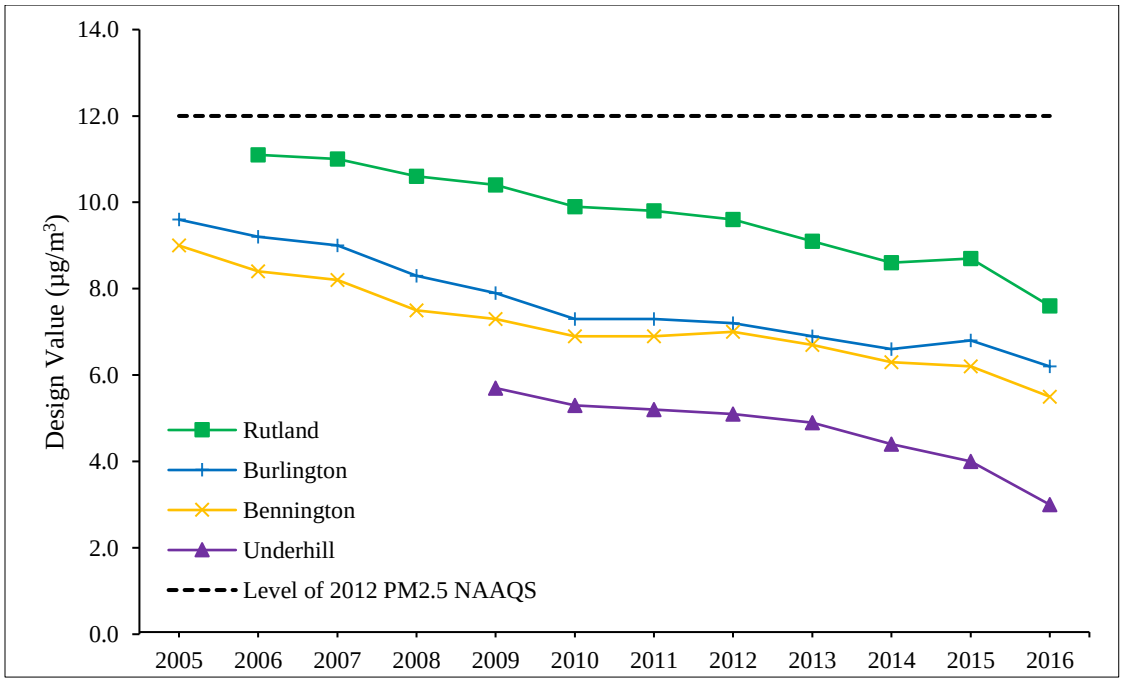

Figure 1: Design value trends for the primary annual 2012 $PM_{2.5}$ NAAQS at four monitoring locations in Vermont. The design value year is the last year of the three-year averaging period, e.g. the 2011 design values are the average of the 2009, 2010, and 2011 annual means. 2016 values are preliminary.[5]

[4] *Id.* As well as CSAPR Update for the 2008 ozone NAAQS, 81 FR 74504 (October 26, 2016).
[5] U.S. EPA Air Quality System, Preliminary Design Value Report, Retrieved Jan. 17, 2017. "Rutland" = Site ID 50-021-0002, "Burlington" = Site ID 50-007-0012, "Bennington" = Site ID 50-003-0004, "Underhill" = Site ID 50-007-0007.

States bordering Vermont have not been identified as having nonattainment or maintenance problems for the 2012 $PM_{2.5}$ NAAQS. Monitors in New York, New Hampshire, and Massachusetts have annual design values well below 12.0 µg/m^3 (**Table 1**). The highest design value for 2015 in Massachusetts was in Boston, with 7.4 µg/m^3 averaged across three monitors, while the design value at the closest monitor to Vermont, at Pittsfield, was 6.8 µg/m^3. Albany, NY and Keene, NH are both near to Vermont's borders and had 2015 design values of 7.0 (average of two monitors) and 8.8 µg/m^3 respectively.

Table 1: Design values for 2011-2015 in states bordering Vermont, with respect to the 2012 $PM_{2.5}$ NAAQS. The design value year is the last year of the three-year averaging period. For each city with greater than one monitor, a mean design value was calculated from all its monitors.[6]

	Design Value (µg/m^3)				
	2011	**2012**	**2013**	**2014**	**2015**
Massachusetts					
Boston	9.3	9.1	8.7	7.8	7.4
Brockton	8.2	7.9	7.5		
Chelmsford	7.7	7.3			
Fall River	7.9	7.6	7.3	7.1	6.9
Haverhill	7.5	7.4	7.0	6.5	6.0
Lawrence	8.2	8.0	7.6	6.6	5.9
Lynn	7.3	7.2	6.9	6.7	6.3
Pittsfield	8.9	8.8	8.3	7.3	6.8
Springfield	8.8	8.6	8.2	7.2	6.8
Worcester	8.7	8.6	8.1	7.3	6.6
New Hampshire					
Keene	9.6	9.1	9.1	8.8	8.8
Laconia	5.8	6.0	6.0	5.5	5.0
Lebanon	6.9	6.8	6.6	6.2	6.3
Londonderry				8.2	8.0
Nashua	7.8	7.9	7.7	7.2	
Peterborough				5.4	6.3
Portsmouth	7.4				6.8
Suncook	8.5	8.7	8.2	7.5	
New York					
Albany	7.8	7.7	7.3	7.0	7.0
Buffalo	9.7	9.6	9.0	8.7	8.6
Cedarhurst	8.9				
East Farmingdale	8.4	8.4	8.1	7.7	7.5
East Syracuse	7.7	7.6	7.2	6.7	6.4
Mamaroneck	9.1				
New York	10.2	10.2	9.5	9.1	9.2
Newburgh	8.2	8.1	7.8	7.4	7.2
Pinnacle State Park, Addison	7.1	7.0	6.5	6.0	5.7
Rochester				7.7	7.2
Westfield	7.4	7.5			
Whiteface Mtn	4.4	4.3	4.3	4.1	4.1

[6] U.S. EPA Air Quality System, Preliminary Design Value Report, Retrieved Jan. 23, 2017. Only design values meeting completeness criteria are included.

Vermont Emissions Related to $PM_{2.5}$

Statewide emissions from sources within Vermont are best summarized by the triennial National Emissions Inventory (NEI). Fine particulate matter is emitted directly (primary $PM_{2.5}$) as well as formed in the atmosphere (secondary $PM_{2.5}$) from precursor pollutants such as SO_2, NO_x, ammonia (NH_3), and volatile organic compounds (VOC). The emissions inventory estimates by source category for the 2002, 2008, 2011, and 2014 NEI are illustrated in **Figure 2**. Due to methodology changes between NEI years, specific trend analyses are not generally possible, yet the overarching pattern suggests that emissions have declined by almost 50%, or more in some cases, in nearly every pollutant category from 2002 to 2014. The largest contributors to secondary $PM_{2.5}$, SO_2 and NO_x, have estimated reductions of 79% and 49% from 2002 to 2014, respectively. Likewise, NH_3 and VOC have estimated reductions of 56% and 46% over the same period.

At this time, interpretation of the primary $PM_{2.5}$ emissions trend is subject to change. While current 2014 NEI v.1 estimates suggest a significant increase from the 2011 NEI, pending revisions will most likely result in an overall decrease in estimated emissions over this period. The Area/Nonpoint source category, including sources such as residential wood combustion and unpaved road dust, is the largest source category of primary $PM_{2.5}$ in Vermont. The latest 2014 NEI v.1 used different methodology than the 2011 NEI for the unpaved road dust category, resulting in an increase of 3811 tons of $PM_{2.5}$ (196% increase). This dramatic increase is attributed to changes in calculation methodologies, utilization of different data sources, and the exclusion of a precipitation adjustment that was included in prior iterations of the NEI. The revised 2014 NEI v.2 will reinstate the precipitation adjustment and will likely result in a decline in estimated Area/Nonpoint emissions as compared to the 2011 NEI, and therefore also result in an overall decline in total primary $PM_{2.5}$ emissions estimated for the 2002-2014 period.

Residential wood combustion emissions are the largest subcategory of the Area/Nonpoint source category and has had a relatively flat trend with an estimated 4% increase from 2011 to 2014. Emissions of residential wood combustion are expected to decline in future years (see Emissions Reduction Efforts or Control Measures, below). The combined Point, Nonroad, and Onroad source categories of direct $PM_{2.5}$ emissions comprise a small proportion of total direct $PM_{2.5}$, yet they too have had reported reductions in estimated emissions over the 2002 to 2014 period.

In general, $PM_{2.5}$ emissions, and those of its precursors, have declined over the past fifteen years and are not expected to increase due to Vermont's ongoing emissions reduction efforts and control measures.

Figure 2: Annual emissions from Vermont sources based on 2002, 2008, 2011, and 2014 National Emissions Inventory (NEI) for primary $PM_{2.5}$ and secondary $PM_{2.5}$ precursors: NO_x, SO_2, NH_3, and VOC. *The 2014 NEI v.2 is expected to include a precipitation adjustment to unpaved road dust emissions in the Area/Nonpoint category that will result in a decline in primary $PM_{2.5}$ emissions from the 2011 NEI.

Emissions Reduction Efforts or Control Measures

Please see the Technical Support Document in Enclosure 4 of the Vermont Infrastructure SIP for the 2012 $PM_{2.5}$ NAAQS for references to the infrastructure in place to limit emissions of $PM_{2.5}$ that will maintain in-state concentrations below the 2012 $PM_{2.5}$ NAAQS and prevent significant contribution to downwind states.

While Vermont's emissions are relatively low and monitoring data indicate that the state attains the $PM_{2.5}$ ambient air quality standards, the state has ongoing emissions reduction efforts that are expected to further decrease emissions of $PM_{2.5}$ and its precursors. For example, Vermont has enrolled in the EPA PM Advance program to facilitate development of local emissions reduction efforts. As of December 2016, the Vermont DEC and Vermont Department of Public Service are administering a woodstove changeout program to reduce emissions from residential wood combustion by providing financial incentives to remove and destroy old, uncertified wood burning appliances, and replace them with lower-emitting, certified cordwood and pellet burning units. Vermont has also recently adopted regulations that incorporate the requirements of EPA's Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters, and Forced Air Furnaces.[7]

Several emissions reduction programs target precursor emissions of secondary $PM_{2.5}$ such as SO_2, NO_x, and VOCs. Sulfate originating from SO_2 emissions has been shown to be a large component of ambient $PM_{2.5}$ concentrations in the northeast, especially in summertime. As sulfate is also a large component of visibility impairment, Vermont committed to adopt a mid-Atlantic/northeast regional low-sulfur fuel oil strategy in Vermont's Regional Haze SIP. New limitations on sulfur in fuel were adopted on September 28, 2011 in Vermont's Air Pollution Control Regulations (VT APCR § 5-221(1)), to take effect in two phases. Vermont's Regional Haze SIP Five-Year Progress Report demonstrates that sulfate concentrations have declined significantly in the past fifteen years. While the bulk of improvement is attributed to changes in the power sector in upwind areas, Vermont's sulfur emissions are expected to decrease further as the second phase of more stringent limitations take effect July 1, 2018.

Mobile sources are responsible for 69% of Vermont's NO_x emissions and 43% of VOC emissions.[8] Efforts to reduce air pollution from mobile sources include adoption of California's vehicle emissions standards, inspection and maintenance of vehicle emissions control systems, enhancement of emissions control technology upgrade programs for diesel engines, and participation in regional and state-specific efforts to build and incentivize zero emission vehicle infrastructure and ownership.

The emissions reduction efforts described here will result in lower contributions of $PM_{2.5}$ from sources or activities within Vermont to downwind areas, and lead to greater air quality benefits locally and regionally.

[7] Air Pollution Control Regulations § 5-204 (effective December 15, 2016).
[8] U.S. EPA 2014 National Emissions Inventory

Conclusion

The contribution analysis, monitoring data, and emissions inventories presented in this report demonstrate that emissions from sources within Vermont do not significantly impact any downwind state. Therefore, Vermont DEC concludes that the existing limits and controls in the Vermont SIP are sufficient to ensure that emissions from sources or other activities within Vermont will not significantly contribute to nonattainment in, or interfere with maintenance by, any other state with respect to the 2012 annual $PM_{2.5}$ NAAQS.