MATTHEW G. BEVIN
GOVERNOR

ENERGY AND ENVIRONMENT CABINET

CHARLES G. SNAVELY
SECRETARY

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DEPUTY SECRETARY

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May 10, 2018

Mr. Trey Glenn
Regional Administrator
US EPA Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

RE: Request for approval of the final submission to revise the Kentucky State Implementation Plan relating to Clean Air Act Section 110(a)(2)(D)(i)(I), Good Neighbor Provisions for the 2008 8-hour Ozone National Ambient Air Quality Standard

Dear Mr. Glenn:

On behalf of the Commonwealth of Kentucky, the Kentucky Energy and Environment Cabinet (Cabinet) respectfully submits a final revision to the Kentucky State Implementation Plan (SIP) in accordance with Clean Air Act (CAA) Section 110. The Cabinet requests the Environmental Protection Agency (EPA) to approve this revision to the Kentucky SIP and find that Kentucky is not required to make any further reductions, beyond those required by the Cross State Air Pollution Rule (CSAPR) Update, to address its statutory obligation under CAA section 110(a)(2)(D)(i)(I) for the 2008 8-hour ozone National Ambient Air Quality Standard.

In accordance with 40 CFR 51.102, the Cabinet made the proposed SIP revision available for public review and comment from March 1, 2018 until March 30, 2018. All comments received during the comment period are included in Appendix C, along with the statement of consideration.

If you have any questions or comments concerning this matter, please contact Ms. Kelly Lewis, Program Planning and Administrative Branch Manager, Division for Air Quality at (502) 782-6687 or Kelly.lewis@ky.gov.

Sincerely,

Charles G. Snavely
Secretary

Cc: Beverly Banister, Region 4 US EPA
Lynorae Benjamin, Region 4 US EPA
Scott Davis, Region 4 US EPA

COMPLETENESS CRITERIA FOR SIP SUBMITTALS –
40 CFR PART 51 APPENDIX V

To ensure completeness of this SIP revision submittal, the following elements detailed in 40 CFR Part 51, Appendix V are listed:

A. ADMINISTRATIVE MATERIALS:

1. **A formal letter of submittal from the Governor or his designee, requesting EPA approval of the plan or revision.**

   The cover letter dated May 10, 2018 signed by Secretary Charles G. Snavely, the Governor's designee requests EPA's approval of the SIP revision to approve this revision to the Kentucky SIP and find that Kentucky is not required to make any further reductions, beyond those required by the Cross State Air Pollution Rule (CSAPR) Update, to address its statutory obligation under CAA section 110(a)(2)(D)(i)(I) for the 2008 8-hour ozone National Ambient Air Quality Standard.

2. **Evidence that the State has adopted the plan in the State code or body of regulations; or issued the permit, order, consent agreement in final form. That evidence shall include the date of adoption or final issuance as well as the effective date of the plan, if different from the adoption/issuance date.**

   This SIP submission is legally adopted by the letter signed by Secretary Charles G. Snavely, the Governor's designee, on May 10, 2018.

3. **Evidence that the State has the necessary legal authority under State law to adopt and implement the plan.**

   The powers and duties of the Cabinet established in KRS 224.10-100 provide the Energy and Environment Cabinet with the statutory authority to prepare and develop a comprehensive plan or plans related to the environment of the Commonwealth. Additionally, KRS 224.10-100 requires the cabinet to administer and enforce all rules, regulations and orders promulgated under Chapter 224, Environmental Protection, including those regulations that provide for the prevention, abatement, and control of all air pollution.

4. **A copy of the actual regulation, or document submitted for approval and incorporation by reference into the plan, including indication of the changes made to the existing approved plan, where applicable. The submittal shall be a copy of the official State regulation/document signed, stamped, dated by the appropriate State official indicating that it is fully enforceable by the State. The effective data of the regulation/document shall, whenever possible, be indicated in the document itself.**

   The Energy and Environmental Cabinet has attached the entire document with appendices for approval. The SIP revision has been signed by the Governor's designee, Charles G. Snavely, Secretary for the Energy and Environment Cabinet, and is effective May 10, 2018.

5. **Evidence that the State followed all of the procedural requirements of the State's laws and constitution in conducting and completing the adoption/issuance of the plan.**

   The procedural requirements associated with this plan and public comment period are included in the submittal to EPA.

6. **Evidence that public notice was given of the proposed change consistent with procedures approved by EPA, including the date of publication of such notice.**

   In accordance with 40 CFR 51.102, a public hearing notice was posted on the Division's website and sent to members of the community on March 1, 2018. This notice detailed that the public had 30 days to provide comment and that a public hearing would be held on March 30, 2018 at 10:00am in room 111 at 300 Sower Blvd, Frankfort, KY. A copy of the public hearing notice is included in Appendix C.

7. **Certification that public hearing(s) were held in accordance with the information provided in the public notice and the State's laws and constitutions, if applicable.**

   A public hearing was held at the Division for Air Quality offices located at 300 Sower Blvd, Frankfort, Kentucky on March 30, 2018. The SIP revision document was made available for public review on the Division's website throughout the 30 day review period. The transcript of the public hearing is included in Appendix C.

8. **Compilation of public comments and the State's response thereto.**

   All comments along with the Cabinet's responses are available in Appendix C.

B. TECHNICAL SUPPORT:

1. **Identification of all regulated pollutants affected by the plan.**

   The appropriate pollutant(s) have been identified within the narrative consistent with EPA's guidance.

2. **Identification of the locations of affected sources including the EPA attainment/nonattainment designations and the status of the attainment plan for the affected area(s).**

   This plan focuses on CAA section 110(a)(2)(D)(i)(I), Good Neighbor Provisions, which encompasses the entire state of Kentucky.

3. **Quantification of the changes in plan allowable emissions from the affected sources; estimates of changes in current actual emissions from affected sources or, where appropriate, quantification of changes in actual emissions from affected sources through calculations of the differences between certain baseline levels and allowable emissions anticipated as a result of the revision.**

Quantification and changes in emissions are discussed within the Emissions Trends Section of this submittal.

4. **The State's demonstration that the national ambient air quality standards, prevention of significant deterioration increments, reasonable further progress demonstration, and visibility, as applicable, are protected if the plan is approved and implemented. For all requests to redesignate an area to attainment for a national ambient air quality standard, under section 107 of the Act, a revision must be submitted to provide for the maintenance of the national primary ambient air quality standards for at least 10 years as required by section 175A of the Act.**

   This submittal addresses CAA section 110(a)(2)(D)(i)(I) which focuses on interstate transport. The submittal demonstrates that the NAAQS will be protected if the plan is approved and implemented.

5. **Modeling information required to support the proposed revision, including input data, output data, models used, justification of model selections, ambient monitoring data used, meteorological data used, justification for use of offsite data (where used), modes of models used, assumptions, and other information relevant to the determination of adequacy of the modeling analysis.**

   Modeling information is discussed throughout the main narrative and provided in Appendix A and B of this submittal.

6. **Evidence, where necessary, that emission limitations are based on continuous emission reduction technology.**

   This is not applicable to this submittal.

7. **Evidence that the plan contains emission limitations, work practice standards and recordkeeping/reporting requirements, where necessary, to ensure emission levels.**

   These elements are consistent with EPA's guidance.

8. **Compliance/enforcement strategies, including how compliance will be determined in practice.**

   Compliance and enforcement strategies have been addressed in the regulatory changes being amended to the SIP.

9. **Special economic and technological justifications required by any applicable EPA policies, or an explanation of why such justifications are not necessary.**

   Economic and technological justifications are consistent with EPA's guidance.

Kentucky State Implementation Plan (SIP) Revision to address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act

Demonstration that Kentucky Satisfies the "Good Neighbor" Requirements of Clean Air Act Section 110(a)(2)(D)(i)(I)

2008 Ozone National Ambient Air Quality Standard

Submitted by
Kentucky Energy and Environment Cabinet
May 2018

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I. Summary of the Kentucky State Implementation Plan Submittal

On behalf of the Commonwealth of Kentucky (Kentucky), the Kentucky Energy and Environment Cabinet (Cabinet) submits the following State Implementation Plan (SIP) revision and requests the United States Environmental Protection Agency's (EPA) approval. This SIP submittal specifically addresses the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act (CAA), also known as the "Good Neighbor" provision, for the 2008 ozone National Ambient Air Quality Standard (NAAQS).

On September 8, 2009 and July 17, 2012, the Cabinet submitted SIPs to demonstrate that Kentucky's SIP contained adequate provisions to address elements of Section 110(a)(1) and 110(a)(2) of the CAA. However, EPA partially disapproved the Kentucky SIP revision as it related to Section 110(a)(2)(D)(i)(I) of the CAA effective April 8, 2013.[1]

This SIP submittal demonstrates that the emission reductions required by the CSAPR Update are adequate to prohibit emissions within Kentucky from significantly contributing to nonattainment, or interfering with the maintenance, of downwind states with respect to the 2008 ozone NAAQS. The Cabinet therefore requests the EPA to approve this revision to the Kentucky SIP and find that Kentucky is not required to make any further reductions, beyond those required by the CSAPR Update, to address its statutory obligation under section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS.

To support this SIP submittal, the Cabinet is including EPA's most recent technical analysis related to the Good Neighbor provision for the 2008 ozone NAAQS. On October 27, 2017, EPA provided supplemental information and updated modeling to address the Good Neighbor provision. EPA's updated modeling indicates that no monitoring sites, outside of California, will violate the 2008 ozone NAAQS in the year 2023.

In addition to EPA's technical analysis, the Cabinet is also providing the final modeling report prepared by Alpine Geophysics, LLC. Independently, the air quality modeling performed by Alpine Geophysics predicts that all problem monitors identified by EPA will achieve the 2008 ozone NAAQS.

II. Interstate Transport Requirements for 2008 Ozone NAAQS

After EPA revises a NAAQS, Section 110(a)(1) of the CAA requires that each state revise its SIP within three (3) years to assure that the SIP contains applicable requirements to achieve and maintain the revised NAAQS. This type of SIP revision is commonly referred to as an "infrastructure SIP." Infrastructure SIPs address the elements listed in sections 110(a)(1) and 110(a)(2) of the CAA, which mandate that each state must develop a plan that provides for the implementation, maintenance and enforcement of the NAAQS.

[1] 78 FR 14681

Section 110(a)(2)(D)(i)(I) of the CAA requires each state plan to contain adequate provisions prohibiting a state from emitting air pollutants in amounts that "contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to any such national primary or secondary ambient air quality standard." This provision is commonly referred to as the "interstate transport" or "Good Neighbor" provision.

On March 27, 2008, the EPA revised the primary and secondary 8-hour ozone NAAQS to a more stringent 0.075 parts per million (ppm) standard.[2] The previous 1997 8-hour ozone standard was 0.08 ppm.

Effective April 8, 2013, EPA partially disapproved the Kentucky SIP revision as it related to Section 110(a)(2)(D)(i)(I) of the CAA for the 2008 8-hour ozone NAAQS.[3] In accordance with CAA Section 110(c)(1), when the EPA disapproves a SIP, it is required to promulgate a Federal Implementation Plan (FIP) within two years if the state does not correct the deficiency during that time period.

i. EPA's Rationale for Partial Disapproval of Kentucky 2008 Ozone Infrastructure SIP

EPA's limited disapproval of the Kentucky SIP revision centered on the use of the Clean Air Interstate Rule (CAIR) to limit emissions from electric generating units to satisfy the interstate transport obligation. EPA commented, "CAIR, however, was promulgated before the 2008 8-hour ozone NAAQS were promulgated, and CAIR did not, in any way, address interstate transport requirements related to the 2008 8-hour ozone NAAQS."[4] Although CAIR became effective in 2009, EPA found that a replacement rule, the Cross-State Air Pollution Rule (CSAPR)[5], for CAIR was better suited to address the 2008 standard. Emission reductions resulting from the CSAPR requirements began January 1, 2015.

ii. Federal Implementation Plan Obligations

Regarding the imposition of a FIP, EPA provided the following rationale in the proposed and final disapproval notices:

> *Kentucky DAQ was not yet required to submit a SIP submission to address these interstate transport requirements. Moreover, under that same court decision, this disapproval does not trigger an obligation for EPA to promulgate a Federal Implementation plan (FIP) to address these interstate transport requirements.*[6,7]

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[2] 73 FR 16435
[3] 78 FR 14681
[4] 78 FR 14682
[5] 76 FR 48207
[6] 78 FR 3867
[7] 78 FR 14681

However, on October 17, 2012 (amended December 7, 2012), the court granted partial summary judgment in *WildEarth Guardians v. Jackson* and ordered the EPA Administrator to take final action on the disapproval of the Kentucky SIP revision submission by March 4, 2013. EPA met the court's deadline with the final disapproval published in the Federal Register on March 7, 2013.[8]

To specifically address the 2008 8-hour ozone NAAQS, EPA published the CSAPR Update on October 26, 2016, and modified the NO_x ozone season allowance-trading program established under the original CSAPR.[9] The rule is anticipated to reduce ground-level ozone in twenty-two (22) eastern states found to have ozone season NO_x emissions potentially affecting the ability of downwind states to attain and maintain the 2008 ozone NAAQS. The final rule became effective on December 27, 2016.

Currently, the owner and operator of each source located in Kentucky, and subject to CSAPR, must comply with the CSAPR NO_x Ozone Season Budget as required by 40 CFR 52.940(b)(1) and (b)(2). The owner and operator of each source and each unit located in Kentucky must comply with the requirements set forth under the CSAPR NO_x ozone Season Group 2 Trading Program in 40 CFR 97 Subpart EEEEE with regard to emissions occurring in 2017 and in each subsequent year. These applicable requirements are federally-enforceable and can be relied upon to satisfy the Good Neighbor provision.

iii. EPA Supplemental Information Memorandum

On October 27, 2017, EPA Air Quality Planning and Standards Director, Stephen Page, signed a memorandum that was issued to air agency directors within all EPA regions. The memorandum provided supplemental information for the 2008 ozone NAAQS under Clean Air Act Section 110(a)(2)(D)(i)(I). In the memo, EPA stated that the objective was "to assist states' efforts to develop, supplement or resubmit good neighbor SIPs for the 2008 ozone NAAQS to fully address their interstate transport obligations."

The memorandum predicted "future year ozone design values and contribution modeling outputs for monitors in the United States based on updated air quality modeling (for 2023) and monitoring data. The EPA's updated modeling indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone NAAQS of 75 ppb in 2023."[10]

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[8] 78 FR 14681
[9] 81 FR 74504
[10] EPA Memorandum, "Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I)," October 27, 2017.

As explained in EPA's Memo, "EPA believes that it is reasonable to assume that installation of emissions controls for EGUs and non-EGUs that could be required under these rulemaking efforts may take up to 4 years, the EPA believes that such reductions are unlikely to be implemented for a full ozone season until 2023." Kentucky concurs with EPA's assessment that the timeline for promulgation of new applicable emission requirements, as well as the installation and operation of additional air pollution controls, cannot be feasibly completed prior to the 2023 ozone season. Kentucky appreciates EPA's balanced consideration to avoid unnecessary over-control of Kentucky sources consistent with the Supreme Court's decision on the matter.[11]

III. Kentucky Modeling for the 2008 Ozone Transport SIP Obligations

In June of 2017, Kentucky contacted Alpine Geophysics (Alpine) to discuss their ability to provide a modeling protocol and demonstration, in a timely manner, which Kentucky could use to satisfy the requirements of the Good Neighbor provision of the 2008 Ozone NAAQS Infrastructure SIP. In the development of the modeling protocol, it was determined that additional emissions inventory information from Kentucky's EGU sources was needed, as well as adjustments to the previous 2023 NODA provided by EPA. Alpine provided Kentucky with a final modeling protocol, which the Division for Air Quality (Division) submitted to EPA for review and comment on August 4, 2017, along with a projected timeline for completing the modeling.

Modeling results provided by Alpine Geophysics to Kentucky on October 16, 2017, indicated that downwind monitors previously identified as being impacted by Kentucky's upwind emissions showed compliance with 2023, and that Kentucky will not interfere with any downwind maintenance monitors in 2023.

IV. Permanent and Enforceable Measures

The following regulations and programs address additional control measures, means and techniques to assure that Kentucky is not interfering with attainment or maintenance of the 2008 ozone NAAQS in downwind states.

i. Kentucky Administrative Regulations addressing 110(a)(2)(D)(i)(I)

The following administrative regulations demonstrate the Cabinet's commitment to apply permanent and enforceable measures to prevent interference with attainment and maintenance of the 2008 ozone NAAQS in downwind areas.

[11] EPA v. EME Homer City Generation, L.P., 134 S. Ct. 1584, 1600-01 (2014)

<u>401 KAR Chapter 50</u>

- 401 KAR 50:012. *General Application*. This administrative regulation provides the general guidelines by which all administrative regulations of 401 KAR 50 through 65 are to be understood. Specifically, this regulation mandates the use of reasonable controls on sources of VOC emissions and defines a major source of VOC, among other applicable items.

- 401 KAR 50:055. *General compliance requirements.* This administrative regulation establishes requirements for demonstrating compliance with standards; establishes requirements for compliance when a source is relocated within the Commonwealth of Kentucky; and other general compliance requirements.

- 401 KAR 50:060. *Enforcement.* This administrative regulation provides for enforcement of the terms and conditions of permits and compliance schedules.

<u>401 KAR Chapter 51</u>

- 401 KAR 51:001. *Definitions for 401 KAR Chapter 51*. This administrative regulation defines the terms used in 401 KAR Chapter 51. The definitions contained in this administrative regulation are neither more stringent nor otherwise different than the corresponding federal definitions.

- 401 KAR 51:010. *Attainment Status Designations.* This administrative regulation designates the status of all areas of the Commonwealth of Kentucky with regard to attainment of the ambient air quality standards.

- 401 KAR 51:017. *Prevention of Significant Deterioration of Air Quality*. This administrative regulation applies to the construction of any new major stationary source or any project at an existing major stationary source in an area designated as attainment or unclassifiable. It ensures the prevention of significant deterioration (PSD) of air quality in areas of Kentucky where the air quality is better than the ambient air quality standards (i.e. attainment areas).

- 401 KAR 51:052. *Review of New Sources in or Impacting Upon Nonattainment Areas.* This administrative regulation establishes requirements for the construction or modification of stationary sources within, or impacting upon, areas where the national ambient air quality standards have not been attained.

- 401 KAR 51:150. *NO_x Requirements for stationary internal combustion engines*. Pursuant to the federal NO_x SIP Call, this administrative regulation provides for the regional control of NO_x emissions by establishing requirements for large stationary internal combustion engines.

<u>401 KAR Chapter 52</u>

- 401 KAR 52:020. *Title V Permits*. This administrative regulation establishes the requirements for air contaminant sources located in Kentucky to obtain a Title V operating permit.

- 401 KAR 52:030. *Federally-enforceable permits for non-major sources*. This administrative regulation establishes requirements for air contaminant sources located in Kentucky that accept federally-enforceable emission limitations. It specifically deals with sources that are located in ozone nonattainment areas and emit, or have the potential to emit 25 tpy or more of VOCs or NO_x, stating that they shall submit an annual emission certification pursuant to Section 25(2) of this administrative regulation.

<u>401 KAR Chapter 53</u>

- 401 KAR 53:010. *Ambient air quality standards*. This administrative regulation establishes ambient air quality standards necessary for the protection of the public health, the general welfare, and the property and people in the Commonwealth of Kentucky.

<u>401 KAR Chapter 59</u>

- 401 KAR 59:001. *Definitions for 401 KAR Chapter 59.* This administrative regulation provides all the definitions used in 401 KAR Chapter 59 regulations.

- 401 KAR 59:005. *General Provisions*. This administrative regulation includes the monitoring requirements for new sources with the potential to emit NO_x and other criteria pollutants, which applies to the controlling of emissions.

- 401 KAR 59:046. *Selected New Petroleum Refining Processes and Equipment*. This administrative regulation provides for the control of VOC emissions from any new petroleum refining processes and equipment.

- 401 KAR 59:050. *New Storage Vessels for Petroleum Liquids*. This administrative regulation controls emissions from new petroleum liquid storage vessels. This regulation includes standards for VOC monitoring, testing, and operating requirements.

- 401 KAR 59:101. *New Bulk Gasoline Plants*. This administrative regulation controls VOC emissions from new bulk gasoline plants.

- 401 KAR 59:174. *Stage II Controls at Gasoline Dispensing Facilities*. This administrative regulation deals with gas dispensing facilities, and imposes controls on VOC emissions and vapor recovery systems.

- 401 KAR 59:175. *New Service Stations*. This administrative regulation controls VOC emissions from new service stations in Kentucky.

- 401 KAR 59:185. *New Solvent Metal Cleaning Equipment*. This administrative regulation describes the controls for VOC emissions from new solvent metal cleaning equipment.

- 401 KAR 59:190. *New Insulation of Magnet Wire Operations*. This administrative regulation controls VOC emissions from new insulation of magnet wire operations.

- 401 KAR 59:210. *New Fabric, Vinyl and Paper Surface Coating Operations*. This administrative regulation addresses VOC emissions from new fabric, vinyl, or paper surface coating operations.

- 401 KAR 59:212. *New Graphic Arts Facilities Using Rotogravure and Flexography*. This administrative regulation applies to new graphic arts facilities that use rotogravure and flexography and controls any potential VOC emissions they create.

- 401 KAR 59:214. *New Factory Surface Coating Operations of Flat Wood Paneling*. This administrative regulation deals with VOC emissions from new factory surface coating operations of flat wood paneling.

- 401 KAR 59:225. *New Miscellaneous Metal Parts and Products Surface Coating Operations*. This administrative regulation controls VOC emissions from new miscellaneous metal parts and products surface coating operations.

- 401 KAR 59:230. *New Synthesized Pharmaceutical Product Manufacturing Operations*. This administrative regulation controls VOC emissions from new synthesized pharmaceutical product manufacturing operations.

- 401 KAR 59:240. *New Perchloroethylene Dry Cleaning Systems*. This administrative regulation deals with VOC emissions from new perchloroethylene dry cleaning systems.

- 401 KAR 59:315. *Specific New Sources*. This administrative regulation controls VOC emissions from specific new sources in Kentucky.

- 401 KAR 59:760. *Commercial Motor Vehicle and Mobile Equipment Refinishing Operations*. This administrative regulation controls VOC emissions from commercial motor vehicle and mobile equipment refinishing operations.

<u>401 KAR Chapter 61</u>

- 401 KAR 61:001. *Definitions for 401 KAR Chapter 61*. This administrative regulation provides definitions used in 401 KAR 61 including major source, VOC, NO_x, and others.

- 401 KAR 61:005. *General Provisions*. This administrative regulation deals with performance test requirements and emissions monitoring.

- 401 KAR 61:065. *Existing Nitric Acid Plants*. This administrative regulation deals with controlling emissions from nitric acid plants and sets a limit on NO_x emissions.

ii. Regulations Administered by the Louisville Metro Air Pollution Control District Addressing 110(a)(2)(D)(i)(I)

The following administrative regulations demonstrate the Louisville Metro Air Pollution Control District's (LMAPCD) commitment to apply permanent and enforceable measures to prevent interference with attainment and maintenance of the 2008 ozone NAAQS in downwind areas.

<u>Part 1: General Provisions</u>

- Regulation 1.01. *General Application of Regulations and Standards.* This regulation describes the general application of District regulations and emission standards.

- Regulation 1.02. *Definitions.* This regulation contains definitions used throughout District regulations.

- Regulation 1.03. *Abbreviations and Acronyms.* This regulation contains certain abbreviations and acronyms used in District regulations.

- Regulation 1.05. *Compliance with Emission Standards and Maintenance Requirements.* This regulation establishes the conditions for compliance with emissions standards.

- Regulation 1.06. *Stationary Source Self-Monitoring, Emissions Inventory Development, and Reporting.* This regulation establishes requirements for stationary source monitoring, recordkeeping, and reporting.

- Regulation 1.07. *Excess Emissions During Startups, Shutdowns, and Upset Conditions.* This regulation establishes the notification, reporting, and operational requirements for the owner or operator of a stationary source when excess emissions occur as a result of a startup, shutdown, preventable upset condition, or malfunction.

Part 2: Permit Requirements

- Regulation 2.02. *Air Pollution Regulation Requirements and Exemptions.* This regulation establishes requirements for exempt stationary sources, temporary exemptions, and registered stationary sources.

- Regulation 2.04. *Construction or Modification of Major Sources in or Impacting upon Non-Attainment Areas (Emission Offset Requirements).* This regulation establishes requirements for the construction, modification of stationary sources within, or impacting upon, areas where the national ambient air quality standards have not been attained.

- Regulation 2.05. *Prevention of Significant Deterioration of Air Quality*. This regulation, which adopts the Federal Prevention of Significant Deterioration of Air Quality program, provides for the prevention of significant deterioration of air quality where the national ambient air quality standards have been achieved.

Part 3: Ambient Air Quality Standards

- Regulation 3.01. *Ambient Air Quality Standards.* This regulation establishes ambient air quality standards to protect public health and welfare.

Part 4: Emergency Episodes

- Regulation 4.05. *Hydrocarbon and Nitrogen Oxides Reduction Requirements.* This regulation establishes the requirements for reduction of hydrocarbon and nitrogen oxides emissions under certain conditions.

Part 6: Standards of Performance for Existing Affected Facilities

- Regulation 6.01. *General Provisions.* This regulation establishes the general provisions for the application of standards of performance for existing affected facilities.

- Regulation 6.09. *Standards of Performance for Existing Process Operations.* This regulation provides for the control of emissions from existing process operations.

- Regulation 6.12. *Standard of Performance for Existing Asphalt Paving Operations.* This regulation provides for the control of emissions from existing asphalt paving operations.

- Regulation 6.13. *Standard of Performance for Existing Storage Vessels for Volatile Organic Compounds.* This regulation provides for the control of emissions of volatile organic compounds from existing storage vessels.

- Regulation 6.16. *Standard of Performance for Existing Large Appliance Surface Coating Operations.* This regulation provides for the control of emissions from surface coating operations at large appliance manufacturing facilities.

- Regulation 6.17. *Standard of Performance for Existing Automobile and Truck Surface Coating Operations.* This regulation provides for the control of emissions from surface coating operations at automobile and truck manufacturing facilities.

- Regulation 6.29. *Standard of Performance for Graphic Arts Facilities Using Rotogravure or Flexographic Printing.* This regulation provides for the control of volatile organic compound emissions from graphic arts facilities that use rotogravure or flexographic printing.

- Regulation 6.30. *Standard of Performance for Existing Factory Surface Coating Operations of Flat Wood Paneling.* This regulation provides for the control of surface coating emissions from existing wood panel facilities.

- Regulation 6.31. *Standard of Performance for Existing Miscellaneous Metal Parts and Products Surface Coating Operations.* This regulation provides for the control of volatile organic compound emissions from existing miscellaneous metal parts and products surface coating operations.

- Regulation 6.32. *Standard of Performance for Leaks from Existing Petroleum Refinery Equipment.* This regulation provides for the control of leakage from equipment at existing petroleum refineries.

- Regulation 6.33. *Standard of Performance for Existing Synthesized Pharmaceutical Product Manufacturing Operations.* This regulation provides for the control of emissions from existing pharmaceutical manufacturing operations.

- Regulation 6.34. *Standard of Performance for Existing Pneumatic Rubber Tire Manufacturing Plants.* This regulation provides for the control of emissions from existing rubber tire manufacturing facilities.

- Regulation 6.35. *Standard of Performance for Existing Fabric, Vinyl, and Paper Surface Coating Operations.* This regulation provides for the control of emissions from existing fabric, vinyl, and paper surface coating operations.

- Regulation 6.38. *Standard of Performance for Existing Air Oxidation Processes in Synthetic Organic Chemical Manufacturing Industries.* This regulation provides for the control of volatile organic compound emissions from air oxidation processes in the synthetic organic chemical manufacturing industry.

- Regulation 6.39. *Standard of Performance for Equipment Leaks of Volatile Organic Compounds in Existing Synthetic Organic Chemical and Polymer Manufacturing Plants.* This regulation provides for the control of volatile organic compound leaks from synthetic organic chemical and polymer manufacturing equipment.

- Regulation 6.42. *Reasonably Available Control Technology Requirements for Major Volatile Organic Compound- and Nitrogen Oxides-Emitting Facilities.* This regulation establishes the requirements for Reasonably Available Control Technology (RACT) determination, demonstration, and compliance for VOC and NO_x emitting facilities for new or renewed operating permit applications.

- Regulation 6.43. *Volatile Organic Compound Emission Reduction Requirements.* This regulation establishes emissions, equipment, and operational requirements for the listed stationary sources, each of which voluntarily agreed to these requirements.

- Regulation 6.44. *Standards of Performance for Existing Commercial Motor Vehicle and Mobile Equipment Refinishing Operations.* This regulation provides for the control of VOC emissions from existing commercial motor vehicle and mobile equipment refinishing operations.

- Regulation 6.48. *Standard of Performance for Existing Bakery Oven Operations.* This regulation provides for the quantification of VOC emissions from existing bakery oven operations.

- Regulation 6.49. *Standards of Performance for Reactor Processes and Distillation Operations Processes in the Synthetic Organic Chemical Manufacturing Industry.* This regulation provides for the control of emissions from reactor processes and distillation operations processes in the synthetic organic chemical manufacturing industry (SOCMI).

- Regulation 6.50. *NO_x Requirements for Portland Cement Kilns.* This regulation, which provides for regional control of oxides of nitrogen (NO_x) emissions from portland cement kilns pursuant to the federal mandate published under the EPA's NO_x SIP Call, would allow the District to enforce 401 KAR 51:170 NO_x requirements for cement kilns.

Part 7: Standards of Performance for New Affected Facilities

- Regulation 7.01. *General Provisions. This regulation establishes general requirements for new affected facilities.* (specifically, Standard of Performance for New Storage Vessels for Volatile Organic Compounds)

- Regulation 7.08. *Standards of Performance for New Process Operations.* This regulation provides for the control of particulates and nitrous oxide emissions from new sources.

- Regulation 7.11. *Standard of Performance for New Asphalt Paving Operations.* This regulation provides for the control of emissions from new asphalt paving operations.

- Regulation 7.12. *Standard of Performance for New Storage Vessels for Volatile Organic Compounds.* This regulation provides for the control of emissions of volatile organic compounds from new storage vessels.

- Regulation 7.15. *Standards of Performance for Gasoline Transfer to New Service Station Storage Tanks (Stage I Vapor Recovery).* This regulation provides for the control of emissions from gasoline delivery and storage tanks at existing service stations.

- Regulation 7.20. *Standard of Performance for New Gasoline Loading Facilities at Bulk Plants.* This regulation provides for the control of volatile organic compound emissions from new gasoline loading facilities at bulk plants.

- Regulation 7.22. *Standard of Performance for New Volatile Organic Materials Loading Facilities.* This regulation provides for the control of emissions from new volatile organic materials loading facilities.

- Regulation 7.25. *Standard of Performance for New Sources Using Volatile Organic Compounds.* This regulation provides for the control of emissions of volatile organic compounds from new sources.

- Regulation 7.36. *Standard of Performance for New Volatile Organic Compound Water Separators.* This regulation provides for the control of emissions from new water separators.

- Regulation 7.51. *Standard of Performance for New Liquid Waste Incinerators.* This regulation provides for the control of emissions from new liquid waste incinerators.

- Regulation 7.52. *Standard of Performance for New Fabric, Vinyl and Paper Surface Coating Operations.* This regulation provides for the control of emissions from new fabric, vinyl and paper surface coating operations.

- Regulation 7.55. *Standard of Performance for New Insulation of Magnet Wire.* This regulation provides for the control of emissions of volatile organic compounds from magnetic wire coatings.

- Regulation 7.56. *Standard of Performance for Leaks from New Petroleum Refinery Equipment.* This regulation provides for the control of leakage from equipment at new petroleum refineries.

- Regulation 7.58. *Standard of Performance for New Factory Surface Coating Operations of Flat Wood Paneling.* This regulation provides for the control of surface coating emissions from new wood panel facilities.

- Regulation 7.59. *Standard of Performance for New Miscellaneous Metal Parts and Products Surface Coating Operations.* This regulation provides for the control of volatile organic compound emissions from new miscellaneous metal parts and products surface coating operations.

- Regulation 7.60. *Standard of Performance for New Synthesized Pharmaceutical Product Manufacturing Operations.* This regulation provides for the control of emissions from new pharmaceutical manufacturing operations.

- Regulation 7.79. *Standards of Performance for New Commercial Motor Vehicle and Mobile Equipment Refinishing Operations.* This regulation provides for the control of VOC emissions from new commercial motor vehicle and mobile equipment refinishing operations.

- Regulation 7.81. *Standard of Performance for New or Modified Bakery Oven Operations.* This regulation provides for the quantification and control of VOC emissions from new or modified bakery ovens.

iii. Federal Programs

The following programs address additional control measures, means and techniques to assure that Kentucky is not interfering with attainment or maintenance of the 2008 ozone NAAQS in downwind states.

- 40 CFR 52.940(b)(2). *Interstate Pollutant Transport Provisions; What are the FIP Requirements for Decreases in Emissions of Nitrogen Oxides?* (2) The owner and operator of each source and each unit located in the State of Kentucky and for which requirements are set forth under the CSAPR NO_x Ozone Season Group 2 Trading Program in subpart EEEEE of part 97 of this chapter must comply with such requirements with regard to emissions occurring in 2017 and each subsequent year.

- *National Program for greenhouse gas (GHG) emissions and fuel economy standards*: The federal GHG and fuel economy standards apply to light-duty cars and trucks in model years 2012-2016 (phase 1) and 2017-2025 (phase 2). The final standards are projected to result in an average industry fleet-wide level of 163 grams/mile of carbon dioxide (CO2) which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements. These emission reductions will be federally enforceable.

- *Tier II Emission Standards for Vehicles and Gasoline Sulfur Standards*: EPA finalized a federal rule in 2000 to reduce emissions from passenger vehicles in each manufacturer's fleet to meet an average standard of 0.07 grams of NO_x per mile. Additionally, in January 2006 the sulfur content of gasoline was required to be on average 30 ppm, which assists in lowering NO_x emissions. EPA estimated that the reduction of NO_x emissions was ranged from 77 percent for cars to 86 percent for minivans, light trucks and small SUVs. VOC emissions were also reduced, ranging from 12 percent for cars up to 18 percent for minivans, light trucks and small SUVs. These emission reductions are federally enforceable.

- *Tier III Emission Standards for Vehicles and Gasoline Sulfur Standards*: On March 3, 2014, the EPA finalized new Tier III emission standards for light duty (and some larger) motor vehicles. Light duty vehicles include cars, SUVs, vans, and most pickup trucks. Phase-in of the standards will begin with Model Year 2017. According to EPA, by the time Tier III is fully implemented in Model Year 2025, the standards for light duty vehicles will require a national reduction of about 80% in tailpipe emissions of VOC and NO_x (both of which contribute to the formation of ground-level ozone) and of about 70% in tailpipe emissions of particulates.

  Like the current Tier II standards, which were promulgated in 2000 and phased in between Model Years 2004 and 2009, the Tier III standards treat vehicles and fuels as a system: reductions in vehicle emissions are easier to achieve if the fuel used contains less sulfur. The Tier III standards will require that gasoline contain no more than 10 parts per million (ppm) sulfur on an annual average basis beginning January 1, 2017, down from 30 ppm under the Tier II program. Further, the rule extends the required useful life of emission control equipment from 120,000 miles to 150,000 miles, and sets standards for heavier duty gasoline-powered vehicles. The standards will also require about a 50% reduction in evaporative emissions.

  EPA anticipates that the implementation of the Tier III vehicle and fuel standards will reduce emissions of NO_x, VOC, PM2.5, and air toxics. The fuel standards alone, which would take effect in 2017, are projected to provide an immediate 56% reduction in sulfur dioxide (SO2) emissions as the ultra-low sulfur gasoline is deployed in existing vehicles and engines. Further, EPA projects that NO_x emissions will be reduced by about 260,000 tons by 2018 (about 10% of the current emissions from on-highway vehicles), and by about 330,000 tons by 2030 (about 25% of the current emissions from on-highway vehicles) as covered vehicles become a larger percentage of the fleet. VOC and CO emissions are projected to be reduced by about 170,000 tons and 3.5 million tons respectively by 2030 (16% and 24% of the current emissions from on-highway vehicles). These projected national reductions would immediately reduce ozone levels in 2017 when the sulfur controls take effect, and would lead to significant decreases in ambient concentrations of ozone, PM2.5 and air toxics by 2030 as the vehicle fleets become updated.

- *Tier 4 Vehicle Standards*: On May 11, 2004, EPA signed the final rule introducing Tier 4 emission standards, which were phased-in from 2008-2015. Engine manufacturers were required to produce new engines with advanced emission control technologies. Exhaust emissions from these engines were predicted to decrease by more than 90 percent. When the full inventory of older non-road engines are replaced by Tier 4 engines, annual emission reductions are estimated at 738,000 tons of NO_x and 129,000 tons of PM.

V. Emission Trends

i. Comparison of annual NO_x emissions from historic year to current emission totals

As demonstrated in Table 1, NO_x emissions in Kentucky have significantly decreased since 2008, and are expected to continue to decline. Although VOC and NO_x emissions both contribute to the formation of ground-level ozone, ozone is far more sensitive to NO_x emissions than VOC emissions in the Southeastern United States.[12] In the 2011 FIP ruling for Interstate Transport of Fine Particulate Matter and Ozone, the EPA stated that "Authoritative assessments of ozone control approaches have concluded that, for reducing regional scale ozone transport, a NO_x control strategy is most effective, whereas VOC reductions are generally most effective locally, in more dense urbanized areas…EPA continues to believe that the most effective regional pollution control strategy for mitigation of interstate transport of ozone remains NO_x emission reductions."[13] Therefore, controlling NO_x emissions is a more effective strategy in reducing ozone levels than controlling VOC emissions.

Table 1: Kentucky Point Source Annual NO_x Emissions under CSAPR (tpy)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
NO_x	**167,427**	**91,203**	**105,081**	**102,680**	**90,952**	**91,527**	**92,323**	**75,798**	**71,442**

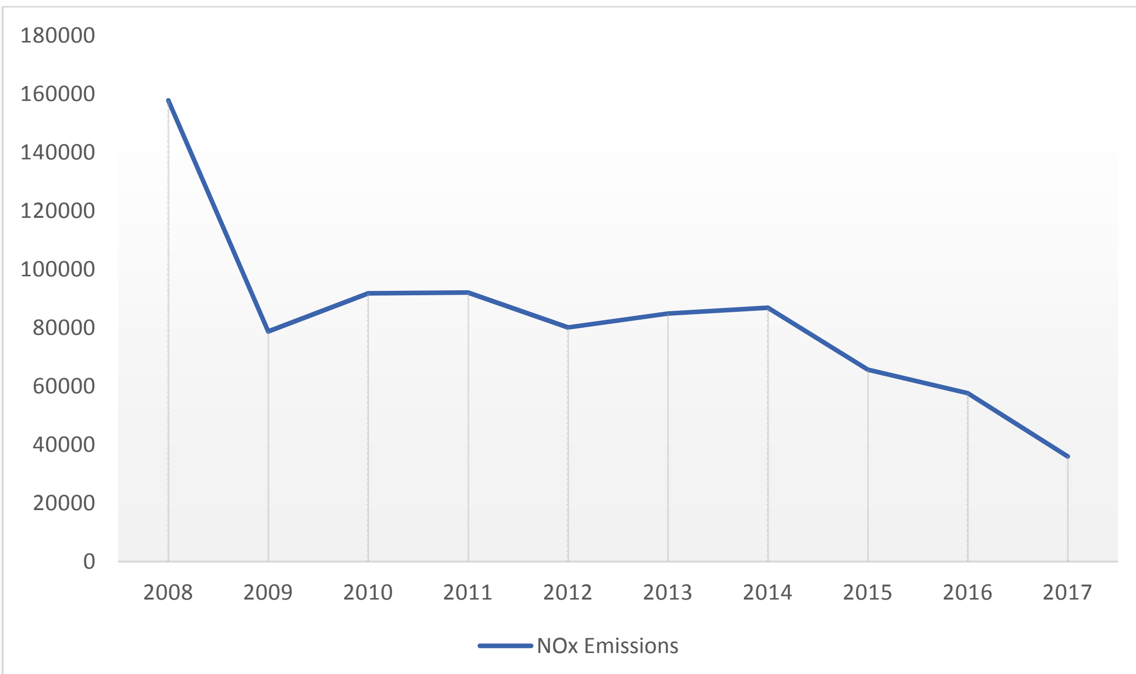
Based on EPA's 2014 NEI emissions data, the major contributor of NO_x emissions in Kentucky are from the mobile & nonpoint sectors, with point sources being the largest contributor. As listed above in Chapter IV, *Permanent and Enforceable Measures*, there are several federal programs that will continue to decrease mobile VOC and NO_x emissions significantly once fully implemented. The majority of point source NO_x emissions in Kentucky are from EGUs, which have already decreased significantly since the implementation of CAIR and CSAPR. NO_x emissions from EGUs will continue to decrease with the implementation of the CSAPR Update, and the retirement of several EGUs located in Kentucky.

[12] Odman, M Talat et al., *Quantifying the sources of ozone, fine particulate matter, and regional haze in the Southeastern United States*, 90 Journal of Environmental Management 3155-3168 (2009).
[13] 76 FR 48222

ii. Trends in EGU NO_x Emissions

As demonstrated in both Charts 1 and 2, there was a significant drop in annual ozone season EGU NO_x emissions between 2008 and 2009, due to the implementation of CAIR. The EPA has stated in their disapproval of the good neighbor portion of Kentucky's 2008 ozone infrastructure SIP submission that "Because CAIR does not, in any way, address transport with respect to the 2008 8-hour ozone NAAQS, it cannot be relied upon to satisfy the requirements of 110(a)(2)(D)(i)(I) for the NAAQS."[14] Although the EPA does not allow Kentucky to take credit for CAIR, the program has nevertheless provided significant NO_x reductions.

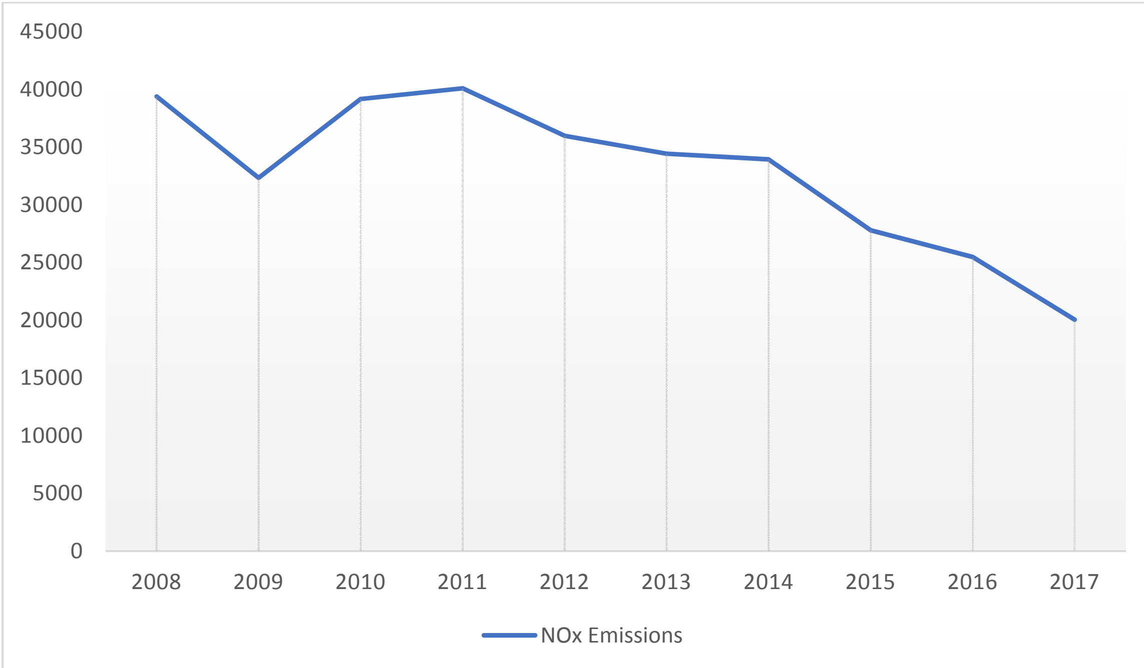
Chart 1: 2008 – 2017 Annual NO_x Emissions for Kentucky EGUs (tpy)



Note: Chart 1 data obtained from EPA's Air Markets Program Data: https://ampd.epa.gov/ampd/

[14] 78 FR 14683

Chart 2: 2008 – 2017 Ozone Season NO_x Emissions for Kentucky EGUs (tpy)



Note: Chart 2 data obtained from EPA's Air Markets Program Data: https://ampd.epa.gov/ampd/

iii. Emission totals after CSAPR Implementation

The implementation of CSAPR required fossil fuel-fired EGUs to reduce emissions to help downwind areas attain and maintain fine particle and/or ozone NAAQS. EPA allocated a set emissions budget for each state covered by CSAPR. In 2015 and 2016, Kentucky was allotted an EGU NO_x ozone season budget of 36,167 tons through CSAPR.[15] Kentucky's 2017 EGU NO_x budget was reduced to 21,115 tons through the CSAPR Update rule.[16] As seen in Table 2 below, Kentucky has not only reduced NO_x emissions at EGU sources to meet the budgets allotted by CSAPR and the CSAPR Update Rule, but actual ozone season NO_x emissions are significantly lower than the allotted budgets. Table 2 demonstrates that the implementation of CSAPR and the CSAPR Update has successfully reduced ozone NO_x emissions within Kentucky and therefore prohibited Kentucky emissions from significantly contributing to nonattainment, or interfering with the maintenance, of downwind states with respect to the 2008 ozone NAAQS.

[15] 40 CFR 97.510(a)(8)(i)
[16] 40 CFR 97.810(a)(8)(i)

Table 2: 2015 - 2017 EGU Point Sources Ozone Season NO_x emissions (tons)

	2015	2016	2017
Allocations	**36,167**	**36,167**	**21,115**
NO_x Actual Emission Totals (tons)[17]	**27,790.75**	**25,473.99**	**20,053.01**

Kentucky Utilities Company's (KU) Green River Station retired its last two coal units in 2015. Also, East Kentucky Power Cooperative's (EKPC) Dale Station retired all of its coal burning units in 2015 and is now closed. It should be particularly noted that American Electric Power's (AEP) Big Sandy Plant converted Unit 1 from coal-fired to natural gas in 2016, and removed Unit 2. Louisville Gas & Electric Company's (LG&E) Cane Run Station converted Unit 7 to natural gas and retired all remaining coal-fired units in 2015.

Two other EGU facilities have made significant changes to their coal boilers. Big Rivers Electric Corporation's (Big Rivers) Robert Reid Station idled one of their boilers in 2016 and has submitted a permit revision requesting to switch this boiler from coal to natural gas. Tennessee Valley Authority's (TVA) Paradise Fossil Plant retired two of their three coal boilers in June 2017 and replaced them with a combined cycle system that has already significantly decreased their NO_x emissions.

Further NO_x emissions reductions are expected with the planned retirement of units at two facilities. KU plans to retire two older coal-fired units, each operating more than 50 years, at the E.W. Brown Generating Station in February 2019.[18] Owensboro Municipal Utilities (OMU) announced in 2015 their plans to retire Unit 1 at the Elmer Smith Plant by 2019.[19] In March 2017, OMU announced that they will also retire Unit 2 which will effectively close the Elmer Smith Plant in its entirety before 2023.

Additionally, as stated in EPA's October 27, 2017 memo for interstate transport SIPs for the 2008 ozone NAAQS, "Generally, emissions levels are expected to decline in the future through implementation of existing local, state and federal emissions reduction programs…While the CSAPR Update included emissions reductions associated with EGU control strategies that could be implemented on a shorter timeframe (*i.e.*, by the 2017 ozone season), the EPA concluded that additional emissions reductions from EGUs would likely require the installation of new post-combustion controls."[20]

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[17] Ozone Season NO_x emissions data obtained from EPA's Air Markets Program Data https://ampd.epa.gov/ampd/
[18] https://lge-ku.com/newsroom/press-releases/2017/11/14/kentucky-utilities-announces-upcoming-retirement-two-coal-fired
[19] https://omu.org/_uploads/20171019_CCR-Ash-Pond-Initial-and-Post-Closure-Plan.pdf
[20] *Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I).* Memorandum from Stephen D. Page, Director, U.S.EPA Office of Air Quality Planning and Standards to Regional Air Division Directors, Regions 1-10. October 27, 2017.

VI. Public Hearing

In accordance with 40 CFR 51.102, the Cabinet will make this proposed plan available for public inspection and provide the opportunity for written comments 30 days prior to the scheduled public hearing. A public hearing is scheduled to be held on March 30, 2018 at 10:00 a.m. (EDT) at the Division for Air Quality offices located at 300 Sower Boulevard, Frankfort, Kentucky. A copy of the public hearing is included with the final submittal.

VII. Conclusion

This SIP submittal demonstrates that the emission reductions required by the CSAPR Update are adequate to prohibit emissions within Kentucky from significantly contributing to nonattainment, or interfering with the maintenance, of downwind states with respect to the 2008 ozone NAAQS. The Cabinet therefore requests the EPA to approve this revision to the Kentucky SIP and find that Kentucky is not required to make any further reductions, beyond those required by the CSAPR Update, to address its statutory obligation under section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS. The Cabinet's request is supported by technical analyses conducted by EPA (Attachment A) and Alpine Geophysics (Attachment B). Independently, the analyses demonstrate and conclude that no additional control strategies beyond what is "on-the-books" are necessary to fully address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act.

Appendix A

October 27, 2017 EPA Memorandum

Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

October 27, 2017

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I)

FROM: Stephen D. Page
Director

TO: Regional Air Division Directors, Regions 1–10

The purpose of this memorandum is to provide supplemental information to states and the Environmental Protection Agency Regional offices as they develop or review state implementation plans (SIPs) that address section 110(a)(2)(D)(i)(I) of the Clean Air Act (CAA), also called the "good neighbor" provision, as it pertains to the 2008 ozone National Ambient Air Quality Standards (NAAQS) of 75 parts per billion (ppb).[1] Specifically, we are providing future year ozone design values and contribution modeling outputs for monitors in the United States based on updated air quality modeling (for 2023) and monitoring data.[2] The EPA's updated modeling indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone NAAQS of 75 ppb in 2023.

The EPA's goal in providing this information is to assist states' efforts to develop, supplement or resubmit good neighbor SIPs for the 2008 ozone NAAQS to fully address their interstate transport obligations. While the information in this memorandum and the associated air quality analysis data can inform the development of these SIPs, the information provided by this memorandum is not a final determination regarding states' remaining obligations under the good neighbor provision. Any such determination would be made through notice-and-comment rulemaking.

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[1] This memorandum supplements the EPA's original memorandum on this subject, *Information on the Interstate Transport "Good Neighbor" Provision for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) under Clean Air Act (CAA) Section 110(a)(2)(D)(i)(I).* Memorandum from Stephen D. Page, Director, U.S. EPA Office of Air Quality Planning and Standards, to Regional Air Division Directors, Regions 1–10. January 22, 2015. Available at *https://www.epa.gov/sites/production/files/2015-10/documents/goodneighborprovision2008naaqs.pdf.* This memorandum also supplements analyses provided in the 2016 Cross-State Air Pollution Rule Update for the 2008 ozone NAAQS, 81 FR 74504 (October 26, 2016).

[2] Attachment A contains the projected 2023 ozone design values for monitors in the United States.

In addition to summarizing the EPA's review of relevant air quality projections as they relate to interstate transport obligations for the 2008 ozone NAAQS, this memorandum includes background on the good neighbor provision and the four-step interstate transport framework that the EPA has previously used, and continues to use, to address the good neighbor provision for regional pollutants, such as ozone. This background may further assist states in developing SIPs using these projections.

The Good Neighbor Provision

Under CAA sections 110(a)(l) and 110(a)(2), each state is required to submit a SIP that provides for the implementation, maintenance and enforcement of each primary or secondary NAAQS. Section 110(a)(1) requires each state to make this new SIP submission within 3 years after promulgation of a new or revised NAAQS. This type of SIP submission is commonly referred to as an "infrastructure SIP." Section 110(a)(2) identifies specific elements that each plan submission must meet. Conceptually, an infrastructure SIP provides assurance that the submitting state's SIP contains the necessary structural requirements to implement the new or revised NAAQS, whether by demonstrating that the state's SIP already contains or sufficiently addresses the necessary provisions, or by making a substantive SIP revision to update the plan provisions.

In particular, CAA section 110(a)(2)(D)(i)(I) requires each state to submit to the EPA new or revised SIPs that "contain adequate provisions ... prohibiting, consistent with the provisions of this subchapter, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will ... contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to any such national primary or secondary ambient air quality standard." The EPA often refers to section 110(a)(2)(D)(i)(I) as the "good neighbor" provision and to SIP revisions addressing this requirement as good neighbor SIPs. Where a state does not submit a good neighbor SIP, or if the EPA disapproves the SIP, the CAA obligates the EPA to promulgate a federal implementation plan (FIP).

In applying the good neighbor provision for the 2008 ozone NAAQS, the EPA finalized in 2016 the Cross-State Air Pollution Rule Update for the 2008 ozone NAAQS (CSAPR Update).[3] The CSAPR Update applied to 22 eastern states, each of which the EPA found had failed to submit an approvable SIP addressing the good neighbor provision for the 2008 ozone NAAQS.[4] Through the CSAPR Update, the EPA promulgated FIPs for these 22 states by requiring power plants in those states to participate in an allowance trading program to partially address the requirements of the good neighbor provision by implementing emissions reductions that were achievable for the 2017 ozone season. Some states have already submitted or may be developing SIPs to adopt the CSAPR Update regulations and replace the CSAPR Update FIPs. However, the EPA acknowledged in the CSAPR Update that the rule may not fully address the requirements of the good neighbor provision for the 2008 ozone NAAQS for most of the states included and that

[3] *See* 81 FR 74504 (October 26, 2016).

[4] The CSAPR Update provided a full FIP for Tennessee and partial FIPs for Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Texas, Virginia, West Virginia, and Wisconsin. The CSAPR Update did not promulgate FIPs for western states.

further analysis was needed of air quality and oxides of nitrogen (NO_X) reductions after 2017.[5] Additionally, a few western states, not regulated in the CSAPR Update, do not yet have approved SIPs. As noted earlier, the EPA believes that the information conveyed through this memorandum can assist states in their efforts to develop, supplement or resubmit good neighbor SIPs for the 2008 ozone NAAQS to fully address their interstate transport obligations.

Framework to Address the Good Neighbor Provision

Through the development and implementation of several previous rulemakings,[6] the EPA, working in partnership with states, established the following four-step interstate transport framework to address the requirements of the good neighbor provision for ozone and fine particulate matter ($PM_{2.5}$) NAAQS: (1) identify downwind air quality problems, (2) identify upwind states that contribute enough to those downwind air quality problems to warrant further review and analysis, (3) identify the emissions reductions necessary to prevent an identified upwind state from contributing significantly to those downwind air quality problems, and (4) adopt permanent and enforceable measures needed to achieve those emissions reductions.

The EPA most recently applied each step in this framework to address the good neighbor provision requirements for the 2008 ozone NAAQS in the CSAPR Update.[7] Two aspects of the CSAPR Update (*i.e.*, selection of the analytic year and the scope of the CSAPR Update good neighbor remedy) are influential in the development of analyses discussed in this memorandum. First, in the CSAPR Update, the EPA selected 2017 as both the analytic year and the implementation year because the 2017 ozone season was the last full season from which data could be used to determine attainment with the 2008 ozone NAAQS by the July 20, 2018, attainment date for nonattainment areas classified as Moderate. Second, given the time constraints for implementing NO_X reduction strategies for the 2008 ozone NAAQS (*i.e.*, in the 2017 ozone season), the EPA, in the CSAPR Update, did not analyze or attempt to quantify further electric generating units (EGU) or non-EGU ozone season NO_X reductions available after 2017. Because the EPA's analysis showed persisting ozone transport problems after implementation of the CSAPR Update and because the EPA did not assess available emissions reductions after 2017, at the time of promulgation, the EPA could not definitively conclude, without further analysis, that the CSAPR Update fully addressed the requirements of the good neighbor provision. Therefore, the EPA explained in the final rule that the CSAPR Update may only provide a partial remedy to address interstate emissions transport for the 2008 ozone NAAQS for 21 of the covered states.[8] As a result, these states (or the EPA) must take additional

[5] The EPA also determined that the following 14 eastern states evaluated in the CSAPR Update had no emissions reduction obligations under the good neighbor provision for the 2008 ozone NAAQS: Connecticut, Florida, Georgia, Maine, Massachusetts, Minnesota, Nebraska, New Hampshire, North Carolina, North Dakota, Rhode Island, South Carolina, South Dakota, and Vermont. The EPA has already approved good neighbor SIPs for the 2008 ozone NAAQS for a number of these states and has pending actions to approve other SIPs.

[6] *See* for example, Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone (also known as the NO_X SIP Call). 63 FR 57356 (October 27, 1998); Clean Air Interstate Rule (CAIR) Final Rule. 70 FR 25162 (May 12, 2005); CSAPR Final Rule. 76 FR 48208 (August 8, 2011); CSAPR Update. 81 FR 74504 (October 26, 2016). Each of these rulemakings also incorporated allowance trading programs to implement emissions reductions.

[7] *See* details on the CSAPR Update analysis and methodology in the final rule at 81 FR 74504 (October 26, 2016).

[8] The CSAPR Update provided a FIP fully addressing the good neighbor provision for Tennessee and FIPs that may only partially address the good neighbor provision for Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas,

steps to fully satisfy the good neighbor provision, or show why no additional emissions reductions are necessary. It is for this reason that the EPA is now conducting and releasing our additional modeling for an analytic year after 2017.

Applying the Interstate Transport Framework to the EPA's 2023 Modeling for the 2008 Ozone NAAQS

This section explains the EPA's choice of 2023 as the analytic year and our application of the interstate transport framework to our updated modeling. As we discuss in the following paragraphs, the EPA's analysis indicates that no areas in the United States, outside of California, are expected to have problems attaining and maintaining the 2008 ozone NAAQS in 2023.

Step 1. Identification of Potential Downwind Nonattainment and Maintenance Receptors

One of the first steps in the modeling process is selecting a future analytic year. In determining the appropriate future analytic year for purposes of assessing remaining interstate transport obligations for the 2008 ozone NAAQS, the EPA considered two primary factors. First, the EPA considered the downwind attainment dates for the 2008 ozone NAAQS. In *North Carolina v. EPA*, the D.C. Circuit held that emissions reductions required by the good neighbor provision should be evaluated considering the relevant attainment dates of downwind nonattainment areas impacted by interstate transport.[9] The next attainment dates for the 2008 ozone NAAQS will be July 20, 2021, for nonattainment areas classified as Serious and July 20, 2027, for nonattainment areas classified as Severe.[10] Because the various attainment deadlines are in July, which is in the middle of the ozone monitoring season for all states, data from the calendar year prior to the attainment date (*e.g.*, data from 2020 for the 2021 attainment date and from 2026 for the 2027 attainment date) are the last data that can be used to demonstrate attainment with the NAAQS. In all cases, the statute provides that areas should attain as expeditiously as practicable.[11]

Second, the EPA considered the timeframes that may be required for implementing further emissions reductions as expeditiously as practicable. Generally, emissions levels are expected to decline in the future through implementation of existing local, state and federal emissions reduction programs. This is an important consideration because the U.S. Supreme Court and the D.C. Circuit Court have both held that the EPA may not require emissions reductions greater than necessary to achieve attainment and maintenance of the NAAQS in downwind areas.[12] Therefore, if new controls cannot be implemented feasibly for several years when air quality will likely be cleaner, the EPA should evaluate air quality in a future year to ensure that any potential emissions reductions would not over-control relative to the identified ozone problem.

Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Texas, Virginia, West Virginia, and Wisconsin. The CSAPR Update did not promulgate FIPs for western states.

[9] 531 F.3d 896, 911–12 (D.C. Cir. 2008) (holding that the EPA must coordinate interstate transport compliance deadlines with downwind attainment deadlines).

[10] While there are no areas (outside of California) that are classified as either Serious or Severe, these classifications (and the associated attainment dates) are required under the statute in the event that the many downwind Moderate nonattainment areas fail to attain by their attainment date of July 20, 2018.

[11] *See* CAA section 181(a)(1).

[12] *EPA v. EME Homer City Generation, L.P.,* 134 S. Ct. 1584, 1600–01 (2014); *EME Homer City Generation, L.P. v. EPA,* 795 F.3d 118, 127 (D.C. Cir. 2015).

Accordingly, it is reasonable to evaluate downwind air quality, and identify any remaining receptors, in the year in which the EPA expects additional emissions reductions, if any, to be implemented.

While the CSAPR Update included emissions reductions associated with EGU control strategies that could be implemented on a shorter timeframe (*i.e.*, by the 2017 ozone season), the EPA concluded that additional emissions reductions from EGUs would likely require the installation of new post-combustion controls. For this analysis, the EPA assumed that the analytic year should reflect the time needed to plan for, install, and test new EGU and non-EGU emissions controls across multiple states. This assumption was based on previous interstate ozone transport analyses showing that multiple upwind states are typically linked to downwind ozone problems.[13] Further, the EPA assumed that new emissions controls would likely be considered on multiple upwind source categories, including those that currently do not report emissions to the EPA under Part 75 and, therefore, may have relatively more uncertainty associated with their emissions levels, existing control efficiencies and further emissions reduction potential. The scope and uncertainty associated with potential new EGU and non-EGU controls led the EPA to assume that it could take up to 4 years for new controls to be fully operational following promulgation of a final rule. For example, the EPA believes that it is reasonable to assume that the installation of these new post-combustion controls for state- or regional-level fleets of EGUs or controls for non-EGU point sources may take up to 4 years following promulgation of a final rule.[14] In addition and not accounting for time needed for permitting or determining and installing appropriate monitoring equipment, the EPA's most recent assessment of non-EGU controls indicates the timing for installing controls is uncertain.[15]

For purposes of conducting updated modeling, to determine in what year future emissions reductions might be implemented, the EPA, therefore, considered the timeframe in which a future rulemaking that might require such emissions reductions would likely be finalized. The EPA is subject to several statutory and court-ordered deadlines to address the requirements of the good neighbor provision for the 2008 ozone NAAQS for several states. The next such deadline is a court-ordered deadline of June 30, 2018, for the EPA to address these requirements for Kentucky,[16] followed by several statutory deadlines in 2018 and 2019.[17] The notice-and-comment rulemakings that must be undertaken to address these requirements, whether in the context of SIPs or FIPs, are unlikely to be completed any earlier than mid-2018 and are likely to continue into 2019. Accordingly, given that the EPA believes that it is reasonable to assume that installation of new emissions controls for EGUs and non-EGUs that could be required under

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[13] *See* 81 FR 74504 (October 26, 2016).
[14] *See* 81 FR 74562 (October 26, 2016).
[15] For the EPA's most current assessment of controls for non-EGU emissions sources, *see Assessment of Non-EGU NOx Emission Controls, Cost of Controls, and Time for Compliance Final Technical Support Document (TSD) for the Cross-State Air Pollution Rule for the 2008 Ozone NAAQS* (Docket ID No.: EPA-HQ-OAR-2015-0500) available at *https://www.epa.gov/sites/production/files/2017-05/documents/final_assessment_of_non-egu_nox_emission_controls_cost_of_controls_and_time_for _compliance_final_tsd.pdf).*
[16] Order, *Sierra Club v. EPA,* Case No. 3:15-cv-04328-JD (N.D. Cal. May 23, 2017).
[17] The EPA has deadlines to promulgate FIPs for Indiana, Ohio and New Jersey by July 15, 2018; for Maryland by August 19, 2018; for Louisiana, Texas and Wisconsin by September 12, 2018; for New York by September 26, 2018; for Utah by November 18, 2018, and for Wyoming by March 6, 2019.

these rulemaking efforts may take up to 4 years, the EPA believes that such reductions are unlikely to be implemented for a full ozone season until 2023.

While 2023 is later than the attainment date for nonattainment areas classified as Serious (July 20, 2021), as explained above, it is unlikely that emissions control requirements could be promulgated and implemented by the Serious area attainment date. Likewise, the EPA also believes that it would not be reasonable to assume that emissions reductions could be postponed to the attainment date for nonattainment areas classified as Severe (July 20, 2027) because the statute instructs states to attain the NAAQS as expeditiously as practicable. Accordingly, the EPA believes that 2023 is a reasonable year to assess downwind air quality to evaluate any remaining requirements under the good neighbor provision for the 2008 ozone NAAQS.[18] Thus, in selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required.

After selecting 2023 as the appropriate analytic year, the EPA performed nationwide photochemical modeling for 2023 to identify nonattainment and maintenance receptors relevant for the 2008 ozone NAAQS. The EPA used as a starting point for this updated air quality modeling some of the data used in the January 2017 Notice of Data Availability (NODA).[19] Although the EPA initially provided the NODA to assist states in developing SIPs to address their good neighbor obligations for the 2015 ozone NAAQS, the emissions files and other modeling input files are independent of the level of the NAAQS.[20] As discussed below, because the EPA began its updated analyses with the data from the January 2017 NODA, we also were able to incorporate some of the stakeholder feedback provided through the public comment process on the NODA.

We are providing an overview of the January 2017 NODA files to help states and the EPA Regional offices better understand the updated air quality modeling for potential application to the 2008 ozone NAAQS. The transport assessment discussed in the January 2017 NODA used a 2011-based modeling platform to develop base year and future year emissions inventories as inputs into the air quality model. The platform also included meteorology for 2011, base year emissions for 2011 and future year base case emissions for 2023. The EPA performed air quality modeling to project ozone design values for 2023 and used these projections to identify nonattainment and maintenance receptors. The EPA then used ozone source apportionment modeling for 2023 to quantify contributions from emissions in each state to ozone concentrations at each of the projected nonattainment and maintenance receptors in that future year. As part of the NODA process and the ensuing 90-day comment period, the EPA made available and took

[18] Using the 2023 analytic year also allowed the EPA to begin the updated analysis using the data sets originally developed for the January 2017 NODA, which we revised in response to stakeholder feedback. Accordingly, the EPA initiated its analysis more quickly than if a different year had been chosen, which might have delayed subsequent rulemaking actions and therefore emissions reductions.
[19] 82 FR 1733 (January 6, 2017).
[20] Good neighbor SIPs for the 2015 ozone NAAQS are due within 3 years of promulgation of the revised NAAQS, or by October 2018.

comment on (1) the emissions inventories for 2011 and 2023, supporting data used to develop those inventories, methods and data used to process emissions inventories into a form that can be used for air quality modeling and (2) air quality modeling results for 2011 and 2023, base period (*i.e.*, 2009-2013) average and maximum design value concentrations, projected 2023 average and maximum ozone design value concentrations and projected 2023 ozone contributions from state-specific anthropogenic emissions and other contribution categories to ozone concentrations at individual ozone monitoring sites. The EPA received comments on the transport modeling NODA from nearly 50 commenters, including 21 state air agencies, 3 multi-state groups and 23 industry groups.

Following the close of the NODA public comment period on April 6, 2017, the EPA began incorporating stakeholder feedback into its EGU and non-EGU emissions projections and its modeling platform. After incorporating many of the suggested updates, the EPA hosted conference calls with these same stakeholders to announce our intent to update the ozone transport air quality modeling and to review updates to the 2011 and projected 2023 emissions inventories (including specific changes to the oil and gas projection methodology),[21] describe incorporated changes to the EGU emissions projections[22] and changes to the modeling platform described here.

Regarding emissions inventories, the updated 2023 modeling reflects revisions to the January 2017 NODA approach for projecting future year emissions from EGUs. The approach used in this modeling is consistent with the EGU projections that the EPA used in the CSAPR Update, specifically the EGU projection called the "budget-setting base case."[23] In brief, the EPA used the CSAPR Update budget-setting approach to develop this projection in support of the updated 2023 ozone transport modeling that is the subject of this memorandum. The EGU projection begins with 2016 reported Part 75 sulfur dioxide (SO_2) and NO_X data for units reporting under the Acid Rain and CSAPR programs. These were the most recent ozone season data available at the time of the EPA's analysis. The EPA then extended these observed emissions levels forward to 2023, and made unit-specific adjustments to emissions to account for upcoming retirements, post-combustion control retrofits, coal-to-gas conversions, combustion controls upgrades, new units, CSAPR Update compliance, state rules and Best Available Retrofit Technology (BART) requirements.[24] The resulting estimated EGU emissions values for this application of 2023 air quality modeling are based on the latest reported operational data combined with known and anticipated fleet and pollution controls changes. For emissions from units not reporting under

[21] *See* the TSD: *Additional Updates to Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform for the Year* 2023, October 2017. Available at *https://www.epa.gov/air-emissions-modeling/2011-version-63-platform*.
[22] *See* Section 4.1 of the TSD: *Additional Updates to Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform for the Year 2023, October 2017* for details on the development of the EGU engineering analytics emissions estimates for the 2023 Flat File.
[23] *See* the preamble to the final CSAPR Update for more details on the development and use of the budget-setting base case.
[24] The EPA uses the U.S. Energy Information Association (EIA) Form 860 as a source for upcoming controls, retirements, and new units.

Part 75, the EPA largely relied on unadjusted 2011 National Emissions Inventory (NEI) data for its 2023 assumptions.[25]

Another important emissions inventory update includes a revised methodology for estimating 2023 emissions from the oil and gas sector. The projection factors used in the updated 2023 oil and gas emissions incorporate state-level factors based on historic growth from 2011-2015 and region-specific factors that represent the projected growth from 2015 to 2023. The 2011-2015 state-level factors were based on historic state oil and gas production data published by the EIA, while the 2015-2023 factors are based on projected oil and gas production in EIA's 2017 Annual Energy Outlook (AEO) Reference Case without the Clean Power Plan for the six EIA supply regions. Details on the revised methodology that the EPA used to project oil and gas emissions to 2023, as well as changes to the base year 2011 and future year 2023 emissions inventories for other sectors, can be found in the technical support document, titled *Additional Updates to Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform for the Year 2023, October 2017*.[26]

The EPA used the Comprehensive Air Quality Model with Extensions (CAMx v6.40)[27] for modeling the updated emissions in 2011 and 2023.[28] The EPA used outputs from the 2011 and 2023 model simulations to project base period 2009-2013 average and maximum ozone design values to 2023 at monitoring sites nationwide. The EPA's modeling guidance[29] recommends that model predictions from the "3 x 3" array of grid cells surrounding the location of the monitoring site be used in the projection of future year design values. The EPA used this approach for projecting design values for the updated 2023 modeling. In addition, in light of comments on the January 2017 NODA and other analyses, the EPA also projected 2023 design values based on a modified version of this approach for those monitoring sites located in coastal areas. In brief, in the alternative approach, the EPA eliminated from the design value calculations those modeling data in grid cells not containing a monitoring site that are dominated by water (*i.e.*, more than 50 percent of the land use in the grid cell is water).[30] The base period and 2023 average and maximum design values at individual monitoring sites for both the "3 x 3" approach and the alternative approach affecting coastal sites are available at *https://www.epa.gov/airmarkets/october-2017-memo-and-information-*

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[25] For non-SO_2 and non-NO_X pollutants for units reporting under Part 75, the EPA used 2016 reported heat input to create a scaler for 2011 data. For instance, if heat input increased by 10 percent during that time frame for a particular unit, then its emissions for these pollutants were assumed to do the same.

[26] Available at *https://www.epa.gov/air-emissions-modeling/2011-version-63-platform*.

[27] CAMx v6.40 was the most recent public release version of CAMx at the time the EPA updated its modeling in fall 2017. ("Comprehensive Air Quality Model with Extensions version 6.40 User's Guide" Ramboll Environ, December 2016. *http://www.camx.com/*.)

[28] For the updated modeling, the EPA used the construct of the modeling platform (*i.e.*, modeling domain and non-emissions inputs) that we used for the NODA modeling, except that the photolysis rates files were updated to be consistent with CAMx v6.40. The NODA Air Quality Modeling Technical Support Document describing the modeling platform is available at *https://www.epa.gov/airmarkets/notice-data-availability-preliminary-interstate-ozone-transport-modeling-data-2015-ozone*.

[29] *http://www.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

[30] A model grid cell is identified as a "water" cell if more than 50 percent of the grid cell is water based on the 2006 National Land Cover Database. Grid cells that meet this criterion are treated as entirely over water in the Weather Research Forecast (WRF) modeling used to develop the 2011 meteorology for the EPA's air quality modeling.

interstate-transport-sips-2008-ozone-naaqs. This file also contains 2014-2016 measured design values.

When identifying areas with potential downwind air quality problems, the EPA's updated modeling used the same "receptor" definitions as those developed during the CSAPR rulemaking process and used in the CSAPR Update.[31] That is, the EPA identified nonattainment receptors as those monitoring sites with current measured values exceeding the NAAQS that also have projected (*i.e.*, in 2023) average design values exceeding the NAAQS. The EPA identified maintenance receptors as those monitoring sites with current measured values below the NAAQS and projected average and maximum design values exceeding the NAAQS. The EPA also identified as maintenance receptors those monitoring sites with projected average design values below the NAAQS but with projected maximum design values exceeding the NAAQS. As with past application of receptor definitions, the EPA considered all nonattainment receptors to also be maintenance receptors because a monitoring site with a projected average design value above the standard necessarily also has a projected maximum design value above the standard. Attachment A contains the projected 2023 ozone design value for monitors in the United States.

The EPA's 2023 updated modeling, using either the "3 x 3" approach or the alternative approach affecting coastal sites, indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone NAAQS in 2023.[32]

Step 2. Identification of States Contributing to Potential Downwind Nonattainment and Maintenance Receptors

Although the EPA has completed nationwide contribution modeling for 2023, this information may not be necessary for most states to develop good neighbor SIPs for the 2008 ozone NAAQS in light of the information described previously. The EPA does, however, plan to make its contribution modeling outputs available to the states and will coordinate with multi-jurisdictional organizations regarding the release of this information.

Conclusion

The EPA believes that states may consider using this national modeling to develop SIPs that fully address requirements of the good neighbor provision for the 2008 ozone NAAQS.[33] States may also be able to use this information to address other CAA obligations. States could include in any such submission state-specific information to support their reliance on the 2023 modeling data. Further, states may supplement the information provided in this memorandum with any additional information that they believe is relevant to addressing the good neighbor provision requirements. States may also choose to use information different from that provided in this document or on the EPA's website to identify nonattainment and maintenance receptors relevant

[31] *See* 81 FR 74530-74532 (October 26, 2016).

[32] This information is available at *https://www.epa.gov/airmarkets/october-2017-memo-and-information-interstate-transport-sips-2008-ozone-naaqs*.

[33] For a state already subject to a CSAPR Update FIP to get full SIP approval, the state would need to address in their SIP submission the reductions that it would achieve by implementing the FIP. One way states could accomplish this would be by submitting a CSAPR Update SIP using the guidance provided in the preamble to the CSAPR Update at 81 FR 74569 (October 26, 2016).

to development of their good neighbor SIPs. If this is the case, states should submit that information along with a full explanation and technical analysis for the EPA's evaluation. The EPA Regional offices and states should work together to accomplish the goal of developing, submitting and reviewing approvable SIPs that fully address the good neighbor provision for the 2008 ozone NAAQS.

Please share this information with the air agencies in your Region.

For Further Information
If you have any questions concerning this memorandum, please contact Norm Possiel at (919) 541-5692, *possiel.norm@epa.gov* for modeling information or Beth Palma at (919) 541-5432, *palma.elizabeth@epa.gov* for any other information.

Attachment

Attachment A

Projected Ozone Design Values at Individual Monitoring Sites Based on the EPA's Updated 2023 Transport Modeling

This attachment contains projected ozone design values at individual monitoring sites nationwide based on EPA's updated transport modeling for 2023. The scenario name for the updated modeling is "2023en." All of the data are in units of "ppb."

The following data are provided in the table below.

(1) Base period 2009 – 2013 average and maximum design values based on 2009 – 2013 measured data.

(2) Projected 2023 average and maximum design values based on the "3x3" approach recommended in EPA's photochemical modeling guidance.

(3) Projected 2023 average and maximum design values based on a modified "3x3" approach in which model predictions in grid cells without monitors that are predominately water are excluded from the projection calculations ("No Water"). Note that the modified approach only affects the projection of design values for monitoring sites in or near coastal areas.

(4) 2016 ozone design values based on 2014 – 2016 measured data (N/A indicates that a 2016 design value is not available). The following web site has additional information on the 2016 design values: *https://www.epa.gov/air-trends/air-quality-design-values#report*.

Note, a value of 75.9 ppb (or less) is considered to be in attainment of the 2008 ozone NAAQS, and a value of 76.0 ppb (or higher) is considered to be in violation of the 2008 ozone NAAQS.

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
10030010	AL	Baldwin	70.0	72	53.4	54.9	55.4	57.0	65
10331002	AL	Colbert	65.0	67	45.5	46.9	45.5	46.9	59
10499991	AL	DeKalb	66.0	66	50.7	50.7	50.7	50.7	63
10510001	AL	Elmore	66.3	68	49.5	50.7	49.5	50.7	N/A
10550011	AL	Etowah	61.7	62	46.2	46.4	46.2	46.4	61
10690004	AL	Houston	63.7	65	49.2	50.2	49.2	50.2	59
10730023	AL	Jefferson	72.3	75	54.9	56.9	54.9	56.9	68
10731003	AL	Jefferson	72.0	75	55.2	57.5	55.2	57.5	66
10731005	AL	Jefferson	75.3	77	56.8	58.1	56.8	58.1	N/A
10731009	AL	Jefferson	72.0	74	56.1	57.7	56.1	57.7	N/A
10731010	AL	Jefferson	73.7	76	55.4	57.2	55.4	57.2	64
10732006	AL	Jefferson	75.0	77	55.7	57.1	55.7	57.1	66
10735002	AL	Jefferson	72.0	74	54.2	55.7	54.2	55.7	N/A
10735003	AL	Jefferson	71.0	73	55.0	56.5	55.0	56.5	N/A
10736002	AL	Jefferson	76.7	80	58.8	61.3	58.8	61.3	68
10890014	AL	Madison	70.7	73	52.8	54.5	52.8	54.5	64
10970003	AL	Mobile	69.0	71	53.2	54.7	53.2	54.7	63

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
10972005	AL	Mobile	73.0	73	56.6	56.6	57.3	57.3	65
11011002	AL	Montgomery	67.3	69	49.6	50.8	49.6	50.8	62
11030011	AL	Morgan	68.7	71	54.2	56.0	54.2	56.0	64
11130002	AL	Russell	66.0	67	49.9	50.6	49.9	50.6	62
11170004	AL	Shelby	73.3	75	54.0	55.3	54.0	55.3	67
11190002	AL	Sumter	61.0	61	49.2	49.2	49.2	49.2	N/A
11250010	AL	Tuscaloosa	58.7	59	45.1	45.4	45.1	45.4	60
40038001	AZ	Cochise	72.0	73	69.4	70.4	69.4	70.4	65
40051008	AZ	Coconino	69.0	69	64.2	64.2	64.2	64.2	69
40058001	AZ	Coconino	71.0	72	66.3	67.2	66.3	67.2	67
40070010	AZ	Gila	74.5	75	64.2	64.6	64.2	64.6	71
40130019	AZ	Maricopa	76.7	79	69.3	71.4	69.3	71.4	73
40131004	AZ	Maricopa	79.7	81	69.8	71.0	69.8	71.0	75
40131010	AZ	Maricopa	69.7	72	60.4	62.3	60.4	62.3	73
40132001	AZ	Maricopa	74.7	76	66.1	67.2	66.1	67.2	68
40132005	AZ	Maricopa	76.0	77	65.3	66.2	65.3	66.2	77
40133002	AZ	Maricopa	73.3	75	65.6	67.2	65.6	67.2	70
40133003	AZ	Maricopa	75.7	77	66.2	67.3	66.2	67.3	70
40134003	AZ	Maricopa	74.7	76	67.8	69.0	67.8	69.0	70
40134004	AZ	Maricopa	72.7	74	63.7	64.8	63.7	64.8	69
40134005	AZ	Maricopa	69.7	71	61.3	62.4	61.3	62.4	N/A
40134008	AZ	Maricopa	76.3	77	65.2	65.8	65.2	65.8	71
40134010	AZ	Maricopa	71.0	72	60.8	61.7	60.8	61.7	66
40134011	AZ	Maricopa	65.0	66	57.6	58.5	57.6	58.5	59
40137003	AZ	Maricopa	70.7	72	62.4	63.6	62.4	63.6	67
40137020	AZ	Maricopa	73.7	75	64.4	65.5	64.4	65.5	72
40137021	AZ	Maricopa	76.7	77	65.9	66.2	65.9	66.2	76
40137022	AZ	Maricopa	73.3	75	63.0	64.4	63.0	64.4	74
40137024	AZ	Maricopa	73.3	74	64.1	64.7	64.1	64.7	71
40139508	AZ	Maricopa	74.0	76	62.5	64.2	62.5	64.2	73
40139702	AZ	Maricopa	74.7	77	63.9	65.9	63.9	65.9	72
40139704	AZ	Maricopa	74.5	76	64.0	65.3	64.0	65.3	N/A
40139706	AZ	Maricopa	74.0	75	63.6	64.5	63.6	64.5	70
40139997	AZ	Maricopa	76.0	77	68.1	69.0	68.1	69.0	75
40170119	AZ	Navajo	68.7	70	60.2	61.3	60.2	61.3	64
40190021	AZ	Pima	71.3	73	61.4	62.9	61.4	62.9	68
40191011	AZ	Pima	67.0	68	57.3	58.1	57.3	58.1	62
40191018	AZ	Pima	68.3	69	59.4	60.0	59.4	60.0	64
40191020	AZ	Pima	69.7	71	59.2	60.3	59.2	60.3	64

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
40191028	AZ	Pima	67.0	68	57.5	58.3	57.5	58.3	64
40191030	AZ	Pima	68.7	70	59.2	60.3	59.2	60.3	63
40191032	AZ	Pima	66.3	67	57.0	57.6	57.0	57.6	64
40191034	AZ	Pima	64.0	65	56.8	57.6	56.8	57.6	61
40213001	AZ	Pinal	73.0	74	62.6	63.4	62.6	63.4	70
40213003	AZ	Pinal	68.3	69	59.7	60.3	59.7	60.3	65
40213007	AZ	Pinal	68.3	69	61.5	62.1	61.5	62.1	65
40217001	AZ	Pinal	70.3	72	61.2	62.6	61.2	62.6	65
40218001	AZ	Pinal	76.0	76	65.3	65.3	65.3	65.3	71
40278011	AZ	Yuma	76.5	77	70.4	70.8	70.4	70.8	74
50350005	AR	Crittenden	77.3	79	60.3	61.6	60.3	61.6	67
51010002	AR	Newton	68.0	69	53.1	53.9	53.1	53.9	59
51130003	AR	Polk	72.3	73	60.8	61.3	60.8	61.3	62
51190007	AR	Pulaski	72.3	73	53.0	53.5	53.0	53.5	64
51191002	AR	Pulaski	75.7	77	55.6	56.6	55.6	56.6	64
51191008	AR	Pulaski	73.0	75	55.0	56.5	55.0	56.5	N/A
51430005	AR	Washington	71.0	73	57.1	58.8	57.1	58.8	59
60010007	CA	Alameda	73.3	76	64.2	66.6	64.2	66.6	74
60010009	CA	Alameda	45.7	49	44.3	47.5	44.3	47.5	55
60010011	CA	Alameda	45.0	45	44.0	44.0	44.0	44.0	49
60012001	CA	Alameda	56.0	56	52.9	52.9	52.9	52.9	66
60050002	CA	Amador	72.0	74	58.6	60.3	58.6	60.3	73
60070007	CA	Butte	76.3	77	62.0	62.6	62.0	62.6	75
60070008	CA	Butte	65.0	66	53.4	54.2	53.4	54.2	66
60090001	CA	Calaveras	75.0	77	61.1	62.7	61.1	62.7	76
60111002	CA	Colusa	61.0	62	52.5	53.4	52.5	53.4	63
60130002	CA	Contra Costa	70.7	73	62.9	64.9	62.9	64.9	67
60131002	CA	Contra Costa	71.7	74	62.7	64.8	62.7	64.8	68
60131004	CA	Contra Costa	51.0	51	49.7	49.7	49.7	49.7	54
60170010	CA	El Dorado	81.0	82	64.4	65.2	64.4	65.2	85
60170012	CA	El Dorado	68.3	69	60.7	61.4	60.7	61.4	N/A
60170020	CA	El Dorado	82.7	84	65.9	66.9	65.9	66.9	82
60190007	CA	Fresno	94.7	95	79.2	79.4	79.2	79.4	86
60190011	CA	Fresno	93.0	96	78.6	81.2	78.6	81.2	89
60190242	CA	Fresno	91.7	95	79.4	82.2	79.4	82.2	86
60192009	CA	Fresno	77.0	77	65.1	65.1	65.1	65.1	76
60194001	CA	Fresno	90.7	92	73.3	74.4	73.3	74.4	91
60195001	CA	Fresno	97.0	99	79.6	81.2	79.6	81.2	94
60210003	CA	Glenn	64.3	65	56.0	56.6	56.0	56.6	64

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
60250005	CA	Imperial	74.7	76	73.3	74.6	73.3	74.6	76
60251003	CA	Imperial	81.0	82	79.0	80.0	79.0	80.0	76
60254003	CA	Imperial	72.0	73	67.6	68.5	68.4	69.4	N/A
60254004	CA	Imperial	71.3	73	63.1	64.6	66.3	67.9	67
60270101	CA	Inyo	71.7	72	67.3	67.6	67.3	67.6	70
60290007	CA	Kern	91.7	96	77.7	81.3	77.7	81.3	87
60290008	CA	Kern	86.3	88	71.3	72.8	71.3	72.8	81
60290011	CA	Kern	80.0	81	69.5	70.4	69.5	70.4	84
60290014	CA	Kern	87.7	89	74.1	75.2	74.1	75.2	84
60290232	CA	Kern	87.3	89	73.7	75.2	73.7	75.2	77
60295002	CA	Kern	90.0	91	75.9	76.8	75.9	76.8	87
60296001	CA	Kern	84.3	86	70.9	72.4	70.9	72.4	81
60311004	CA	Kings	87.0	90	71.7	74.2	71.7	74.2	84
60370002	CA	Los Angeles	80.0	82	73.3	75.1	73.3	75.1	88
60370016	CA	Los Angeles	94.0	97	86.1	88.9	86.1	88.9	96
60370113	CA	Los Angeles	65.0	68	60.3	63.1	60.3	63.1	70
60371002	CA	Los Angeles	80.0	81	69.4	70.3	69.4	70.3	N/A
60371103	CA	Los Angeles	63.7	65	59.1	60.3	59.1	60.3	71
60371201	CA	Los Angeles	90.0	90	79.8	79.8	79.8	79.8	85
60371302	CA	Los Angeles	58.0	58	57.2	57.2	57.2	57.2	67
60371602	CA	Los Angeles	63.5	64	61.6	62.1	61.6	62.1	76
60371701	CA	Los Angeles	84.0	85	78.1	79.1	78.1	79.1	90
60372005	CA	Los Angeles	79.5	82	72.3	74.6	72.3	74.6	83
60374002	CA	Los Angeles	58.5	59	56.1	56.6	56.1	56.6	N/A
60376012	CA	Los Angeles	97.3	99	85.9	87.4	85.9	87.4	96
60379033	CA	Los Angeles	90.0	91	76.3	77.2	76.3	77.2	88
60390004	CA	Madera	79.3	81	68.6	70.1	68.6	70.1	83
60392010	CA	Madera	85.0	86	72.1	72.9	72.1	72.9	83
60410001	CA	Marin	52.3	53	47.6	48.2	47.2	47.9	61
60430003	CA	Mariposa	77.3	78	69.8	70.4	69.8	70.4	74
60430006	CA	Mariposa	77.0	78	64.6	65.5	64.6	65.5	75
60470003	CA	Merced	82.7	84	69.9	71.0	69.9	71.0	82
60530002	CA	Monterey	57.0	58	49.0	49.9	49.0	49.9	59
60530008	CA	Monterey	58.0	60	48.6	50.3	48.6	50.3	60
60531003	CA	Monterey	52.3	54	45.1	46.5	45.1	46.5	55
60550003	CA	Napa	62.3	65	51.9	54.2	51.9	54.2	62
60570005	CA	Nevada	77.7	79	62.3	63.3	62.3	63.3	83
60570007	CA	Nevada	76.0	78	60.7	62.3	60.7	62.3	N/A
60590007	CA	Orange	63.7	64	61.1	61.4	61.1	61.4	70

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
60591003	CA	Orange	61.3	62	58.1	58.8	57.8	58.4	69
60592022	CA	Orange	72.0	74	60.3	61.9	60.3	61.9	77
60595001	CA	Orange	69.7	71	68.3	69.6	68.3	69.6	74
60610003	CA	Placer	83.0	85	66.1	67.7	66.1	67.7	83
60610004	CA	Placer	74.0	75	58.9	59.7	58.9	59.7	76
60610006	CA	Placer	84.0	86	68.6	70.2	68.6	70.2	80
60650004	CA	Riverside	85.0	85	76.7	76.7	76.7	76.7	N/A
60650012	CA	Riverside	97.3	99	83.6	85.1	83.6	85.1	93
60650016	CA	Riverside	77.0	77	62.8	62.8	62.8	62.8	77
60651016	CA	Riverside	100.7	101	85.2	85.5	85.2	85.5	97
60652002	CA	Riverside	84.3	85	72.4	73.0	72.4	73.0	81
60655001	CA	Riverside	92.3	93	79.5	80.1	79.5	80.1	87
60656001	CA	Riverside	94.0	98	78.3	81.6	78.3	81.6	91
60658001	CA	Riverside	97.0	98	87.0	87.9	87.0	87.9	94
60658005	CA	Riverside	92.7	94	83.2	84.4	83.2	84.4	91
60659001	CA	Riverside	88.3	91	73.7	75.9	73.7	75.9	86
60659003	CA	Riverside	67.0	68	60.2	61.1	60.2	61.1	66
60670002	CA	Sacramento	76.7	77	64.8	65.0	64.8	65.0	77
60670006	CA	Sacramento	78.7	81	66.6	68.6	66.6	68.6	77
60670010	CA	Sacramento	70.3	71	60.4	61.0	60.4	61.0	69
60670011	CA	Sacramento	72.5	74	61.3	62.6	61.3	62.6	68
60670012	CA	Sacramento	93.3	95	74.5	75.9	74.5	75.9	83
60670014	CA	Sacramento	69.3	70	58.8	59.4	58.8	59.4	71
60675003	CA	Sacramento	86.3	88	69.9	71.3	69.9	71.3	79
60690002	CA	San Benito	62.0	66	52.0	55.4	52.0	55.4	63
60690003	CA	San Benito	70.0	70	59.9	59.9	59.9	59.9	69
60710001	CA	San Bernardino	77.0	78	68.0	68.9	68.0	68.9	80
60710005	CA	San Bernardino	105.0	107	96.2	98.1	96.2	98.1	108
60710012	CA	San Bernardino	95.0	97	84.1	85.8	84.1	85.8	91
60710306	CA	San Bernardino	83.7	85	76.2	77.4	76.2	77.4	86
60711004	CA	San Bernardino	96.7	98	89.8	91.0	89.8	91.0	101
60711234	CA	San Bernardino	69.0	69	64.1	64.1	64.1	64.1	69
60712002	CA	San Bernardino	101.0	103	93.1	95.0	93.1	95.0	97
60714001	CA	San Bernardino	94.3	97	86.0	88.5	86.0	88.5	90
60714003	CA	San Bernardino	105.0	107	94.1	95.8	94.1	95.8	101
60719002	CA	San Bernardino	92.3	94	80.0	81.4	80.0	81.4	86
60719004	CA	San Bernardino	98.7	99	88.4	88.7	88.4	88.7	104
60730001	CA	San Diego	61.3	63	58.0	59.6	58.0	59.6	61
60731001	CA	San Diego	63.0	64	56.4	57.3	56.2	57.0	67

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
60731002	CA	San Diego	70.3	72	55.9	57.3	55.9	57.3	N/A
60731006	CA	San Diego	81.0	82	69.4	70.2	69.4	70.2	81
60731008	CA	San Diego	64.7	67	55.1	57.1	54.9	56.8	70
60731010	CA	San Diego	56.3	59	53.2	55.8	53.2	55.8	62
60731016	CA	San Diego	68.0	69	59.8	60.7	59.8	60.7	68
60731018	CA	San Diego	69.7	71	59.2	60.3	59.2	60.3	N/A
60732007	CA	San Diego	57.7	58	54.0	54.2	54.0	54.2	N/A
60771002	CA	San Joaquin	68.0	69	59.1	60.0	59.1	60.0	68
60773005	CA	San Joaquin	79.0	80	67.2	68.1	67.2	68.1	79
60790005	CA	San Luis Obispo	64.3	66	54.1	55.5	54.1	55.5	62
60792006	CA	San Luis Obispo	54.3	57	45.4	47.7	45.4	47.7	57
60793001	CA	San Luis Obispo	53.3	55	45.4	46.9	45.4	46.9	55
60794002	CA	San Luis Obispo	58.7	62	49.0	51.7	49.0	51.7	62
60798002	CA	San Luis Obispo	62.3	63	52.3	52.9	52.3	52.9	63
60798005	CA	San Luis Obispo	78.0	79	66.0	66.8	66.0	66.8	73
60798006	CA	San Luis Obispo	75.0	76	64.0	64.9	64.0	64.9	68
60811001	CA	San Mateo	54.0	56	54.0	56.1	54.0	56.1	59
60830008	CA	Santa Barbara	57.7	59	50.1	51.3	50.2	51.4	61
60830011	CA	Santa Barbara	56.0	57	49.0	49.9	48.6	49.4	63
60831008	CA	Santa Barbara	50.3	52	42.1	43.5	42.1	43.5	54
60831013	CA	Santa Barbara	62.7	64	53.2	54.3	53.2	54.3	62
60831014	CA	Santa Barbara	67.0	69	57.5	59.2	57.5	59.2	64
60831018	CA	Santa Barbara	55.0	56	47.5	48.3	47.1	47.9	60
60831021	CA	Santa Barbara	66.7	71	58.6	62.4	57.6	61.3	63
60831025	CA	Santa Barbara	68.3	73	59.4	63.4	59.5	63.6	67
60832004	CA	Santa Barbara	53.0	54	45.5	46.4	45.5	46.4	56
60832011	CA	Santa Barbara	55.7	57	48.9	50.0	48.6	49.7	63
60833001	CA	Santa Barbara	59.7	62	51.1	53.0	51.1	53.0	62
60834003	CA	Santa Barbara	60.3	61	52.2	52.8	51.9	52.5	60
60850002	CA	Santa Clara	68.3	71	56.7	58.9	56.7	58.9	66
60850005	CA	Santa Clara	60.7	63	57.3	59.5	57.3	59.5	63
60851001	CA	Santa Clara	66.0	70	60.0	63.7	60.0	63.7	67
60852006	CA	Santa Clara	71.3	74	60.1	62.3	60.1	62.3	70
60852009	CA	Santa Clara	62.0	62	57.9	57.9	57.9	57.9	N/A
60870007	CA	Santa Cruz	53.0	55	47.1	48.9	47.1	48.9	57
60890004	CA	Shasta	60.0	64	48.8	52.0	48.8	52.0	70
60890007	CA	Shasta	67.0	69	55.1	56.7	55.1	56.7	68
60890009	CA	Shasta	68.0	69	55.3	56.2	55.3	56.2	N/A
60893003	CA	Shasta	66.3	68	57.2	58.7	57.2	58.7	65

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
60950004	CA	Solano	59.0	61	52.0	53.8	52.0	53.8	63
60950005	CA	Solano	67.3	69	56.0	57.4	56.0	57.4	64
60953003	CA	Solano	68.0	69	56.7	57.5	56.7	57.5	67
60970003	CA	Sonoma	48.0	50	39.0	40.6	39.0	40.6	N/A
60990005	CA	Stanislaus	75.0	75	65.2	65.2	65.2	65.2	81
60990006	CA	Stanislaus	87.0	88	74.8	75.7	74.8	75.7	83
61010003	CA	Sutter	65.0	66	53.4	54.3	53.4	54.3	65
61030004	CA	Tehama	75.3	76	62.3	62.9	62.3	62.9	79
61030007	CA	Tehama	72.5	73	59.7	60.1	59.7	60.1	67
61070006	CA	Tulare	81.7	85	69.1	71.9	69.1	71.9	84
61070009	CA	Tulare	94.7	96	76.1	77.2	76.1	77.2	89
61072002	CA	Tulare	85.0	88	68.9	71.4	68.9	71.4	80
61072010	CA	Tulare	89.0	90	73.1	73.9	73.1	73.9	83
61090005	CA	Tuolumne	73.3	74	60.6	61.2	60.6	61.2	79
61110007	CA	Ventura	71.7	76	62.9	66.7	62.9	66.7	69
61110009	CA	Ventura	74.0	77	63.7	66.2	63.7	66.2	74
61111004	CA	Ventura	76.7	77	66.1	66.4	66.1	66.4	74
61112002	CA	Ventura	81.0	83	70.5	72.2	70.5	72.2	77
61113001	CA	Ventura	60.7	63	53.3	55.3	53.3	55.3	63
61130004	CA	Yolo	68.7	70	56.5	57.6	56.5	57.6	64
61131003	CA	Yolo	69.0	69	59.5	59.5	59.5	59.5	69
80013001	CO	Adams	76.0	76	70.8	70.8	70.8	70.8	67
80050002	CO	Arapahoe	76.7	79	69.3	71.3	69.3	71.3	N/A
80050006	CO	Arapahoe	73.5	74	65.0	65.4	65.0	65.4	67
80130011	CO	Boulder	74.7	77	65.5	67.5	65.5	67.5	N/A
80310014	CO	Denver	71.0	73	66.2	68.0	66.2	68.0	N/A
80310025	CO	Denver	65.0	65	61.8	61.8	61.8	61.8	N/A
80350004	CO	Douglas	80.7	83	71.1	73.2	71.1	73.2	77
80410013	CO	El Paso	71.0	74	64.0	66.7	64.0	66.7	66
80410016	CO	El Paso	72.7	74	65.4	66.6	65.4	66.6	64
80450012	CO	Garfield	65.0	66	62.4	63.3	62.4	63.3	63
80590002	CO	Jefferson	74.0	74	66.7	66.7	66.7	66.7	N/A
80590005	CO	Jefferson	75.7	78	67.5	69.5	67.5	69.5	72
80590006	CO	Jefferson	80.3	83	71.3	73.7	71.3	73.7	77
80590011	CO	Jefferson	78.7	82	70.9	73.9	70.9	73.9	80
80590013	CO	Jefferson	74.5	75	65.6	66.1	65.6	66.1	70
80671004	CO	La Plata	73.0	74	66.0	66.9	66.0	66.9	N/A
80677001	CO	La Plata	68.7	69	61.9	62.2	61.9	62.2	68
80690007	CO	Larimer	75.7	77	66.8	68.0	66.8	68.0	69

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
80690011	CO	Larimer	78.0	80	71.2	73.0	71.2	73.0	75
80690012	CO	Larimer	71.0	71	64.2	64.2	64.2	64.2	N/A
80691004	CO	Larimer	68.7	72	63.3	66.3	63.3	66.3	70
80770020	CO	Mesa	67.0	68	63.1	64.1	63.1	64.1	63
80830006	CO	Montezuma	67.3	68	59.8	60.4	59.8	60.4	62
80830101	CO	Montezuma	68.3	69	59.3	59.9	59.3	59.9	65
81030005	CO	Rio Blanco	63.5	64	59.8	60.3	59.8	60.3	61
81230009	CO	Weld	74.7	76	70.2	71.4	70.2	71.4	70
90010017	CT	Fairfield	80.3	83	69.8	72.1	68.9	71.2	80
90011123	CT	Fairfield	81.3	83	66.4	67.8	66.4	67.8	78
90013007	CT	Fairfield	84.3	89	71.2	75.2	71.0	75.0	81
90019003	CT	Fairfield	83.7	87	72.7	75.6	73.0	75.9	85
90031003	CT	Hartford	73.7	75	60.7	61.7	60.7	61.7	75
90050005	CT	Litchfield	70.3	71	57.2	57.8	57.2	57.8	74
90070007	CT	Middlesex	79.3	81	64.7	66.1	64.7	66.1	79
90090027	CT	New Haven	74.3	78	62.3	65.4	61.9	65.0	76
90099002	CT	New Haven	85.7	89	71.2	73.9	69.9	72.6	76
90110124	CT	New London	80.3	84	66.4	69.5	67.3	70.4	72
90131001	CT	Tolland	75.3	77	61.4	62.8	61.4	62.8	73
100010002	DE	Kent	74.3	78	58.3	61.2	57.6	60.5	66
100031007	DE	New Castle	76.3	80	59.2	62.0	59.2	62.0	68
100031010	DE	New Castle	78.0	78	61.2	61.2	61.2	61.2	74
100031013	DE	New Castle	77.7	80	60.8	62.6	60.8	62.6	70
100051002	DE	Sussex	77.3	81	59.7	62.6	59.7	62.6	65
100051003	DE	Sussex	77.7	81	62.4	65.1	61.1	63.7	69
110010041	DC	DC	76.0	80	58.7	61.7	58.7	61.7	N/A
110010043	DC	DC	80.7	84	62.3	64.8	62.3	64.8	70
120013011	FL	Alachua	63.7	65	51.0	52.0	51.0	52.0	58
120030002	FL	Baker	61.7	63	50.5	51.6	50.5	51.6	59
120050006	FL	Bay	68.0	69	51.7	52.4	52.6	53.4	62
120090007	FL	Brevard	64.0	64	52.2	52.2	51.6	51.6	58
120094001	FL	Brevard	64.0	65	52.6	53.4	51.7	52.5	61
120110033	FL	Broward	58.0	59	53.6	54.5	53.6	54.5	59
120112003	FL	Broward	58.0	58	50.7	50.7	52.6	52.6	N/A
120118002	FL	Broward	59.3	60	53.1	53.7	55.7	56.3	62
120210004	FL	Collier	59.5	60	49.8	50.2	51.2	51.6	57
120230002	FL	Columbia	62.7	64	51.6	52.7	51.6	52.7	N/A
120310077	FL	Duval	63.3	66	49.8	51.9	51.2	53.3	N/A
120310100	FL	Duval	64.3	67	50.3	52.5	50.4	52.5	N/A

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
120310106	FL	Duval	63.0	64	51.4	52.2	51.4	52.2	N/A
120330004	FL	Escambia	68.7	70	54.0	55.0	55.8	56.8	64
120330018	FL	Escambia	72.0	73	56.2	57.0	58.8	59.6	64
120550003	FL	Highlands	63.3	64	52.8	53.4	52.8	53.4	60
120570081	FL	Hillsborough	71.7	73	60.6	61.7	60.8	61.9	68
120571035	FL	Hillsborough	68.3	69	57.5	58.1	58.4	59.0	66
120571065	FL	Hillsborough	70.7	72	59.9	61.0	60.7	61.8	66
120573002	FL	Hillsborough	71.5	72	58.5	58.9	58.5	58.9	66
120590004	FL	Holmes	62.3	63	47.8	48.3	47.8	48.3	60
120619991	FL	Indian River	65.0	65	53.3	53.3	54.1	54.1	61
120690002	FL	Lake	65.7	66	53.5	53.7	54.1	54.3	63
120712002	FL	Lee	63.7	64	53.4	53.7	53.6	53.8	60
120713002	FL	Lee	61.3	62	50.7	51.3	51.7	52.3	59
120730012	FL	Leon	64.3	66	49.3	50.6	49.3	50.6	60
120730013	FL	Leon	64.0	65	49.2	50.0	49.2	50.0	N/A
120813002	FL	Manatee	64.0	65	53.3	54.2	53.0	53.8	59
120814012	FL	Manatee	67.0	67	55.4	55.4	55.5	55.5	N/A
120830003	FL	Marion	65.0	66	52.7	53.5	52.7	53.5	61
120830004	FL	Marion	62.0	63	49.6	50.4	49.6	50.4	58
120860027	FL	Miami-Dade	64.0	65	58.5	59.4	60.3	61.2	62
120860029	FL	Miami-Dade	63.3	64	56.4	57.0	57.7	58.4	61
120910002	FL	Okaloosa	66.0	67	51.2	52.0	51.3	52.1	62
120950008	FL	Orange	71.0	72	58.0	58.8	58.0	58.8	62
120952002	FL	Orange	71.7	73	60.0	61.1	60.0	61.1	62
120972002	FL	Osceola	66.0	66	53.2	53.2	53.2	53.2	63
120990009	FL	Palm Beach	62.7	63	54.1	54.4	54.1	54.4	N/A
120990020	FL	Palm Beach	61.7	62	54.0	54.2	54.3	54.5	N/A
121010005	FL	Pasco	66.7	67	53.9	54.1	53.9	54.1	61
121012001	FL	Pasco	65.3	67	55.6	57.1	55.7	57.1	62
121030004	FL	Pinellas	66.7	67	57.1	57.3	57.1	57.3	61
121030018	FL	Pinellas	65.3	66	57.8	58.4	56.9	57.5	61
121035002	FL	Pinellas	64.3	65	54.9	55.5	54.8	55.4	59
121056005	FL	Polk	67.3	68	55.1	55.7	55.1	55.7	63
121056006	FL	Polk	68.3	69	56.0	56.6	56.0	56.6	62
121130015	FL	Santa Rosa	71.7	74	55.4	57.2	55.3	57.1	64
121151005	FL	Sarasota	71.3	72	58.7	59.3	58.7	59.2	62
121151006	FL	Sarasota	67.7	68	55.2	55.4	55.2	55.5	62
121152002	FL	Sarasota	66.0	67	54.5	55.3	54.6	55.5	61
121171002	FL	Seminole	67.3	69	55.1	56.5	55.1	56.5	61

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
121272001	FL	Volusia	59.7	60	46.6	46.9	48.3	48.6	59
121275002	FL	Volusia	63.3	64	50.4	51.0	51.6	52.1	59
121290001	FL	Wakulla	63.7	65	50.8	51.8	50.0	51.0	N/A
130210012	GA	Bibb	72.3	73	51.3	51.8	51.3	51.8	65
130510021	GA	Chatham	63.3	64	49.7	50.3	49.7	50.3	57
130550001	GA	Chattooga	66.3	67	50.1	50.7	50.1	50.7	62
130590002	GA	Clarke	70.7	73	50.6	52.3	50.6	52.3	64
130670003	GA	Cobb	76.0	78	55.4	56.9	55.4	56.9	N/A
130730001	GA	Columbia	68.7	70	50.6	51.5	50.6	51.5	61
130770002	GA	Coweta	65.0	67	46.4	47.8	46.4	47.8	66
130850001	GA	Dawson	66.3	68	47.7	48.9	47.7	48.9	65
130890002	GA	DeKalb	77.3	80	56.1	58.1	56.1	58.1	71
130970004	GA	Douglas	73.3	75	52.9	54.2	52.9	54.2	68
131210055	GA	Fulton	81.0	83	59.2	60.6	59.2	60.6	75
131270006	GA	Glynn	60.0	61	47.4	48.2	47.6	48.4	56
131350002	GA	Gwinnett	76.7	78	54.5	55.4	54.5	55.4	72
131510002	GA	Henry	80.0	82	57.7	59.2	57.7	59.2	74
132130003	GA	Murray	70.3	72	51.2	52.5	51.2	52.5	65
132150008	GA	Muscogee	66.0	67	50.2	50.9	50.2	50.9	62
132230003	GA	Paulding	70.7	72	54.3	55.3	54.3	55.3	63
132450091	GA	Richmond	70.0	72	51.9	53.4	51.9	53.4	62
132470001	GA	Rockdale	77.0	79	54.4	55.8	54.4	55.8	74
132611001	GA	Sumter	64.7	66	50.4	51.4	50.4	51.4	60
160010017	ID	Ada	67.5	68	59.4	59.8	59.4	59.8	67
160010019	ID	Ada	62.0	62	54.2	54.2	54.2	54.2	N/A
160230101	ID	Butte	62.3	63	59.6	60.2	59.6	60.2	60
160550003	ID	Kootenai	56.0	56	47.9	47.9	47.9	47.9	N/A
170010007	IL	Adams	67.0	69	54.5	56.2	54.5	56.2	62
170190007	IL	Champaign	71.0	71	57.7	57.7	57.7	57.7	63
170230001	IL	Clark	66.0	66	53.8	53.8	53.8	53.8	64
170310001	IL	Cook	72.0	74	63.2	64.9	63.2	64.9	69
170310032	IL	Cook	77.7	81	58.8	61.3	66.6	69.5	70
170310064	IL	Cook	71.3	75	53.9	56.7	61.1	64.3	N/A
170310076	IL	Cook	71.7	74	62.7	64.7	62.7	64.7	69
170311003	IL	Cook	69.7	72	53.3	55.1	62.4	64.4	69
170311601	IL	Cook	71.3	74	61.5	63.9	61.5	63.9	69
170314002	IL	Cook	71.7	74	55.8	57.6	62.3	64.3	66
170314007	IL	Cook	65.7	68	49.2	50.9	58.0	60.0	71
170314201	IL	Cook	75.7	78	56.7	58.4	66.8	68.8	71

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
170317002	IL	Cook	76.0	80	55.7	58.6	66.8	70.3	72
170436001	IL	DuPage	66.3	68	57.9	59.4	57.9	59.4	68
170491001	IL	Effingham	68.3	70	55.5	56.9	55.5	56.9	64
170650002	IL	Hamilton	74.3	78	60.7	63.8	60.7	63.8	65
170831001	IL	Jersey	76.0	79	58.4	60.7	58.4	60.7	68
170859991	IL	Jo Daviess	68.0	68	56.4	56.4	56.4	56.4	65
170890005	IL	Kane	69.7	71	62.8	63.9	62.8	63.9	68
170971007	IL	Lake	79.3	82	57.5	59.5	63.4	65.6	73
171110001	IL	McHenry	69.7	71	61.8	62.9	61.8	62.9	68
171132003	IL	McLean	70.3	72	56.0	57.4	56.0	57.4	64
171150013	IL	Macon	71.3	73	58.0	59.4	58.0	59.4	66
171170002	IL	Macoupin	71.3	73	53.8	55.1	53.8	55.1	64
171190008	IL	Madison	77.0	80	59.5	61.8	59.5	61.8	71
171191009	IL	Madison	78.3	80	59.9	61.2	59.9	61.2	67
171193007	IL	Madison	76.7	79	59.3	61.0	59.3	61.0	71
171199991	IL	Madison	76.0	76	56.7	56.7	56.7	56.7	67
171430024	IL	Peoria	61.7	63	51.3	52.4	51.3	52.4	64
171431001	IL	Peoria	70.7	72	58.8	59.8	58.8	59.8	N/A
171570001	IL	Randolph	67.7	70	54.7	56.6	54.7	56.6	67
171613002	IL	Rock Island	58.3	60	49.2	50.6	49.2	50.6	62
171630010	IL	Saint Clair	74.7	77	56.9	58.7	56.9	58.7	68
171670014	IL	Sangamon	72.0	72	56.8	56.8	56.8	56.8	63
171971011	IL	Will	64.0	65	55.6	56.5	55.6	56.5	64
172012001	IL	Winnebago	67.3	68	57.5	58.0	57.5	58.0	68
180030002	IN	Allen	68.3	70	55.2	56.6	55.2	56.6	63
180030004	IN	Allen	69.3	71	56.1	57.4	56.1	57.4	63
180110001	IN	Boone	72.3	74	59.4	60.8	59.4	60.8	66
180150002	IN	Carroll	69.0	71	56.8	58.5	56.8	58.5	64
180190008	IN	Clark	78.0	81	62.1	64.5	62.1	64.5	70
180350010	IN	Delaware	68.7	70	54.4	55.5	54.4	55.5	59
180390007	IN	Elkhart	67.7	70	54.6	56.5	54.6	56.5	61
180431004	IN	Floyd	76.0	79	61.7	64.1	61.7	64.1	69
180550001	IN	Greene	77.0	78	63.5	64.3	63.5	64.3	66
180570006	IN	Hamilton	71.0	72	57.2	58.0	57.2	58.0	63
180590003	IN	Hancock	66.7	69	53.4	55.2	53.4	55.2	N/A
180630004	IN	Hendricks	67.0	68	55.5	56.3	55.5	56.3	60
180690002	IN	Huntington	65.0	66	53.0	53.8	53.0	53.8	58
180710001	IN	Jackson	66.0	67	53.0	53.8	53.0	53.8	66
180810002	IN	Johnson	69.0	70	56.0	56.8	56.0	56.8	60

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
180839991	IN	Knox	73.0	73	59.2	59.2	59.2	59.2	65
180890022	IN	Lake	66.7	69	55.2	57.1	58.3	60.3	67
180890030	IN	Lake	69.7	73	58.9	61.7	61.9	64.8	N/A
180892008	IN	Lake	68.0	68	57.5	57.5	60.4	60.4	65
180910005	IN	LaPorte	79.3	83	65.4	68.5	67.2	70.4	N/A
180910010	IN	LaPorte	69.7	72	59.2	61.2	58.9	60.9	63
180950010	IN	Madison	68.3	70	54.2	55.5	54.2	55.5	57
180970050	IN	Marion	72.7	74	59.1	60.2	59.1	60.2	69
180970057	IN	Marion	69.0	71	57.8	59.4	57.8	59.4	65
180970073	IN	Marion	72.0	74	59.1	60.7	59.1	60.7	65
180970078	IN	Marion	69.7	72	58.3	60.3	58.3	60.3	N/A
181090005	IN	Morgan	69.0	70	55.1	55.9	55.1	55.9	64
181230009	IN	Perry	72.7	75	53.6	55.3	53.6	55.3	67
181270024	IN	Porter	70.3	72	57.6	59.0	61.8	63.3	69
181270026	IN	Porter	63.0	64	54.4	55.3	54.4	55.3	66
181290003	IN	Posey	70.3	71	56.5	57.0	56.5	57.0	66
181410010	IN	St. Joseph	62.7	64	51.2	52.3	51.2	52.3	62
181410015	IN	St. Joseph	69.3	73	56.9	59.9	56.9	59.9	68
181411007	IN	St. Joseph	64.0	64	52.5	52.5	52.5	52.5	N/A
181450001	IN	Shelby	74.0	75	60.6	61.4	60.6	61.4	62
181630013	IN	Vanderburgh	71.7	73	56.2	57.3	56.2	57.3	69
181630021	IN	Vanderburgh	74.0	74	58.6	58.6	58.6	58.6	70
181670018	IN	Vigo	65.7	68	52.5	54.3	52.5	54.3	65
181670024	IN	Vigo	64.0	64	51.3	51.3	51.3	51.3	61
181730008	IN	Warrick	71.0	73	54.9	56.5	54.9	56.5	68
181730009	IN	Warrick	69.7	72	55.0	56.8	55.0	56.8	66
181730011	IN	Warrick	71.0	74	54.2	56.5	54.2	56.5	67
190170011	IA	Bremer	64.0	65	50.9	51.7	50.9	51.7	60
190450021	IA	Clinton	66.7	68	55.9	57.0	55.9	57.0	63
190850007	IA	Harrison	66.7	68	53.9	54.9	53.9	54.9	62
190851101	IA	Harrison	67.7	69	54.7	55.7	54.7	55.7	62
191130028	IA	Linn	64.3	66	54.1	55.5	54.1	55.5	61
191130033	IA	Linn	64.0	65	51.9	52.7	51.9	52.7	61
191130040	IA	Linn	62.7	64	52.8	53.9	52.8	53.9	61
191370002	IA	Montgomery	65.3	67	54.1	55.5	54.1	55.5	60
191471002	IA	Palo Alto	66.7	68	55.2	56.3	55.2	56.3	61
191530030	IA	Polk	59.7	61	48.1	49.2	48.1	49.2	60
191630014	IA	Scott	63.0	63	52.4	52.4	52.4	52.4	63
191630015	IA	Scott	66.0	67	55.7	56.5	55.7	56.5	60

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
191690011	IA	Story	61.3	62	49.1	49.7	49.1	49.7	60
191770006	IA	Van Buren	65.7	68	53.0	54.9	53.0	54.9	60
191810022	IA	Warren	63.7	65	51.8	52.9	51.8	52.9	58
200910010	KS	Johnson	72.7	76	59.0	61.7	59.0	61.7	60
201030003	KS	Leavenworth	72.0	74	56.3	57.8	56.3	57.8	63
201070002	KS	Linn	70.0	72	55.4	57.0	55.4	57.0	N/A
201730010	KS	Sedgwick	76.3	78	61.9	63.2	61.9	63.2	65
201730018	KS	Sedgwick	75.7	77	61.6	62.6	61.6	62.6	65
201770013	KS	Shawnee	71.7	74	56.0	57.8	56.0	57.8	63
201910002	KS	Sumner	76.3	78	63.0	64.4	63.0	64.4	64
201950001	KS	Trego	72.3	74	64.3	65.9	64.3	65.9	63
202090021	KS	Wyandotte	65.7	70	52.8	56.3	52.8	56.3	63
210130002	KY	Bell	63.3	65	49.3	50.6	49.3	50.6	61
210150003	KY	Boone	68.0	70	53.5	55.1	53.5	55.1	63
210190017	KY	Boyd	70.0	72	57.7	59.3	57.7	59.3	66
210290006	KY	Bullitt	72.3	75	58.0	60.1	58.0	60.1	66
210373002	KY	Campbell	76.7	79	61.3	63.1	61.3	63.1	70
210430500	KY	Carter	67.0	69	53.6	55.2	53.6	55.2	61
210470006	KY	Christian	70.7	73	55.6	57.4	55.6	57.4	62
210590005	KY	Daviess	76.3	79	57.1	59.1	57.1	59.1	65
210610501	KY	Edmonson	72.0	75	56.3	58.6	56.3	58.6	64
210670012	KY	Fayette	71.3	74	57.0	59.1	57.0	59.1	67
210890007	KY	Greenup	69.7	72	57.4	59.2	57.4	59.2	63
210910012	KY	Hancock	73.7	76	54.1	55.8	54.1	55.8	68
210930006	KY	Hardin	70.3	73	54.2	56.3	54.2	56.3	65
211010014	KY	Henderson	76.3	79	59.7	61.8	59.7	61.8	69
211110027	KY	Jefferson	77.0	80	62.5	64.9	62.5	64.9	69
211110051	KY	Jefferson	78.5	79	64.4	64.8	64.4	64.8	69
211110067	KY	Jefferson	85.0	85	70.1	70.1	70.1	70.1	74
211130001	KY	Jessamine	70.0	72	55.3	56.9	55.3	56.9	65
211390003	KY	Livingston	72.3	75	57.1	59.2	57.1	59.2	65
211451024	KY	McCracken	73.7	77	59.3	62.0	59.3	62.0	63
211850004	KY	Oldham	82.0	86	63.5	66.6	63.5	66.6	70
211930003	KY	Perry	65.3	68	54.3	56.5	54.3	56.5	58
211950002	KY	Pike	65.7	68	53.1	55.0	53.1	55.0	60
211990003	KY	Pulaski	66.7	69	51.1	52.9	51.1	52.9	62
212130004	KY	Simpson	69.3	71	52.9	54.2	52.9	54.2	64
212218001	KY	Trigg	69.0	69	54.8	54.8	54.8	54.8	N/A
212270008	KY	Warren	64.0	64	49.5	49.5	49.5	49.5	N/A

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212299991	KY	Washington	69.0	69	54.4	54.4	54.4	54.4	64
220050004	LA	Ascension	74.7	77	63.5	65.4	63.5	65.4	71
220150008	LA	Bossier	77.3	80	63.4	65.6	63.4	65.6	65
220170001	LA	Caddo	74.7	76	61.0	62.0	61.0	62.0	64
220190002	LA	Calcasieu	72.7	75	66.5	68.6	66.5	68.6	68
220190008	LA	Calcasieu	67.7	69	61.7	62.8	61.7	62.8	N/A
220190009	LA	Calcasieu	72.0	74	63.6	65.4	63.6	65.4	64
220330003	LA	E. Baton Rouge	78.7	82	67.8	70.6	67.8	70.6	72
220330009	LA	E. Baton Rouge	75.0	77	64.1	65.8	64.1	65.8	66
220330013	LA	E. Baton Rouge	71.0	72	60.5	61.4	60.5	61.4	N/A
220470009	LA	Iberville	73.3	75	63.5	65.0	63.5	65.0	N/A
220470012	LA	Iberville	76.0	77	65.7	66.6	65.7	66.6	N/A
220511001	LA	Jefferson	73.7	76	66.0	68.0	66.6	68.6	68
220550007	LA	Lafayette	71.0	72	59.8	60.7	59.8	60.7	66
220570004	LA	Lafourche	72.3	74	64.1	65.6	64.1	65.6	65
220630002	LA	Livingston	74.0	76	63.3	65.0	63.3	65.0	70
220710012	LA	Orleans	69.3	70	62.1	62.7	62.2	62.8	N/A
220730004	LA	Ouachita	63.3	66	52.8	55.1	52.8	55.1	N/A
220770001	LA	Pointe Coupee	75.3	77	63.3	64.7	63.3	64.7	68
220870004	LA	St. Bernard	69.0	69	61.8	61.8	61.9	61.9	66
220890003	LA	St. Charles	70.0	72	62.7	64.5	63.0	64.8	N/A
220930002	LA	St. James	68.0	69	60.0	60.9	60.0	60.9	65
220950002	LA	St. John the Baptist	74.0	75	66.3	67.2	66.3	67.2	66
221030002	LA	St. Tammany	73.3	74	64.1	64.7	64.0	64.6	68
221210001	LA	West Baton Rouge	70.3	72	60.0	61.5	60.0	61.5	66
230010014	ME	Androscoggin	61.0	62	49.4	50.2	49.3	50.1	60
230052003	ME	Cumberland	69.3	70	56.2	56.8	56.7	57.3	65
230090102	ME	Hancock	71.7	74	61.3	63.2	59.9	61.8	66
230090103	ME	Hancock	66.3	69	55.0	57.3	55.3	57.5	62
230112005	ME	Kennebec	62.7	64	50.5	51.5	50.5	51.5	59
230130004	ME	Knox	67.7	69	54.7	55.7	54.8	55.8	63
230173001	ME	Oxford	54.3	55	43.7	44.3	43.7	44.3	N/A
230194008	ME	Penobscot	57.7	59	46.6	47.6	46.6	47.6	58
230230006	ME	Sagadahoc	61.0	61	48.7	48.7	48.7	48.7	N/A
230310038	ME	York	60.3	62	48.2	49.6	48.2	49.6	58
230310040	ME	York	64.3	65	51.5	52.0	51.5	52.0	61
230312002	ME	York	73.7	75	60.1	61.2	59.6	60.7	67

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240030014	MD	Anne Arundel	83.0	87	63.4	66.4	63.4	66.4	N/A
240051007	MD	Baltimore	79.0	82	63.9	66.3	63.9	66.3	72
240053001	MD	Baltimore	80.7	84	64.9	67.6	65.3	67.9	72
240090011	MD	Calvert	79.7	83	64.2	66.9	63.2	65.9	69
240130001	MD	Carroll	76.3	79	58.8	60.9	58.8	60.9	68
240150003	MD	Cecil	83.0	86	64.5	66.8	64.5	66.8	76
240170010	MD	Charles	79.0	83	61.6	64.7	61.6	64.7	70
240199991	MD	Dorchester	75.0	75	60.7	60.7	59.4	59.4	66
240210037	MD	Frederick	76.3	79	59.6	61.8	59.6	61.8	67
240230002	MD	Garrett	72.0	75	55.1	57.4	55.1	57.4	65
240251001	MD	Harford	90.0	93	71.4	73.8	70.9	73.3	73
240259001	MD	Harford	79.3	82	61.8	63.9	62.2	64.3	73
240290002	MD	Kent	78.7	82	61.2	63.7	61.2	63.7	70
240313001	MD	Montgomery	75.7	77	60.0	61.0	60.0	61.0	68
240330030	MD	Prince George's	79.0	82	60.5	62.8	60.5	62.8	69
240338003	MD	Prince George's	82.3	87	63.2	66.8	63.2	66.8	71
240339991	MD	Prince George's	80.0	80	61.0	61.0	61.0	61.0	68
240430009	MD	Washington	72.7	75	56.0	57.8	56.0	57.8	66
245100054	MD	Baltimore (City)	73.7	75	59.9	61.0	59.4	60.4	69
250010002	MA	Barnstable	73.0	75	59.6	61.3	60.5	62.2	N/A
250034002	MA	Berkshire	69.0	71	56.1	57.7	56.1	57.7	N/A
250051002	MA	Bristol	74.0	74	61.6	61.6	61.2	61.2	N/A
250070001	MA	Dukes	77.0	80	64.1	66.6	64.1	66.6	N/A
250092006	MA	Essex	71.0	71	57.5	57.5	58.4	58.4	65
250094005	MA	Essex	70.0	70	57.2	57.2	57.2	57.2	64
250095005	MA	Essex	69.3	70	56.2	56.8	56.2	56.8	62
250130008	MA	Hampden	73.7	74	59.3	59.5	59.3	59.5	70
250150103	MA	Hampshire	64.7	66	51.9	53.0	51.9	53.0	N/A
250154002	MA	Hampshire	71.3	72	57.0	57.5	57.0	57.5	70
250170009	MA	Middlesex	67.3	68	54.0	54.5	54.0	54.5	63
250171102	MA	Middlesex	67.0	67	53.4	53.4	53.4	53.4	N/A
250213003	MA	Norfolk	72.3	73	59.6	60.2	59.6	60.2	67
250250041	MA	Suffolk	68.3	70	56.4	57.8	55.5	56.9	N/A
250250042	MA	Suffolk	60.7	61	49.6	49.9	50.1	50.4	56
250270015	MA	Worcester	68.3	70	54.6	55.9	54.6	55.9	64
250270024	MA	Worcester	69.0	70	54.9	55.7	54.9	55.7	64
260050003	MI	Allegan	82.7	86	69.0	71.8	69.0	71.7	75
260190003	MI	Benzie	73.0	75	60.9	62.6	60.6	62.3	69
260210014	MI	Berrien	79.7	82	67.4	69.3	66.9	68.8	74

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260270003	MI	Cass	76.7	78	62.0	63.1	62.0	63.1	70
260370001	MI	Clinton	69.3	71	56.2	57.6	56.2	57.6	67
260490021	MI	Genesee	73.0	76	60.1	62.5	60.1	62.5	68
260492001	MI	Genesee	72.3	74	58.8	60.2	58.8	60.2	69
260630007	MI	Huron	71.3	74	59.5	61.7	59.0	61.2	68
260650012	MI	Ingham	70.3	72	56.8	58.2	56.8	58.2	67
260770008	MI	Kalamazoo	73.7	75	59.9	60.9	59.9	60.9	69
260810020	MI	Kent	73.0	75	59.8	61.4	59.8	61.4	69
260810022	MI	Kent	72.7	74	58.3	59.3	58.3	59.3	67
260910007	MI	Lenawee	75.5	76	60.6	61.0	60.6	61.0	67
260990009	MI	Macomb	76.7	78	65.1	66.2	64.5	65.6	72
260991003	MI	Macomb	77.3	79	66.7	68.1	66.7	68.1	67
261010922	MI	Manistee	72.3	74	60.2	61.6	60.5	61.9	68
261050007	MI	Mason	73.3	75	60.7	62.1	60.7	62.1	70
261130001	MI	Missaukee	68.3	70	56.9	58.3	56.9	58.3	67
261210039	MI	Muskegon	79.7	82	65.6	67.5	65.8	67.7	75
261250001	MI	Oakland	76.3	78	64.1	65.6	64.1	65.6	69
261390005	MI	Ottawa	76.0	78	62.3	64.0	62.3	64.0	70
261470005	MI	St. Clair	75.3	77	63.7	65.1	62.5	63.9	73
261530001	MI	Schoolcraft	71.7	75	59.4	62.1	59.4	62.1	70
261610008	MI	Washtenaw	73.3	76	60.7	62.9	60.7	62.9	67
261630001	MI	Wayne	71.7	74	60.5	62.4	60.5	62.4	65
261630019	MI	Wayne	78.7	81	69.0	71.0	69.0	71.0	72
270031001	MN	Anoka	67.0	67	55.1	55.1	55.1	55.1	60
270031002	MN	Anoka	66.3	67	57.3	57.9	57.3	57.9	63
270353204	MN	Crow Wing	62.0	62	50.7	50.7	50.7	50.7	59
270495302	MN	Goodhue	62.5	63	52.2	52.6	52.2	52.6	61
270834210	MN	Lyon	64.5	65	54.1	54.5	54.1	54.5	62
270953051	MN	Mille Lacs	59.7	60	48.6	48.8	48.9	49.2	60
271095008	MN	Olmsted	63.5	64	52.3	52.7	52.3	52.7	61
271377550	MN	Saint Louis	49.7	50	42.0	42.2	42.2	42.5	53
271390505	MN	Scott	63.5	65	54.3	55.5	54.3	55.5	60
271453052	MN	Stearns	61.5	62	52.7	53.1	52.7	53.1	60
271713201	MN	Wright	63.5	64	54.6	55.0	54.6	55.0	61
280110001	MS	Bolivar	71.7	74	60.9	62.9	60.9	62.9	62
280330002	MS	DeSoto	72.3	74	55.4	56.7	55.4	56.7	64
280450003	MS	Hancock	66.3	67	53.4	53.9	53.9	54.4	63
280470008	MS	Harrison	72.3	75	55.9	58.0	57.7	59.9	67
280490010	MS	Hinds	67.0	68	50.0	50.7	50.0	50.7	N/A

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
280590006	MS	Jackson	71.7	73	56.9	58.0	57.1	58.2	67
280750003	MS	Lauderdale	62.7	63	50.0	50.2	50.0	50.2	57
280810005	MS	Lee	65.0	66	49.7	50.5	49.7	50.5	59
281619991	MS	Yalobusha	63.0	63	51.4	51.4	51.4	51.4	57
290030001	MO	Andrew	73.3	75	58.3	59.6	58.3	59.6	63
290190011	MO	Boone	69.0	72	54.0	56.3	54.0	56.3	64
290270002	MO	Callaway	67.7	70	53.5	55.3	53.5	55.3	64
290370003	MO	Cass	70.0	72	56.3	57.9	56.3	57.9	63
290390001	MO	Cedar	71.7	74	58.0	59.9	58.0	59.9	61
290470003	MO	Clay	77.0	79	61.9	63.5	61.9	63.5	65
290470005	MO	Clay	75.3	77	59.8	61.1	59.8	61.1	64
290470006	MO	Clay	77.7	80	61.7	63.5	61.7	63.5	67
290490001	MO	Clinton	78.0	80	61.3	62.9	61.3	62.9	67
290770036	MO	Greene	69.3	71	54.5	55.8	54.5	55.8	59
290770042	MO	Greene	71.7	74	56.4	58.2	56.4	58.2	60
290970004	MO	Jasper	76.7	78	60.2	61.2	60.2	61.2	61
290990019	MO	Jefferson	76.3	79	58.7	60.8	58.7	60.8	70
291130003	MO	Lincoln	77.0	80	59.6	62.0	59.6	62.0	65
291370001	MO	Monroe	68.7	71	55.8	57.7	55.8	57.7	59
291570001	MO	Perry	74.3	77	59.7	61.9	59.7	61.9	67
291831002	MO	Saint Charles	82.3	86	63.2	66.1	63.2	66.1	72
291831004	MO	Saint Charles	77.7	80	61.9	63.8	61.9	63.8	71
291860005	MO	Sainte Genevieve	72.3	75	57.4	59.5	57.4	59.5	66
291890005	MO	Saint Louis	72.0	74	54.4	55.9	54.4	55.9	65
291890014	MO	Saint Louis	79.0	82	60.5	62.8	60.5	62.8	71
292130004	MO	Taney	69.0	70	55.3	56.1	55.3	56.1	57
295100085	MO	St. Louis City	75.7	79	58.7	61.2	58.7	61.2	65
300870001	MT	Rosebud	55.5	56	51.6	52.1	51.6	52.1	56
310550019	NE	Douglas	67.0	67	56.2	56.2	56.2	56.2	62
310550028	NE	Douglas	58.7	60	49.3	50.3	49.3	50.3	59
310550035	NE	Douglas	64.0	66	53.1	54.7	53.1	54.7	N/A
311090016	NE	Lancaster	53.3	55	43.4	44.7	43.4	44.7	60
320010002	NV	Churchill	56.7	58	51.9	53.1	51.9	53.1	67
320030043	NV	Clark	74.7	76	67.7	68.8	67.7	68.8	73
320030071	NV	Clark	75.3	76	68.7	69.4	68.7	69.4	71
320030073	NV	Clark	74.7	76	68.2	69.4	68.2	69.4	73
320030075	NV	Clark	76.0	77	67.4	68.3	67.4	68.3	75
320030538	NV	Clark	71.0	72	62.9	63.8	62.9	63.8	N/A

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
320030540	NV	Clark	71.0	71	62.9	62.9	62.9	62.9	70
320030601	NV	Clark	72.0	72	65.7	65.7	65.7	65.7	67
320031019	NV	Clark	74.3	75	66.8	67.4	66.8	67.4	70
320032002	NV	Clark	71.7	73	63.4	64.5	63.4	64.5	73
320190006	NV	Lyon	68.5	69	62.1	62.5	62.1	62.5	69
320310016	NV	Washoe	66.0	67	59.2	60.1	59.2	60.1	70
320310020	NV	Washoe	67.0	68	60.1	61.0	60.1	61.0	68
320310025	NV	Washoe	66.3	67	60.0	60.6	60.0	60.6	67
320311005	NV	Washoe	67.3	68	59.9	60.5	59.9	60.5	69
320312002	NV	Washoe	61.7	62	54.3	54.5	55.2	55.5	62
320312009	NV	Washoe	67.0	68	60.1	61.0	60.1	61.0	69
320330101	NV	White Pine	72.0	74	65.8	67.7	65.8	67.7	64
325100002	NV	Carson City	66.0	66	60.2	60.2	60.2	60.2	N/A
330012004	NH	Belknap	62.3	63	50.4	51.0	50.0	50.6	58
330050007	NH	Cheshire	62.3	63	49.7	50.2	49.7	50.2	61
330074001	NH	Coos	69.3	70	57.1	57.7	57.1	57.7	67
330074002	NH	Coos	59.7	61	49.3	50.4	49.3	50.4	57
330090010	NH	Grafton	59.7	60	48.1	48.4	48.1	48.4	57
330111011	NH	Hillsborough	66.3	67	53.6	54.2	53.6	54.2	63
330115001	NH	Hillsborough	69.0	70	55.5	56.3	55.5	56.3	68
330131007	NH	Merrimack	64.7	65	51.6	51.8	51.6	51.8	61
330150014	NH	Rockingham	66.0	66	53.6	53.6	53.4	53.4	65
330150016	NH	Rockingham	66.3	67	53.8	54.4	53.6	54.2	67
330150018	NH	Rockingham	68.0	68	55.1	55.1	55.1	55.1	65
340010006	NJ	Atlantic	74.3	76	58.5	59.9	58.6	60.0	64
340030006	NJ	Bergen	77.0	78	64.1	65.0	64.1	65.0	74
340071001	NJ	Camden	82.7	87	66.3	69.8	66.3	69.8	69
340110007	NJ	Cumberland	72.0	75	57.0	59.4	57.0	59.4	68
340130003	NJ	Essex	78.0	82	64.3	67.6	64.3	67.6	70
340150002	NJ	Gloucester	84.3	87	68.2	70.4	68.2	70.4	74
340170006	NJ	Hudson	77.0	78	65.4	66.3	64.6	65.4	72
340190001	NJ	Hunterdon	78.0	80	62.0	63.6	62.0	63.6	72
340210005	NJ	Mercer	78.3	81	63.2	65.4	63.2	65.4	72
340219991	NJ	Mercer	76.0	76	60.4	60.4	60.4	60.4	73
340230011	NJ	Middlesex	81.3	85	65.0	68.0	65.0	68.0	74
340250005	NJ	Monmouth	80.0	83	65.4	67.8	64.1	66.5	70
340273001	NJ	Morris	76.3	78	62.4	63.8	62.4	63.8	69
340290006	NJ	Ocean	82.0	85	65.8	68.2	65.8	68.2	73
340315001	NJ	Passaic	73.3	75	61.3	62.7	61.3	62.7	70

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
340410007	NJ	Warren	66.0	66	54.0	54.0	54.0	54.0	64
350010023	NM	Bernalillo	68.0	70	59.0	60.7	59.0	60.7	65
350010024	NM	Bernalillo	69.3	70	60.1	60.7	60.1	60.7	N/A
350010027	NM	Bernalillo	70.0	71	63.4	64.3	63.4	64.3	N/A
350010029	NM	Bernalillo	68.7	70	59.2	60.3	59.2	60.3	65
350010032	NM	Bernalillo	70.0	70	60.6	60.6	60.6	60.6	N/A
350011012	NM	Bernalillo	72.0	74	64.2	66.0	64.2	66.0	64
350011013	NM	Bernalillo	68.7	69	61.1	61.3	61.1	61.3	N/A
350130008	NM	Dona Ana	64.7	67	60.8	63.0	60.8	63.0	66
350130017	NM	Dona Ana	66.7	68	63.1	64.3	63.1	64.3	N/A
350130020	NM	Dona Ana	67.7	69	62.8	64.0	62.8	64.0	66
350130021	NM	Dona Ana	71.0	72	67.1	68.1	67.1	68.1	72
350130022	NM	Dona Ana	70.3	75	66.3	70.8	66.3	70.8	68
350130023	NM	Dona Ana	64.3	65	58.7	59.3	58.7	59.3	65
350151005	NM	Eddy	70.3	71	67.7	68.4	67.7	68.4	67
350171003	NM	Grant	65.0	67	61.9	63.8	61.9	63.8	N/A
350250008	NM	Lea	62.7	66	59.9	63.0	59.9	63.0	66
350290003	NM	Luna	63.0	67	58.2	61.9	58.2	61.9	N/A
350431001	NM	Sandoval	61.7	63	55.4	56.5	55.4	56.5	64
350439004	NM	Sandoval	63.0	63	58.8	58.8	58.8	58.8	N/A
350450009	NM	San Juan	65.3	68	56.7	59.0	56.7	59.0	62
350450018	NM	San Juan	71.0	71	62.0	62.0	62.0	62.0	66
350451005	NM	San Juan	66.0	68	55.3	57.0	55.3	57.0	62
350490021	NM	Santa Fe	64.3	66	60.5	62.1	60.5	62.1	63
350610008	NM	Valencia	68.5	70	60.1	61.4	60.1	61.4	64
360010012	NY	Albany	68.0	70	55.4	57.0	55.4	57.0	64
360050133	NY	Bronx	74.0	76	68.0	69.9	63.3	65.0	70
360130006	NY	Chautauqua	73.3	76	59.6	61.7	58.5	60.7	68
360130011	NY	Chautauqua	74.0	76	60.2	61.8	59.4	61.0	N/A
360150003	NY	Chemung	66.5	67	54.9	55.3	54.9	55.3	N/A
360270007	NY	Dutchess	72.0	74	58.6	60.2	58.6	60.2	68
360290002	NY	Erie	71.3	73	58.3	59.7	58.2	59.6	69
360310002	NY	Essex	70.3	73	57.5	59.8	57.5	59.8	62
360310003	NY	Essex	67.3	69	55.1	56.5	55.1	56.5	65
360410005	NY	Hamilton	66.0	67	53.7	54.5	53.7	54.5	60
360430005	NY	Herkimer	62.0	63	50.5	51.3	50.5	51.3	63
360450002	NY	Jefferson	71.7	74	59.0	60.9	59.4	61.3	63
360530006	NY	Madison	67.0	67	55.0	55.0	55.0	55.0	N/A
360610135	NY	New York	73.3	76	65.3	67.8	64.2	66.5	69

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
360631006	NY	Niagara	72.3	75	60.5	62.8	59.5	61.7	66
360650004	NY	Oneida	61.5	64	50.5	52.5	50.5	52.5	N/A
360671015	NY	Onondaga	69.3	72	57.8	60.1	57.8	60.1	64
360715001	NY	Orange	67.0	69	55.3	56.9	55.3	56.9	66
360750003	NY	Oswego	68.0	70	55.7	57.4	55.6	57.2	60
360790005	NY	Putnam	70.0	71	58.4	59.2	58.4	59.2	68
360810124	NY	Queens	78.0	80	70.1	71.9	70.2	72.0	69
360830004	NY	Rensselaer	67.0	67	54.4	54.4	54.4	54.4	N/A
360850067	NY	Richmond	81.3	83	71.9	73.4	67.1	68.5	76
360870005	NY	Rockland	75.0	76	62.0	62.8	62.0	62.8	72
360910004	NY	Saratoga	67.0	68	54.3	55.1	54.3	55.1	63
361010003	NY	Steuben	65.3	67	54.4	55.9	54.4	55.9	59
361030002	NY	Suffolk	83.3	85	72.5	74.0	74.0	75.5	72
361030004	NY	Suffolk	78.0	80	66.3	68.0	65.2	66.9	72
361030009	NY	Suffolk	78.7	80	68.5	69.7	67.6	68.7	N/A
361111005	NY	Ulster	69.0	69	57.4	57.4	57.4	57.4	N/A
361173001	NY	Wayne	65.0	67	53.4	55.0	53.4	55.0	64
361192004	NY	Westchester	75.3	76	68.1	68.8	63.8	64.4	74
370030004	NC	Alexander	66.7	68	51.3	52.3	51.3	52.3	N/A
370110002	NC	Avery	63.3	65	48.1	49.3	48.1	49.3	62
370119991	NC	Avery	63.0	63	48.9	48.9	48.9	48.9	64
370210030	NC	Buncombe	66.7	68	48.8	49.8	48.8	49.8	63
370270003	NC	Caldwell	66.0	67	49.6	50.3	49.6	50.3	64
370330001	NC	Caswell	70.7	73	53.9	55.7	53.9	55.7	63
370370004	NC	Chatham	64.0	66	47.4	48.9	47.4	48.9	N/A
370510008	NC	Cumberland	68.7	70	51.1	52.0	51.1	52.0	61
370511003	NC	Cumberland	70.7	72	51.5	52.4	51.5	52.4	N/A
370590003	NC	Davie	71.0	73	53.5	55.0	53.5	55.0	N/A
370630015	NC	Durham	70.0	72	49.8	51.3	49.8	51.3	62
370650099	NC	Edgecombe	70.0	71	51.3	52.0	51.3	52.0	N/A
370670022	NC	Forsyth	75.3	78	56.6	58.6	56.6	58.6	67
370670028	NC	Forsyth	69.7	72	52.0	53.7	52.0	53.7	N/A
370670030	NC	Forsyth	72.7	76	55.0	57.5	55.0	57.5	68
370671008	NC	Forsyth	72.3	75	54.5	56.5	54.5	56.5	67
370690001	NC	Franklin	69.3	71	50.2	51.5	50.2	51.5	N/A
370750001	NC	Graham	70.3	72	54.4	55.7	54.4	55.7	64
370770001	NC	Granville	70.7	72	51.2	52.1	51.2	52.1	64
370810013	NC	Guilford	74.0	76	55.0	56.5	55.0	56.5	65
370870008	NC	Haywood	61.0	61	48.6	48.6	48.6	48.6	62

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
370870036	NC	Haywood	67.7	69	53.8	54.8	53.8	54.8	65
370990005	NC	Jackson	67.0	67	53.1	53.1	53.1	53.1	N/A
371010002	NC	Johnston	71.7	74	51.5	53.2	51.5	53.2	65
371070004	NC	Lenoir	67.7	69	51.7	52.7	51.7	52.7	63
371090004	NC	Lincoln	72.7	75	55.4	57.1	55.4	57.1	67
371170001	NC	Martin	66.3	67	50.7	51.2	50.7	51.2	60
371190041	NC	Mecklenburg	80.0	83	60.8	63.1	60.8	63.1	69
371191005	NC	Mecklenburg	75.0	77	56.4	57.9	56.4	57.9	N/A
371191009	NC	Mecklenburg	79.7	83	58.2	60.6	58.2	60.6	N/A
371239991	NC	Montgomery	66.0	66	47.2	47.2	47.2	47.2	61
371290002	NC	New Hanover	63.0	64	46.0	46.8	46.9	47.6	60
371450003	NC	Person	71.0	74	57.5	59.9	57.5	59.9	63
371470006	NC	Pitt	69.7	71	52.6	53.6	52.6	53.6	62
371570099	NC	Rockingham	71.0	73	56.2	57.8	56.2	57.8	66
371590021	NC	Rowan	75.3	78	54.5	56.5	54.5	56.5	65
371590022	NC	Rowan	75.0	77	53.7	55.2	53.7	55.2	N/A
371730002	NC	Swain	60.7	62	48.7	49.7	48.7	49.7	60
371790003	NC	Union	71.0	73	50.9	52.4	50.9	52.4	68
371830014	NC	Wake	70.3	72	51.3	52.6	51.3	52.6	65
371830016	NC	Wake	73.0	75	54.2	55.7	54.2	55.7	N/A
371990004	NC	Yancey	69.7	71	53.0	54.0	53.0	54.0	65
390030009	OH	Allen	73.0	74	59.6	60.4	59.6	60.4	66
390071001	OH	Ashtabula	77.3	79	60.7	62.1	61.3	62.7	70
390090004	OH	Athens	69.0	69	55.5	55.5	55.5	55.5	N/A
390170004	OH	Butler	77.0	79	62.2	63.8	62.2	63.8	72
390170018	OH	Butler	79.7	82	63.0	64.9	63.0	64.9	71
390179991	OH	Butler	77.0	77	59.7	59.7	59.7	59.7	69
390230001	OH	Clark	75.0	76	58.6	59.4	58.6	59.4	69
390230003	OH	Clark	74.0	75	58.6	59.4	58.6	59.4	67
390250022	OH	Clermont	78.7	82	60.2	62.7	60.2	62.7	70
390271002	OH	Clinton	78.7	82	59.3	61.8	59.3	61.8	70
390350034	OH	Cuyahoga	77.7	80	57.0	58.7	62.1	63.9	69
390350060	OH	Cuyahoga	68.5	70	52.4	53.6	54.1	55.3	64
390350064	OH	Cuyahoga	70.0	73	56.1	58.5	57.4	59.9	64
390355002	OH	Cuyahoga	76.7	80	56.9	59.4	61.0	63.7	68
390410002	OH	Delaware	73.0	74	58.5	59.3	58.5	59.3	67
390479991	OH	Fayette	72.0	72	55.6	55.6	55.6	55.6	68
390490029	OH	Franklin	80.3	82	65.3	66.7	65.3	66.7	71
390490037	OH	Franklin	75.0	76	60.8	61.6	60.8	61.6	66

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
390490081	OH	Franklin	71.0	73	57.7	59.4	57.7	59.4	67
390550004	OH	Geauga	74.7	78	59.0	61.6	59.0	61.6	71
390570006	OH	Greene	73.0	74	55.4	56.2	55.4	56.2	68
390610006	OH	Hamilton	82.0	85	65.0	67.4	65.0	67.4	72
390610010	OH	Hamilton	76.3	80	60.4	63.3	60.4	63.3	72
390610040	OH	Hamilton	78.7	80	63.2	64.3	63.2	64.3	71
390810017	OH	Jefferson	70.3	72	57.9	59.3	57.9	59.3	65
390830002	OH	Knox	73.7	75	57.6	58.6	57.6	58.6	67
390850003	OH	Lake	80.0	83	58.0	60.2	63.5	65.8	75
390850007	OH	Lake	71.7	73	53.0	54.0	56.1	57.2	67
390870011	OH	Lawrence	65.0	67	51.8	53.4	51.8	53.4	64
390870012	OH	Lawrence	70.0	72	57.6	59.2	57.6	59.2	67
390890005	OH	Licking	74.3	76	57.5	58.8	57.5	58.8	67
390930018	OH	Lorain	71.7	75	54.6	57.1	58.8	61.5	66
390950024	OH	Lucas	68.0	70	53.9	55.5	55.3	57.0	67
390950027	OH	Lucas	66.7	68	55.4	56.5	55.4	56.5	64
390950034	OH	Lucas	73.7	76	58.9	60.7	60.2	62.1	N/A
390970007	OH	Madison	74.3	76	56.5	57.8	56.5	57.8	68
390990013	OH	Mahoning	70.7	73	57.0	58.8	57.0	58.8	63
391030004	OH	Medina	69.0	69	55.9	55.9	55.9	55.9	64
391090005	OH	Miami	73.3	74	57.2	57.8	57.2	57.8	67
391130037	OH	Montgomery	76.7	78	60.6	61.6	60.6	61.6	70
391331001	OH	Portage	68.3	71	54.8	57.0	54.8	57.0	61
391351001	OH	Preble	72.3	74	58.0	59.3	58.0	59.3	67
391510016	OH	Stark	76.7	79	60.9	62.7	60.9	62.7	69
391510022	OH	Stark	72.0	73	57.3	58.1	57.3	58.1	64
391514005	OH	Stark	72.3	75	57.2	59.3	57.2	59.3	66
391530020	OH	Summit	72.0	74	58.8	60.4	58.8	60.4	61
391550009	OH	Trumbull	71.0	73	56.1	57.7	56.1	57.7	N/A
391550011	OH	Trumbull	76.3	79	60.8	63.0	60.8	63.0	68
391650007	OH	Warren	77.7	79	59.5	60.5	59.5	60.5	72
391670004	OH	Washington	71.3	74	56.4	58.5	56.4	58.5	65
391730003	OH	Wood	71.3	73	58.6	60.0	58.6	60.0	63
400019009	OK	Adair	73.7	76	58.6	60.4	58.6	60.4	61
400159008	OK	Caddo	74.7	77	61.2	63.1	61.2	63.1	N/A
400170101	OK	Canadian	75.7	76	60.4	60.6	60.4	60.6	65
400219002	OK	Cherokee	73.7	76	57.9	59.7	57.9	59.7	60
400270049	OK	Cleveland	75.0	76	61.8	62.7	61.8	62.7	66
400310651	OK	Comanche	74.7	77	62.6	64.5	62.6	64.5	65

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
400370144	OK	Creek	77.0	78	58.5	59.2	58.5	59.2	64
400430860	OK	Dewey	72.3	74	63.4	64.9	63.4	64.9	65
400719010	OK	Kay	73.0	77	60.3	63.6	60.3	63.6	63
400871073	OK	McClain	74.0	75	60.2	61.0	60.2	61.0	66
400892001	OK	McCurtain	68.0	68	58.9	58.9	58.9	58.9	N/A
400979014	OK	Mayes	76.3	78	56.6	57.9	56.6	57.9	62
401090033	OK	Oklahoma	76.7	78	62.7	63.8	62.7	63.8	67
401090096	OK	Oklahoma	76.0	77	61.5	62.4	61.5	62.4	65
401091037	OK	Oklahoma	78.3	79	64.4	65.0	64.4	65.0	68
401159004	OK	Ottawa	74.0	76	57.7	59.3	57.7	59.3	54
401210415	OK	Pittsburg	73.3	75	61.8	63.3	61.8	63.3	60
401359021	OK	Sequoyah	72.0	72	58.7	58.7	58.7	58.7	60
401430137	OK	Tulsa	79.0	80	61.0	61.7	61.0	61.7	N/A
401430174	OK	Tulsa	75.3	77	59.0	60.3	59.0	60.3	N/A
401430178	OK	Tulsa	76.7	78	60.9	61.9	60.9	61.9	63
401431127	OK	Tulsa	78.3	80	62.1	63.5	62.1	63.5	N/A
410050004	OR	Clackamas	64.0	66	55.0	56.8	55.0	56.8	65
410090004	OR	Columbia	51.3	53	45.3	46.8	45.3	46.8	54
410170122	OR	Deschutes	58.5	59	52.8	53.2	52.8	53.2	N/A
410290201	OR	Jackson	61.7	63	53.5	54.7	53.5	54.7	59
410390060	OR	Lane	58.0	59	48.3	49.2	48.3	49.2	61
410391007	OR	Lane	60.0	61	49.7	50.5	49.7	50.5	61
410470004	OR	Marion	59.3	61	49.7	51.1	49.7	51.1	65
410510080	OR	Multnomah	56.7	57	51.2	51.5	51.2	51.5	55
410591003	OR	Umatilla	61.3	62	51.2	51.8	51.2	51.8	65
410671004	OR	Washington	57.7	59	50.6	51.8	50.6	51.8	59
420030008	PA	Allegheny	76.3	79	65.5	67.8	65.5	67.8	67
420030010	PA	Allegheny	73.7	75	63.3	64.4	63.3	64.4	N/A
420030067	PA	Allegheny	75.7	78	63.0	65.0	63.0	65.0	68
420031008	PA	Allegheny	80.7	82	67.1	68.2	67.1	68.2	70
420050001	PA	Armstrong	74.3	75	60.6	61.2	60.6	61.2	70
420070002	PA	Beaver	70.7	72	59.5	60.6	59.5	60.6	70
420070005	PA	Beaver	74.7	77	63.0	64.9	63.0	64.9	68
420070014	PA	Beaver	72.3	74	61.0	62.5	61.0	62.5	65
420110006	PA	Berks	71.7	75	56.2	58.8	56.2	58.8	66
420110011	PA	Berks	76.3	79	58.9	61.0	58.9	61.0	71
420130801	PA	Blair	72.7	75	60.3	62.3	60.3	62.3	63
420170012	PA	Bucks	80.3	83	64.6	66.8	64.6	66.8	77
420210011	PA	Cambria	70.3	72	58.0	59.4	58.0	59.4	63

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
420270100	PA	Centre	71.0	73	59.1	60.8	59.1	60.8	63
420279991	PA	Centre	72.0	72	59.8	59.8	59.8	59.8	65
420290100	PA	Chester	76.3	79	58.7	60.8	58.7	60.8	73
420334000	PA	Clearfield	72.3	74	60.3	61.8	60.3	61.8	64
420430401	PA	Dauphin	69.0	69	54.7	54.7	54.7	54.7	66
420431100	PA	Dauphin	74.7	77	58.3	60.1	58.3	60.1	67
420450002	PA	Delaware	75.7	78	60.3	62.1	60.3	62.1	72
420490003	PA	Erie	74.0	76	59.1	60.7	59.5	61.1	66
420550001	PA	Franklin	67.0	68	53.2	53.9	53.2	53.9	60
420590002	PA	Greene	69.0	71	56.5	58.1	56.5	58.1	67
420630004	PA	Indiana	75.7	79	62.7	65.4	62.7	65.4	70
420690101	PA	Lackawanna	71.0	72	55.8	56.6	55.8	56.6	67
420692006	PA	Lackawanna	68.7	71	54.0	55.8	54.0	55.8	N/A
420710007	PA	Lancaster	77.0	80	60.1	62.4	60.1	62.4	69
420710012	PA	Lancaster	78.0	82	60.2	63.3	60.2	63.3	66
420730015	PA	Lawrence	71.0	73	58.0	59.6	58.0	59.6	68
420750100	PA	Lebanon	76.0	76	58.6	58.6	58.6	58.6	71
420770004	PA	Lehigh	76.0	78	59.5	61.1	59.5	61.1	70
420791100	PA	Luzerne	65.0	66	49.9	50.6	49.9	50.6	N/A
420791101	PA	Luzerne	64.3	66	49.9	51.2	49.9	51.2	64
420810100	PA	Lycoming	67.0	69	53.9	55.5	53.9	55.5	64
420850100	PA	Mercer	76.3	79	60.0	62.1	60.0	62.1	69
420890002	PA	Monroe	66.7	70	52.9	55.6	52.9	55.6	65
420910013	PA	Montgomery	76.3	78	61.0	62.4	61.0	62.4	72
420950025	PA	Northampton	74.3	77	58.5	60.6	58.5	60.6	70
420958000	PA	Northampton	69.7	71	54.8	55.9	54.8	55.9	69
420990301	PA	Perry	68.3	70	54.8	56.2	54.8	56.2	N/A
421010004	PA	Philadelphia	66.0	70	53.9	57.1	53.9	57.1	61
421010024	PA	Philadelphia	83.3	87	67.3	70.3	67.3	70.3	77
421011002	PA	Philadelphia	80.0	80	64.7	64.7	64.7	64.7	N/A
421119991	PA	Somerset	65.0	65	50.8	50.8	50.8	50.8	N/A
421174000	PA	Tioga	69.7	71	57.3	58.3	57.3	58.3	63
421250005	PA	Washington	70.0	72	57.6	59.2	57.6	59.2	68
421250200	PA	Washington	70.7	73	57.6	59.4	57.6	59.4	65
421255001	PA	Washington	70.3	71	57.9	58.5	57.9	58.5	68
421290006	PA	Westmoreland	71.7	74	60.1	62.0	60.1	62.0	N/A
421290008	PA	Westmoreland	71.0	73	58.0	59.6	58.0	59.6	68
421330008	PA	York	72.3	74	56.9	58.3	56.9	58.3	66
421330011	PA	York	74.3	77	58.0	60.1	58.0	60.1	N/A

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
440030002	RI	Kent	73.7	74	60.4	60.7	60.4	60.7	70
440071010	RI	Providence	74.0	76	60.1	61.8	59.5	61.1	68
440090007	RI	Washington	76.3	78	63.6	65.0	62.6	64.0	70
450010001	SC	Abbeville	62.0	64	45.3	46.8	45.3	46.8	N/A
450030003	SC	Aiken	64.3	67	47.6	49.7	47.6	49.7	60
450070005	SC	Anderson	70.0	73	52.1	54.4	52.1	54.4	60
450150002	SC	Berkeley	62.3	64	47.4	48.7	47.4	48.7	N/A
450190046	SC	Charleston	64.7	66	49.6	50.6	49.8	50.8	N/A
450210002	SC	Cherokee	67.3	70	49.2	51.2	49.2	51.2	N/A
450250001	SC	Chesterfield	64.3	66	48.4	49.6	48.4	49.6	60
450290002	SC	Colleton	61.0	64	46.4	48.7	46.4	48.7	N/A
450310003	SC	Darlington	68.0	70	52.1	53.6	52.1	53.6	62
450370001	SC	Edgefield	63.0	63	46.2	46.2	46.2	46.2	N/A
450450016	SC	Greenville	68.0	69	50.5	51.2	50.5	51.2	N/A
450451003	SC	Greenville	65.3	67	48.9	50.2	48.9	50.2	N/A
450730001	SC	Oconee	64.5	65	48.6	48.9	48.6	48.9	63
450770002	SC	Pickens	69.7	71	52.5	53.5	52.5	53.5	N/A
450790007	SC	Richland	70.0	70	51.2	51.2	51.2	51.2	N/A
450790021	SC	Richland	60.0	62	44.1	45.6	44.1	45.6	N/A
450791001	SC	Richland	71.7	73	52.4	53.4	52.4	53.4	N/A
450830009	SC	Spartanburg	73.7	75	54.6	55.5	54.6	55.5	N/A
450910006	SC	York	64.0	65	47.7	48.4	47.7	48.4	59
460330132	SD	Custer	61.7	63	57.6	58.8	57.6	58.8	58
460710001	SD	Jackson	57.0	59	52.2	54.0	52.2	54.0	58
460930001	SD	Meade	58.5	60	52.0	53.3	52.0	53.3	57
460990008	SD	Minnehaha	66.0	68	55.3	56.9	55.3	56.9	64
461270003	SD	Union	62.5	64	52.6	53.9	52.6	53.9	N/A
470010101	TN	Anderson	70.7	73	54.3	56.0	54.3	56.0	63
470090101	TN	Blount	76.7	79	59.0	60.7	59.0	60.7	67
470090102	TN	Blount	66.3	68	50.8	52.1	50.8	52.1	60
470259991	TN	Claiborne	62.0	62	48.0	48.0	48.0	48.0	63
470370011	TN	Davidson	66.0	69	52.6	54.9	52.6	54.9	66
470370026	TN	Davidson	67.0	67	52.7	52.7	52.7	52.7	67
470651011	TN	Hamilton	72.3	75	54.9	57.0	54.9	57.0	65
470654003	TN	Hamilton	73.3	76	55.4	57.4	55.4	57.4	68
470890002	TN	Jefferson	74.7	78	56.9	59.4	56.9	59.4	68
470930021	TN	Knox	69.0	71	52.6	54.2	52.6	54.2	64
470931020	TN	Knox	71.7	74	54.2	55.9	54.2	55.9	66
471050109	TN	Loudon	72.3	75	55.9	58.0	55.9	58.0	N/A

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
471210104	TN	Meigs	71.3	74	54.4	56.5	54.4	56.5	N/A
471490101	TN	Rutherford	68.5	70	52.8	53.9	52.8	53.9	N/A
471550101	TN	Sevier	74.3	76	57.6	58.9	57.6	58.9	68
471570021	TN	Shelby	76.7	79	59.2	61.0	59.2	61.0	67
471570075	TN	Shelby	78.0	78	60.5	60.5	60.5	60.5	66
471571004	TN	Shelby	75.0	78	57.2	59.5	57.2	59.5	66
471632002	TN	Sullivan	71.7	74	59.2	61.1	59.2	61.1	66
471632003	TN	Sullivan	70.3	72	58.7	60.1	58.7	60.1	64
471650007	TN	Sumner	76.7	79	59.9	61.7	59.9	61.7	67
471650101	TN	Sumner	73.0	75	57.0	58.5	57.0	58.5	N/A
471870106	TN	Williamson	70.3	73	53.9	55.9	53.9	55.9	61
471890103	TN	Wilson	71.7	74	55.1	56.8	55.1	56.8	64
480271047	TX	Bell	74.5	75	63.8	64.2	63.8	64.2	67
480290032	TX	Bexar	76.7	78	66.3	67.4	66.3	67.4	73
480290052	TX	Bexar	78.7	81	68.4	70.4	68.4	70.4	73
480290059	TX	Bexar	68.3	70	59.4	60.9	59.4	60.9	64
480391004	TX	Brazoria	88.0	89	74.0	74.9	74.0	74.9	75
480391016	TX	Brazoria	71.7	73	61.3	62.4	61.3	62.4	64
480430101	TX	Brewster	70.0	71	67.9	68.9	67.9	68.9	62
480610006	TX	Cameron	62.7	64	56.7	57.9	56.7	57.9	57
480850005	TX	Collin	82.7	84	68.2	69.2	68.2	69.2	74
481130069	TX	Dallas	79.7	84	66.2	69.8	66.2	69.8	71
481130075	TX	Dallas	82.0	83	69.0	69.9	69.0	69.9	72
481130087	TX	Dallas	80.0	81	66.9	67.8	66.9	67.8	64
481210034	TX	Denton	84.3	87	69.7	72.0	69.7	72.0	80
481211032	TX	Denton	82.7	84	67.7	68.8	67.7	68.8	76
481390016	TX	Ellis	75.7	77	63.5	64.6	63.5	64.6	63
481391044	TX	Ellis	70.0	72	59.3	61.0	59.3	61.0	62
481410029	TX	El Paso	65.0	65	61.1	61.1	61.1	61.1	62
481410037	TX	El Paso	71.0	72	67.6	68.5	67.6	68.5	71
481410044	TX	El Paso	69.0	70	65.7	66.6	65.7	66.6	67
481410055	TX	El Paso	66.3	68	63.1	64.7	63.1	64.7	64
481410057	TX	El Paso	66.0	66	62.6	62.6	62.6	62.6	66
481410058	TX	El Paso	69.3	71	65.4	67.0	65.4	67.0	68
481671034	TX	Galveston	77.3	80	67.5	69.9	67.3	69.6	76
481830001	TX	Gregg	77.7	79	65.1	66.2	65.1	66.2	66
482010024	TX	Harris	80.3	83	70.4	72.8	70.4	72.8	79
482010026	TX	Harris	77.3	80	67.9	70.2	67.6	70.0	68
482010029	TX	Harris	83.0	84	68.7	69.5	68.7	69.5	69

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
482010046	TX	Harris	75.7	77	66.4	67.5	66.4	67.5	67
482010047	TX	Harris	78.3	79	66.7	67.3	66.7	67.3	74
482010051	TX	Harris	80.3	81	67.5	68.1	67.5	68.1	71
482010055	TX	Harris	81.3	83	68.3	69.8	68.3	69.8	75
482010062	TX	Harris	76.7	78	66.0	67.1	66.0	67.1	65
482010066	TX	Harris	77.0	79	64.7	66.4	64.7	66.4	76
482010070	TX	Harris	77.0	77	66.5	66.5	66.5	66.5	N/A
482010416	TX	Harris	78.7	80	66.7	67.8	66.7	67.8	72
482011015	TX	Harris	74.3	77	65.2	67.6	65.0	67.4	65
482011034	TX	Harris	81.0	82	70.8	71.6	70.8	71.6	73
482011035	TX	Harris	78.3	80	68.4	69.9	68.4	69.9	69
482011039	TX	Harris	82.0	84	71.8	73.6	71.8	73.5	67
482011050	TX	Harris	78.3	80	68.3	69.8	68.0	69.5	70
482030002	TX	Harrison	72.7	74	59.9	61.0	59.9	61.0	62
482150043	TX	Hidalgo	61.0	62	55.3	56.2	55.3	56.2	55
482151048	TX	Hidalgo	59.5	60	53.8	54.2	53.8	54.2	N/A
482210001	TX	Hood	76.7	77	63.4	63.7	63.4	63.7	69
482311006	TX	Hunt	71.7	74	59.1	61.0	59.1	61.0	60
482450009	TX	Jefferson	73.3	75	63.5	65.0	63.5	65.0	64
482450011	TX	Jefferson	76.0	76	66.5	66.5	66.2	66.2	67
482450022	TX	Jefferson	71.3	72	61.1	61.7	61.1	61.7	68
482450101	TX	Jefferson	78.0	80	68.4	70.2	68.2	70.0	65
482450102	TX	Jefferson	69.7	71	60.8	62.0	61.0	62.2	62
482450628	TX	Jefferson	70.7	73	61.9	63.9	61.6	63.6	N/A
482451035	TX	Jefferson	71.0	72	62.0	62.8	62.2	63.0	68
482510003	TX	Johnson	79.0	79	65.8	65.8	65.8	65.8	72
482570005	TX	Kaufman	70.7	74	60.5	63.4	60.5	63.4	61
483091037	TX	McLennan	72.7	74	61.9	63.0	61.9	63.0	63
483390078	TX	Montgomery	77.3	79	65.7	67.1	65.7	67.1	72
483491051	TX	Navarro	71.0	72	61.4	62.2	61.4	62.2	61
483550025	TX	Nueces	71.0	72	62.9	63.8	63.5	64.4	64
483550026	TX	Nueces	70.7	72	62.9	64.1	62.9	64.1	63
483611001	TX	Orange	72.7	75	63.7	65.7	64.5	66.6	61
483611100	TX	Orange	68.7	69	60.7	60.9	60.7	60.9	N/A
483670081	TX	Parker	78.7	79	65.8	66.0	65.8	66.0	73
483970001	TX	Rockwall	77.0	77	64.0	64.0	64.0	64.0	66
484230007	TX	Smith	75.0	75	62.3	62.3	62.3	62.3	65
484390075	TX	Tarrant	82.0	83	67.8	68.7	67.8	68.7	72
484391002	TX	Tarrant	81.0	82	67.5	68.4	67.5	68.4	74

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
484392003	TX	Tarrant	87.3	90	72.5	74.8	72.5	74.8	73
484393009	TX	Tarrant	86.0	86	70.6	70.6	70.6	70.6	75
484393011	TX	Tarrant	80.7	83	68.0	70.0	68.0	70.0	65
484530014	TX	Travis	73.7	75	62.9	64.0	62.9	64.0	66
484530020	TX	Travis	72.0	73	60.8	61.6	60.8	61.6	66
484690003	TX	Victoria	68.7	70	61.4	62.6	61.4	62.6	65
490030003	UT	Box Elder	67.7	69	59.8	60.9	60.9	62.1	67
490050004	UT	Cache	64.3	67	57.9	60.3	57.9	60.3	N/A
490071003	UT	Carbon	69.0	69	61.1	61.1	61.1	61.1	66
490110004	UT	Davis	69.3	71	61.3	62.8	60.0	61.5	74
490131001	UT	Duchesne	68.0	68	62.0	62.0	62.0	62.0	N/A
490352004	UT	Salt Lake	74.0	76	65.5	67.2	65.4	67.1	N/A
490353006	UT	Salt Lake	76.0	76	65.8	65.8	65.8	65.8	75
490370101	UT	San Juan	68.7	69	63.6	63.9	63.6	63.9	64
490450003	UT	Tooele	72.0	73	63.9	64.8	63.5	64.4	N/A
490490002	UT	Utah	70.0	73	62.5	65.2	62.7	65.4	71
490495010	UT	Utah	69.3	70	61.9	62.5	62.3	62.9	73
490530006	UT	Washington	67.0	67	61.4	61.4	61.4	61.4	N/A
490530130	UT	Washington	71.7	73	65.8	67.0	65.8	67.0	N/A
490570002	UT	Weber	71.7	72	64.0	64.3	64.0	64.3	71
490571003	UT	Weber	72.7	74	64.1	65.2	65.3	66.5	72
500030004	VT	Bennington	63.7	65	51.3	52.4	51.3	52.4	63
500070007	VT	Chittenden	61.0	62	49.6	50.4	49.6	50.4	61
510030001	VA	Albemarle	66.7	68	52.9	53.9	52.9	53.9	N/A
510130020	VA	Arlington	81.7	86	64.9	68.3	64.9	68.3	72
510330001	VA	Caroline	72.0	74	56.0	57.6	56.0	57.6	N/A
510360002	VA	Charles	75.7	79	59.4	62.0	59.4	62.0	63
510410004	VA	Chesterfield	72.0	75	56.8	59.2	56.8	59.2	62
510590030	VA	Fairfax	82.3	86	65.1	68.1	65.1	68.1	70
510610002	VA	Fauquier	62.7	64	49.5	50.5	49.5	50.5	59
510690010	VA	Frederick	66.7	69	51.4	53.2	51.4	53.2	61
510719991	VA	Giles	63.0	63	47.1	47.1	47.1	47.1	62
510850003	VA	Hanover	73.7	76	56.9	58.6	56.9	58.6	62
510870014	VA	Henrico	75.0	78	58.8	61.2	58.8	61.2	N/A
511071005	VA	Loudoun	73.0	75	57.8	59.4	57.8	59.4	67
511130003	VA	Madison	70.7	72	57.0	58.0	57.0	58.0	63
511390004	VA	Page	66.3	68	53.2	54.6	53.2	54.6	N/A
511479991	VA	Prince Edward	62.0	62	50.3	50.3	50.3	50.3	60
511530009	VA	Prince William	70.0	72	56.2	57.8	56.2	57.8	65

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
511611004	VA	Roanoke	67.3	70	53.4	55.5	53.4	55.5	62
511630003	VA	Rockbridge	62.3	64	50.2	51.6	50.2	51.6	58
511650003	VA	Rockingham	66.0	68	53.7	55.3	53.7	55.3	60
511790001	VA	Stafford	73.0	76	55.4	57.7	57.1	59.4	63
511970002	VA	Wythe	64.3	66	51.9	53.3	51.9	53.3	61
515100009	VA	Alexandria City	80.0	83	63.4	65.8	63.4	65.8	N/A
516500008	VA	Hampton City	74.0	76	58.2	59.8	56.9	58.4	64
518000004	VA	Suffolk City	71.3	73	58.7	60.1	56.2	57.5	60
518000005	VA	Suffolk City	69.7	71	54.7	55.7	54.7	55.7	61
530110011	WA	Clark	56.0	57	50.4	51.3	50.4	51.3	59
530330010	WA	King	55.0	57	50.0	51.8	50.0	51.8	55
530330017	WA	King	57.0	59	48.9	50.6	48.9	50.6	58
530330023	WA	King	65.0	67	54.9	56.6	54.9	56.6	67
530531010	WA	Pierce	53.3	54	46.2	46.8	46.2	46.8	N/A
530630001	WA	Spokane	58.7	60	51.8	53.0	51.8	53.0	N/A
530630021	WA	Spokane	59.0	60	53.1	54.0	53.1	54.0	N/A
530630046	WA	Spokane	58.7	60	51.0	52.1	51.0	52.1	59
530670005	WA	Thurston	55.7	56	48.3	48.6	48.3	48.6	57
540030003	WV	Berkeley	68.0	70	52.6	54.2	52.6	54.2	63
540110006	WV	Cabell	69.3	72	57.0	59.2	57.0	59.2	64
540219991	WV	Gilmer	60.0	60	49.5	49.5	49.5	49.5	59
540250003	WV	Greenbrier	64.7	66	53.1	54.1	53.1	54.1	59
540291004	WV	Hancock	73.0	75	60.2	61.8	60.2	61.8	N/A
540390010	WV	Kanawha	72.3	74	60.1	61.5	60.1	61.5	N/A
540610003	WV	Monongalia	69.7	72	58.0	59.9	58.0	59.9	64
540690010	WV	Ohio	72.3	74	59.3	60.7	59.3	60.7	68
541071002	WV	Wood	68.3	71	54.5	56.6	54.5	56.6	68
550090026	WI	Brown	68.3	70	56.8	58.2	58.0	59.4	66
550210015	WI	Columbia	67.0	69	55.3	57.0	55.3	57.0	67
550250041	WI	Dane	66.3	69	55.8	58.1	55.8	58.1	65
550270001	WI	Dodge	71.5	72	61.5	61.9	61.5	61.9	68
550290004	WI	Door	75.7	78	63.6	65.5	63.3	65.2	72
550350014	WI	Eau Claire	62.0	62	50.0	50.0	50.0	50.0	61
550390006	WI	Fond du Lac	70.0	72	59.8	61.5	59.8	61.5	66
550410007	WI	Forest	64.7	67	53.3	55.2	53.3	55.2	63
550550002	WI	Jefferson	68.5	70	58.1	59.4	58.1	59.4	N/A
550590019	WI	Kenosha	81.0	84	58.7	60.9	64.8	67.2	77
550610002	WI	Kewaunee	75.0	78	64.0	66.5	64.5	67.1	69
550630012	WI	La Crosse	63.3	65	52.0	53.4	52.0	53.4	62

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
550710007	WI	Manitowoc	78.7	80	65.6	66.7	67.6	68.7	72
550730012	WI	Marathon	63.3	65	51.3	52.7	51.3	52.7	65
550790010	WI	Milwaukee	69.7	72	55.8	57.6	60.6	62.6	64
550790026	WI	Milwaukee	74.7	78	60.4	63.1	66.5	69.4	68
550790085	WI	Milwaukee	80.0	82	65.4	67.0	71.2	73.0	71
550870009	WI	Outagamie	69.3	72	59.1	61.4	59.1	61.4	67
550890008	WI	Ozaukee	76.3	80	65.7	68.8	67.2	70.5	71
550890009	WI	Ozaukee	74.7	77	62.2	64.1	63.6	65.5	73
551010017	WI	Racine	77.7	81	57.5	59.9	62.2	64.8	N/A
551050024	WI	Rock	69.5	72	58.9	61.1	58.9	61.1	N/A
551110007	WI	Sauk	65.0	67	54.2	55.8	54.2	55.8	64
551170006	WI	Sheboygan	84.3	87	70.8	73.1	72.8	75.1	79
551199991	WI	Taylor	63.0	63	51.1	51.1	51.1	51.1	61
551270005	WI	Walworth	69.3	71	59.7	61.2	59.7	61.2	70
551330027	WI	Waukesha	66.7	69	58.1	60.1	58.1	60.1	66
560050123	WY	Campbell	63.7	65	59.3	60.5	59.3	60.5	58
560050456	WY	Campbell	63.0	64	59.1	60.1	59.1	60.1	60
560070100	WY	Carbon	63.0	64	58.7	59.6	58.7	59.6	60
560130232	WY	Fremont	65.0	66	61.2	62.1	61.2	62.1	61
560210100	WY	Laramie	68.0	68	62.4	62.4	62.4	62.4	63
560350700	WY	Sublette	64.0	64	59.9	59.9	59.9	59.9	61
560370200	WY	Sweetwater	63.7	64	57.9	58.2	57.9	58.2	55
560370300	WY	Sweetwater	66.0	66	60.0	60.0	60.0	60.0	66
560391011	WY	Teton	65.3	66	62.6	63.3	62.4	63.1	60
560410101	WY	Uinta	64.3	65	58.0	58.6	58.0	58.6	61

Appendix B

Alpine Geophysics Final Modeling Report

“Good Neighbor” Modeling for the 2008 8-Hour Ozone State Implementation Plans

"Good Neighbor" Modeling for the 2008 8-Hour Ozone State Implementation Plans

Final Modeling Report

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December 2017
Project Number: TS-510

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1.0 INTRODUCTION

1.1 OVERVIEW

Sections 110(a)(1) and (2) of the Clean Air Act (CAA) require all states to adopt and submit to the U. S. Environmental Protection Agency (EPA) any revisions to their infrastructure State Implementation Plans (SIP) which provide for the implementation, maintenance and enforcement of a new or revised national ambient air quality standard (NAAQS). The EPA revised the ozone NAAQS in March 2008 and completed the designation process to identify nonattainment areas in July 2012. Through final action and rulemaking of the Cross-State Air Pollution Rule (CSAPR) (81 FR 74504), EPA has indicated its intention to issue a Federal Implementation Plan (FIP) to multiple states in the absence of an approved revision to the SIP.

CAA section 110(a)(2)(D)(i)(I) requires each state to prohibit emissions that will significantly contribute to nonattainment of a NAAQS, or interfere with maintenance of a NAAQS, in a downwind state. According to EPA many states' infrastructure certification failed to demonstrate that emissions activities within those states will not significantly contribute to nonattainment or interfere with maintenance of the 2008 ozone NAAQS in a neighboring state.

This document serves to provide the air quality modeling results for 8-hour ozone modeling analysis in support of the revision of 2008 8-hour ozone Good Neighbor State Implementation Plan (GNS). The 2008 8-hour ozone NAAQS form is the three year average of the fourth highest daily maximum 8-hour ozone concentrations with a threshold not to be exceeded of 0.075 ppm (75 ppb). On October 26, 2015, the EPA promulgated a new 8-hour ozone NAAQS with a threshold not to be exceeded of 0.070 ppm (70 ppb). Attainment of this new (2015) ozone NAAQS will be addressed in future SIP actions and may use results of this effort to inform that determination.

This document describes the overall modeling activities performed in order to demonstrate that states do not significantly contribute to nonattainment or interfere with maintenance of the 2008 ozone NAAQS in a neighboring state. This effort was undertaken working closely with states, other local agencies, and stakeholder groups, including the Midwest Ozone Group which funded this modeling.

A comprehensive draft Modeling Protocol for an 8-hour ozone SIP revision study was prepared and provided to EPA for comment and review relative to Kentucky's Good Neighbor SIP requirements on which this modeling is established. Based on EPA comments, the draft document was revised to include many of the comments and recommendations submitted, most importantly, but not limited to, using EPA's 2023en modeling platform (EPA, 2017a). This 2023en modeling platform represents EPA's estimation of a projected "base case" that demonstrates compliance with final CSAPR update seasonal EGU NOx budgets. A final Modeling Protocol (Alpine, 2017) was prepared and submitted to the Midwest Ozone Group and KYDAQ.

1.2 STUDY BACKGROUND

Section 110(a)(2)(D)(i)(I) of the CAA requires that states address the interstate transport of pollutants and ensure that emissions within the state do not contribute significantly to nonattainment in, or interfere with maintenance by, any other state. The following section is intended to address eastern state interstate transport, or “Good Neighbor,” responsibilities for the 2008 ozone NAAQS. Eastern states have many rules and limits currently in place that control ozone precursor pollutants and emissions of these pollutants are decreasing in the state. These facts strengthen the demonstration that no further controls or emission limits may be required to fulfil responsibilities under the Good Neighbor Provisions for the 2008 ozone NAAQS.

On October 26, 2016, EPA published in the Federal Register a final update to the Cross-State Air Pollution Rule (CSAPR) for the 2008 ozone NAAQS. In this final update, EPA outlines its four-tiered approach to addressing the interstate transport of pollution related to the ozone NAAQS, or states’ Good Neighbor responsibilities. EPA’s approach determines which states contribute significantly to nonattainment areas or significantly interfere with air quality in maintenance areas in downwind states. EPA has determined that if a state’s contribution to downwind air quality problems is below one percent of the applicable NAAQS, then it does not consider that state to be significantly contributing to the downwind area’s nonattainment or maintenance concerns. EPA’s approach to addressing interstate transport has been shaped by public notice and comment and refined in response to court decisions.

As part of the final CSAPR update, EPA released regional air quality modeling to support the 2008 ozone NAAQS attainment date of 2017, indicating which states significantly contribute to nonattainment or maintenance area air quality problems in other states. To make these determinations, the EPA projected future ozone nonattainment and maintenance receptors, then conducted state-level ozone source apportionment modeling to determine which states contributed pollution over a pre-identified “contribution threshold.”

Multiple upwind states’ contributions to projected downwind nonattainment area air quality was found to be over the one-percent threshold at numerous final CSAPR-identified nonattainment and maintenance (“problem”) monitors. The one percent threshold for the 2008 NAAQS is 0.75 parts per billion (ppb). These monitors and their final CSAPR update base period and modeled future year design values are shown in Table 1-1.

Table 1-1. Final CSAPR Update-identified problem monitor base period and modeled future year design values (ppb) .

Monitor ID	State	County	2009-2013 Base Period Average Design Value (ppb)	2009-2013 Base Period Maximum Design Value (ppb)	2017 Base Case Average Design Value (ppb)	2017 Base Case Maximum Design Value (ppb)
Nonattainment Monitors						
90019003	Connecticut	Fairfield	83.7	87	76.5	79.5
90099002	Connecticut	New Haven	85.7	89	76.2	79.2
480391004	Texas	Brazoria	88.0	89	79.9	80.8
484392003	Texas	Tarrant	87.3	90	77.3	79.7
484393009	Texas	Tarrant	86.0	86	76.4	76.4
551170006	Wisconsin	Sheboygan	84.3	87	76.2	78.7
Maintenance Monitors						
90010017	Connecticut	Fairfield	80.3	83	74.1	76.6
90013007	Connecticut	Fairfield	84.3	89	75.5	79.7
211110067	Kentucky	Jefferson	85.0	85	76.9	76.9
240251001	Maryland	Harford	90.0	93	78.8	81.4
260050003	Michigan	Allegan	82.7	86	74.7	77.7
360850067	New York	Richmond	81.3	83	75.8	77.4
361030002	New York	Suffolk	83.3	85	76.8	78.4
390610006	Ohio	Hamilton	82.0	85	74.6	77.4
421010024	Pennsylvania	Philadelphia	83.3	87	73.6	76.9
481210034	Texas	Denton	84.3	87	75.0	77.4
482010024	Texas	Harris	80.3	83	75.4	77.9
482011034	Texas	Harris	81.0	82	75.7	76.6
482011039	Texas	Harris	82.0	84	76.9	78.8

Because upwind state contribution to projected downwind maintenance problems is above the one percent threshold and thus significant, additional analyses are required to fulfil these state responsibilities under the Good Neighbor Provisions for the 2008 ozone NAAQS.

1.2.1 Current Ozone Air Quality at the Problem Monitors

Table 1-2 displays the maximum 8-hour ozone Design Values from 2008-2015 along with the highest fourth highest daily maximum 8-hour ozone concentration at the CSAPR-problem monitors. The fourth highest daily maximum 8-hour ozone concentration at these monitors exhibits high year-to-year variability that is primarily due to meteorological variations that can cause the values to change between successive years. Use of the three-year average of these fourth highest values in the ozone Design Value results in a suppression of this variability so that the differences in the maximum 8-hour ozone Design Value over this period is less pronounced.

Table 1-2. Final CSAPR Update-identified problem monitor design value observations (ppb).

			4th Highest (ppb)								3-yr Avg (ppb)					
Site ID	**State**	**County**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2008-10**	**2009-11**	**2010-12**	**2011-13**	**2012-14**	**2013-15**
Nonattainment Monitors																
90019003	Connecticut	Fairfield	90	73	79	87	89	86	81	87	80	79	85	87	85	84
90099002	Connecticut	New Haven		73	79	92	90	85	69	81		81	87	89	81	78
480391004	Texas	Brazoria	75	91	88	90	87	84	71	86	84	89	88	87	80	80
484392003	Texas	Tarrant	85	90	85	97	79	80	74	76	86	90	87	85	77	76
484393009	Texas	Tarrant	77	86	83	91	86	83	73	79	82	86	86	86	80	78
551170006	Wisconsin	Sheboygan	75	74	85	84	93	78	72	81	78	81	87	85	81	77
Maintenance Monitors																
90010017	Connecticut	Fairfield	88	68	79	81	88	82	78	84	78	76	82	83	82	81
90013007	Connecticut	Fairfield	78	73	79	87	90	90	74	86	76	79	85	89	84	83
211110067	Kentucky	Jefferson			85	82	90	65	70	76			85	79	75	70
240251001	Maryland	Harford	89	83	96	98	86	72	67	74	89	92	93	85	75	71
260050003	Michigan	Allegan	73	76	73	85	95	78	77	72	74	78	84	86	83	75
360850067	New York	Richmond	64	78	85	87	78	71	72	79	75	83	83	78	73	74
361030002	New York	Suffolk	83	79	85	89	83	72	66	78	82	84	85	81	73	72
390610006	Ohio	Hamilton	86	72	80	88	87	69	70	72	79	80	85	81	75	70
421010024	Pennsylvania	Philadelphia	87	72	88	89	85	68	72	79	82	83	87	80	75	73
481210034	Texas	Denton	84	82	74	95	81	85	77	88	80	83	83	87	81	83
482010024	Texas	Harris	83	80	87	83	75	74	68	95	83	83	81	77	72	79
482011034	Texas	Harris	73	79	76	88	83	69	66	88	76	81	82	80	72	74
482011039	Texas	Harris	76	82	85	83	85	69	63	77	81	83	84	79	72	69

1.2.3 Purpose

This document serves to provide air quality modeling results for the 8-hour ozone modeling analysis in support of revisions of 2008 8-hour ozone Good Neighbor State Implementation Plans. This document demonstrates that emissions activities within eastern states will not significantly contribute to nonattainment or interfere with maintenance of the 2008 ozone NAAQS in a neighboring state with the four problem monitors identified in the final CSAPR update.

1.3 LEAD AGENCY AND PRINCIPAL PARTICIPANTS

Individual impacted states will be the lead agency in the development of 8-hour ozone SIP revisions. Relevant EPA Regional offices will be the local regional EPA office that will take the lead in the review and approval process for this SIP revision.

1.4 OVERVIEW OF MODELING APPROACH

The GNS 8-Hour ozone SIP modeling documented here includes an ozone simulation study using the 12 km grid based on EPA's 2023en modeling platform and preliminary source contribution assessment (EPA, 2016b).

1.4.1 Episode Selection

Episode selection is an important component of an 8-hour ozone attainment demonstration. EPA guidance recommends that 10 days be used to project 8-hour ozone Design Values at each critical monitor. The May 1 through August 31 2011 ozone season period was selected for the ozone SIP modeling primarily due to the following reasons:

- It is aligned with the 2011 NEI year, which is the latest currently available NEI.
- It is not an unusually low ozone year.
- Ambient meteorological and air quality data are available.
- A 2011 12 km CAMx modeling platform is available from the EPA that can be leveraged for the GNS ozone SIP modeling.

More details of the summer 2011 episode selection and justification using criteria in EPA's modeling guidance are contained in Section 3.

1.4.2 Model Selection

Details on the rationale for model selection are provided in Section 2. The Weather Research Forecast (WRF) prognostic meteorological model was selected for the GNS ozone modeling using a 12 km resolution grid. Additional emission modeling is not required as the 2023en platform was provided to Alpine in pre-merged CAMx ready format. Emissions processing was completed by EPA using the SMOKE emissions model for most source categories. The exceptions are that BEIS model was used for biogenic emissions and there are special processors for fires, windblown dust, lightning and sea salt emissions. The MOVES2014 on-road mobile source emissions model was used with SMOKE-MOVES to generate on-road mobile source emissions with EPA generated vehicle activity data provided in the NAAQS NODA. The CAMx photochemical grid model was also be used. The setup is based on the same WRF/SMOKE/BEIS/CAMx modeling system used in the EPA 2023en platform modeling.

1.4.3 Base and Future Year Emissions Data

The 2023 future year was selected for the attainment demonstration modeling based on OAQPS Director Steven Page's October 27, 2017 memo (Page, 2017, page 4) to Regional Air Directors. In this memo, Director Page identified the two primary reasons the EPA selected 2023 for their 2008 NAAQS modeling; (1) the D.C. Circuit Court's response to *North Carolina v. EPA* in considering downwind attainment dates for the 2008 NAAQS, and (2) EPA's consideration of the timeframes that may be required for implementing further emission reductions as expeditiously as possible. The 2011 base case and 2023 future year emissions will be based on EPA's "en" inventories with no adjustment. This platform has been identified by EPA as the base case for compliance with the final CSAPR update seasonal EGU NOx emission budgets.

1.4.4 Input Preparation and QA/QC

Quality assurance (QA) and quality control (QC) of the emissions datasets are some of the most critical steps in performing air quality modeling studies. Because emissions processing is tedious, time consuming and involves complex manipulation of many different types of large databases, rigorous QA measures are a necessity to prevent errors in emissions processing from occurring. The GNS 8-Hour ozone modeling study utilized EPA's pre-QA/QC'd emissions platform that followed a multistep emissions QA/QC approach.

1.4.5 Meteorology Input Preparation and QA/QC

The CAMx 2011 12 km meteorological inputs are based on WRF meteorological modeling conducted by EPA. Details on the EPA 2011 WRF application and evaluation are provided by EPA (EPA 2014d).

1.4.6 Initial and Boundary Conditions Development

Initial concentrations (IC) and Boundary Conditions (BCs) are important inputs to the CAMx model. We ran 15 days of model spin-up before the first high ozone days occur in the modeling domain so the ICs are washed out of the modeling domain before the first high ozone day of the May-August 2011 modeling period. The lateral boundary and initial species concentrations are provided by a three dimensional global atmospheric chemistry model, GEOS-Chem (Yantosca, 2004) standard version 8-03-02 with 8-02-01 chemistry.

1.4.7 Air Quality Modeling Input Preparation and QA/QC

Each step of the air quality modeling was subjected to QA/QC procedures. These procedures included verification of model configurations, confirmation that the correct data were used and processed correctly, and other procedures.

1.4.8 Model Performance Evaluation

The Model Performance Evaluation (MPE) relied on the CAMx MPE from EPA's associated modeling platforms. EPA's MPE recommendations in their ozone modeling guidance (EPA, 2007; 2014e) were followed in this evaluation. Many of EPA's MPE procedures have already been performed by EPA in their CAMx 2011 modeling database being used in the GNS ozone SIP modeling.

1.4.9 Diagnostic Sensitivity Analyses

Since no issues were identified in confirming Alpine's CAMx runs compared to EPA's using the same modeling platform and configuration, additional diagnostic sensitivity analyses were not required.

2.0 MODEL SELECTION

This section documents the models used in the 8-hour ozone GNS SIP modeling study. The selection methodology presented in this chapter mirrors EPA's regulatory modeling in support of the 2008 Ozone NAAQS Preliminary Interstate Transport Assessment (Page, 2017; EPA, 2016b).

Unlike some previous ozone modeling guidance that specified a particular ozone model (e.g., EPA, 1991 that specified the Urban Airshed Model; Morris and Myers, 1990), the EPA now recommends that models be selected for ozone SIP studies on a "case-by-case" basis. The latest EPA ozone guidance (EPA, 2014) explicitly mentions the CMAQ and CAMx PGMs as the most commonly used PGMs that would satisfy EPA's selection criteria but notes that this is not an exhaustive list and does not imply that they are "preferred" over other PGMs that could also be considered and used with appropriate justification. EPA's current modeling guidelines lists the following criteria for model selection (EPA, 2014e):

- It should not be proprietary;
- It should have received a scientific peer review;
- It should be appropriate for the specific application on a theoretical basis;
- It should be used with data bases which are available and adequate to support its application;
- It should be shown to have performed well in past modeling applications;
- It should be applied consistently with an established protocol on methods and procedures;
- It should have a user's guide and technical description;
- The availability of advanced features (e.g., probing tools or science algorithms) is desirable; and
- When other criteria are satisfied, resource considerations may be important and are a legitimate concern.

For the GNS 8-hour ozone modeling, we used the WRF/SMOKE/MOVES2014/BEIS/CAMx-OSAT/APCA modeling system as the primary tool for demonstrating attainment of the ozone NAAQS at downwind monitors at downwind problem monitors. The utilized modeling system satisfies all of EPA's selection criteria. A description of the key models to be used in the GNS ozone SIP modeling follows.

<u>WRF/ARW:</u> The Weather Research and Forecasting (WRF)[1] Model is a mesoscale numerical weather prediction system designed to serve both operational forecasting and atmospheric research needs (Skamarock, 2004; 2006; Skamarock et al., 2005). The Advanced Research WRF (ARW) version of WRF was used in this ozone modeling study. It features multiple dynamical cores, a 3-dimensional variational (3DVAR) data assimilation system, and a software architecture allowing for computational parallelism and system extensibility. WRF is suitable for a broad spectrum of applications across scales ranging from meters to thousands of

1 http://www.wrf-model.org/index.php

kilometers. The effort to develop WRF has been a collaborative partnership, principally among the National Center for Atmospheric Research (NCAR), the National Oceanic and Atmospheric Administration (NOAA), the National Centers for Environmental Prediction (NCEP) and the Forecast Systems Laboratory (FSL), the Air Force Weather Agency (AFWA), the Naval Research Laboratory, the University of Oklahoma, and the Federal Aviation Administration (FAA). WRF allows researchers the ability to conduct simulations reflecting either real data or idealized configurations. WRF provides operational forecasting a model that is flexible and efficient computationally, while offering the advances in physics, numerics, and data assimilation contributed by the research community.

SMOKE: The Sparse Matrix Operator Kernel Emissions (SMOKE)[2] modeling system is an emissions modeling system that generates hourly gridded speciated emission inputs of mobile, non-road, area, point, fire and biogenic emission sources for photochemical grid models (Coats, 1995; Houyoux and Vukovich, 1999). As with most 'emissions models', SMOKE is principally an emission processing system and not a true emissions modeling system in which emissions estimates are simulated from 'first principles'. This means that, with the exception of mobile and biogenic sources, its purpose is to provide an efficient, modern tool for converting an existing base emissions inventory data into the hourly gridded speciated formatted emission files required by a photochemical grid model. SMOKE was used by EPA to prepare 2023en emission inputs for non-road mobile, area and point sources. These files were adopted and used as-is for this analysis.

SMOKE-MOVES: SMOKE-MOVES uses an Emissions Factor (EF) Look-Up Table from MOVES, gridded vehicle miles travelled (VMT) and other activity data and hourly gridded meteorological data (typically from WRF) and generates hourly gridded speciated on-road mobile source emissions inputs.

MOVES2014: MOVES2014[3] is EPA's latest on-road mobile source emissions model that was first released in July 2014 (EPA, 2014a,b,c). MOVES2014 includes the latest on-road mobile source emissions factor information. Emission factors developed by EPA were used in this analysis.

BEIS: Biogenic emissions were modeled by EPA using version 3.61 of the Biogenic Emission Inventory System (BEIS). First developed in 1988, BEIS estimates volatile organic compound (VOC) emissions from vegetation and nitric oxide (NO) emissions from soils. Because of resource limitations, recent BEIS development has been restricted to versions that are built within the Sparse Matrix Operational Kernel Emissions (SMOKE) system.

CAMx: The Comprehensive Air quality Model with Extensions (CAMx[4]) is a state-of-science "One-Atmosphere" photochemical grid model capable of addressing ozone, particulate matter (PM), visibility and acid deposition at regional scale for periods up to one year (ENVIRON, 2015[5]). CAMx is a publicly available open-source computer modeling system for the integrated assessment of gaseous and particulate air pollution. Built on today's understanding that air

2 http://www.smoke-model.org/index.cfm
3 http://www.epa.gov/otaq/models/moves/
4 http://www.camx.com
5 http://www.camx.com/files/camxusersguide_v6-20.pdf

quality issues are complex, interrelated, and reach beyond the urban scale, CAMx is designed to (a) simulate air quality over many geographic scales, (b) treat a wide variety of inert and chemically active pollutants including ozone, inorganic and organic $PM_{2.5}$ and PM_{10} and mercury and toxics, (c) provide source-receptor, sensitivity, and process analyses and (d) be computationally efficient and easy to use. The U.S. EPA has approved the use of CAMx for numerous ozone and PM State Implementation Plans throughout the U.S., and has used this model to evaluate regional mitigation strategies including those for most recent regional rules (e.g., Transport Rule, CAIR, NO_X SIP Call, etc.). The current version of CAMx is Version 6.40 that was used in this study.

OSAT/APCA: Ozone Source Apportionment Technique/Anthropogenic Precursor Culpability Assessment (OSAT/APCA) tool of CAMx was selected to develop source contribution and significant contribution calculations and was not required for this analysis.

3.0 EPISODE SELECTION

EPA's most recent 8-hour ozone modeling guidance (EPA, 2014e) contains recommended procedures for selecting modeling episodes The GNS ozone SIP revision modeling used the May through end of August 2011 modeling period because it satisfies the most criteria in EPA's modeling guidance episode selection discussion.

EPA guidance recommends that 10 days be used to project 8-hour ozone Design Values at each critical monitor. The May through August 2011 period has been selected for the ozone SIP modeling primarily due to being aligned with the 2011 NEI year, not being an unusually low ozone year and availability of a 2011 12 km CAMx modeling platform from the EPA NAAQS NODA.

4.0 MODELING DOMAIN SELECTION

This section summarizes the modeling domain definitions for the GNS 8-hour ozone modeling, including the domain coverage, resolution, and map projection. It also discusses emissions, aerometric, and other data available for use in model input preparation and performance testing.

4.1 HORIZONTAL DOMAIN

The GNS ozone SIP modeling used a 12 km continental U.S. (12US2) domain. The 12 km nested grid modeling domain configuration is shown in Figure 4-1. The 12 km domain shown in Figure 4-1 represents the CAMx 12km air quality and SMOKE/BEIS emissions modeling domain. The WRF meteorological modeling was run on larger 12 km modeling domains than used for CAMx as demonstrated in EPA's meteorological model performance evaluation document (EPA, 2014d). The WRF meteorological modeling domains are defined larger than the air quality modeling domains because meteorological models can sometimes produce artifacts in the meteorological variables near the boundaries as the prescribed boundary conditions come into dynamic balance with the coupled equations and numerical methods in the meteorological model.

Figure 4-1. Map of 12km CAMx modeling domains. Source: EPA NAAQS NODA.

4.2 VERTICAL MODELING DOMAIN

The CAMx vertical structure is primarily defined by the vertical layers used in the WRF meteorological modeling. The WRF model employs a terrain following coordinate system defined by pressure, using multiple layer interfaces that extend from the surface to 50 mb (approximately 19 km above sea level). EPA ran WRF using 35 vertical layers. A layer averaging scheme is adopted for CAMx simulations whereby multiple WRF layers are combined into one CAMx layer to reduce the air quality model computational time. Table 4-1 displays the approach for collapsing the WRF 35 vertical layers to 25 vertical layers in CAMx.

Table 4-1. WRF and CAMx layers and their approximate height above ground level.

CAMx Layer	WRF Layers	Sigma P	Pressure (mb)	Approx. Height (m AGL)
25	35	0.00	50.00	17,556
	34	0.05	97.50	14,780
24	33	0.10	145.00	12,822
	32	0.15	192.50	11,282
23	31	0.20	240.00	10,002
	30	0.25	287.50	8,901
22	29	0.30	335.00	7,932
	28	0.35	382.50	7,064
21	27	0.40	430.00	6,275
	26	0.45	477.50	5,553
20	25	0.50	525.00	4,885
	24	0.55	572.50	4,264
19	23	0.60	620.00	3,683
18	22	0.65	667.50	3,136
17	21	0.70	715.00	2,619
16	20	0.74	753.00	2,226
15	19	0.77	781.50	1,941
14	18	0.80	810.00	1,665
13	17	0.82	829.00	1,485
12	16	0.84	848.00	1,308
11	15	0.86	867.00	1,134
10	14	0.88	886.00	964
9	13	0.90	905.00	797
	12	0.91	914.50	714
8	11	0.92	924.00	632
	10	0.93	933.50	551
7	9	0.94	943.00	470
	8	0.95	952.50	390
6	7	0.96	962.00	311
5	6	0.97	971.50	232
4	5	0.98	981.00	154
	4	0.99	985.75	115
3	3	0.99	990.50	77
2	2	1.00	995.25	38
1	1	1.00	997.63	19

4.3 DATA AVAILABILITY

The CAMx modeling systems requires emissions, meteorology, surface characteristics, initial and boundary conditions (IC/BC), and ozone column data for defining the inputs.

4.3.1 Emissions Data

Without exception, the 2011 base year and 2023 base case emissions inventories for ozone modeling for this analysis were based on emissions obtained from the EPA's "en" modeling platform. This platform was obtained from EPA, via LADCO, in late September of 2017 and represents EPA's best estimate of all promulgated national, regional, and local control strategies, including final implementation of the seasonal EGU NOx emission budgets outlined in CSAPR.

4.3.2 Air Quality

Data from ambient monitoring networks for gas species are used in the model performance evaluation. Table 4-2 summarizes routine ambient gaseous and PM monitoring networks available in the U.S.

4.3.4 Meteorological Data

Meteorological data were generated by EPA using the WRF prognostic meteorological model (EPA, 2014d). WRF was run on a continental U.S. 12 km grid for the NAAQS NODA platform.

4.3.5 Initial and Boundary Conditions Data

The lateral boundary and initial species concentrations are provided by a three dimensional global atmospheric chemistry model, GEOS-Chem (Yantosca, 2004) standard version 8-03-02 with 8-02-01 chemistry. The global GEOS-Chem model simulates atmospheric chemical and physical processes driven by assimilated meteorological observations from the NASA's Goddard Earth Observing System (GEOS-5; additional information available at: http://gmao.gsfc.nasa.gov/GEOS/ and http://wiki.seas.harvard.edu/geos-chem/index.php/GEOS-5). This model was run for 2011 with a grid resolution of 2.0 degrees x 2.5 degrees (latitude-longitude). The predictions were used to provide one-way dynamic boundary concentrations at one-hour intervals and an initial concentration field for the CAMx simulations. The 2011 boundary concentrations from GEOS-Chem will be used for the 2011 and 2023 model simulations.

Table 4-2. Overview of routine ambient data monitoring networks.

Monitoring Network	Chemical Species Measured	Sampling Period	Data Availability/Source
The Interagency Monitoring of Protected Visual Environments (IMPROVE)	Speciated PM25 and PM10 (see species mappings)	1 in 3 days; 24 hr average	http://vista.cira.colostate.edu/improve/Data/IMPROVE/improve_data.htm
Clean Air Status and Trends Network (CASTNET)	Speciated PM25, Ozone (see species mappings)	Approximately 1-week average	http://www.epa.gov/castnet/data.html
National Atmospheric Deposition Program (NADP)	Wet deposition (hydrogen (acidity as pH), sulfate, nitrate, ammonium, chloride, and base cations (such as calcium, magnesium, potassium and sodium)), Mercury	1-week average	http://nadp.sws.uiuc.edu/
Air Quality System (AQS) or Aerometric Information Retrieval System (AIRS)	CO, NO2, O3, SO2, PM25, PM10, Pb	Typically hourly average	http://www.epa.gov/air/data/
Chemical Speciation Network (CSN)	Speciated PM	24-hour average	http://www.epa.gov/ttn/amtic/amticpm.html
Photochemical Assessment Monitoring Stations (PAMS)	Varies for each of 4 station types.		http://www.epa.gov/ttn/amtic/pamsmain.html
National Park Service Gaseous Pollutant Monitoring Network	Acid deposition (Dry; SO4, NO3, HNO3, NH4, SO2), O3, meteorological data	Hourly	http://www2.nature.nps.gov/ard/gas/netdata1.htm

5.0 MODEL INPUT PREPARATION PROCEDURES

This section summarizes the procedures used in developing the meteorological, emissions, and air quality inputs to the CAMx model for the GNS 8-hour ozone modeling on the 12 km grid for the May through August 2011 period. The 12 km CAMx modeling databases are based on the EPA "en" platform (EPA, 2017a; Page, 2017) databases. While some of the data prepared for this platform are new, many of the files are largely based on the NAAQS NODA platform. More details on the NAAQS NODA 2011 CAMx database development are provided in EPA documentation as follows:

- Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform (EPA, 2016a).
- Meteorological Model Performance for Annual 2011 WRF v3.4 Simulation (EPA, 2014d).
- Air Quality Modeling Technical Support Document for the 2015 Ozone NAAQS Preliminary Interstate Transport Assessment (EPA, 2016b).

The modeling procedures used in the modeling are consistent with over 20 years of EPA ozone modeling guidance documents (e.g., EPA, 1991; 1999; 2005a; 2007; 2014), other recent 8-hour ozone modeling studies conducted for various State and local agencies using these or other state-of-science modeling tools (see, for example, Morris et al., 2004a,b, 2005a,b; 2007; 2008a,b,c; Tesche et al., 2005a,b; Stoeckenius et al., 2009; ENVIRON, Alpine and UNC, 2013; Adelman, Shanker, Yang and Morris, 2014; 2015), as well as the methods used by EPA in support of the recent Transport analysis (EPA, 2010; 2015b, 2016b).

5.1 METEOROLOGICAL INPUTS

5.1.1 WRF Model Science Configuration

Version 3.4 of the WRF model, Advanced Research WRF (ARW) core (Skamarock, 2008) was used for generating the 2011 simulations. Selected physics options include Pleim-Xiu land surface model, Asymmetric Convective Model version 2 planetary boundary layer scheme, KainFritsch cumulus parameterization utilizing the moisture-advection trigger (Ma and Tan, 2009), Morrison double moment microphysics, and RRTMG longwave and shortwave radiation schemes (Gilliam and Pleim, 2010). The WRF model configuration was prepared by EPA (EPA, 2014d).

5.1.2 WRF Input Data Preparation Procedures

A summary of the WRF input data preparation procedures that were used are listed in EPA's documentation (EPA, 2014d).

5.1.3 WRF Model Performance Evaluation

The WRF model evaluation approach was based on a combination of qualitative and quantitative analyses. The quantitative analysis was divided into monthly summaries of 2-m temperature, 2-m mixing ratio, and 10-m wind speed using the boreal seasons to help generalize the model bias and error relative to a set of standard model performance benchmarks. The qualitative approach was to compare spatial plots of model estimated monthly total precipitation with the monthly PRISM precipitation. The WRF model performance evaluation for the 12km domain is provided in EPA's documentation (EPA, 2014d).

5.1.3 WRFCAMx/MCIP Reformatting Methodology

The WRF meteorological model output data was processed to provide inputs for the CAMx photochemical grid model. The WRFCAMx processor maps WRF meteorological fields to the format required by CAMx. It also calculates turbulent vertical exchange coefficients (Kz) that define the rate and depth of vertical mixing in CAMx. A summary of the methodology used by EPA to reform the meteorological data into CAMx format is provided in EPA's documentation (EPA, 2014d).

5.2 EMISSION INPUTS

5.2.1 Available Emissions Inventory Datasets

The base year and future year base case emission inventories used for the GNS 8-hour ozone modeling study were based on EPA's "en" modeling platform (EPA, 2017a) without exception.

5.2.2 Development of CAMx-Ready Emission Inventories

CAMx-ready emission inputs were generated by EPA mainly by the SMOKE and BEIS emissions models. CAMx requires two emission input files for each day: (1) low level gridded emissions that are emitted directly into the first layer of the model from sources at the surface with little or no plume rise; and (2) elevated point sources (stacks) with plume rise calculated from stack parameters and meteorological conditions. For this analysis, CAMx will be operated using version 6 revision 4 of the Carbon Bond chemical mechanism (CB6r4).

EPA's 2011 base year and 2023 future year inventories from the "en" platform were used for all categories.

5.2.2.1 Episodic Biogenic Source Emissions

Biogenic emissions were generated by EPA using the BEIS biogenic emissions model within SMOKE. BEIS uses high resolution GIS data on plant types and biomass loadings and the WRF surface temperature fields, and solar radiation (modeled or satellite-derived) to develop hourly emissions for biogenic species on the 12 km grids. BEIS generates gridded, speciated, temporally allocated emission files

5.2.2.2 Point Source Emissions

2011 point source emissions were from the 2011 "en" modeling platform. Point sources were developed in two categories: (1) major point sources with Continuous Emissions Monitoring (CEM) devices; and (2) point sources without CEMs. For point sources with continuous emissions monitoring (CEM) data, day-specific hourly NOX and SO2 emissions were used for the 2011 base case emissions scenario. The VOC, CO and PM emissions for point sources with CEM data were based on the annual emissions temporally allocated to each hour of the year using the CEM hourly heat input. The locations of the point sources were converted to the LCP coordinate system used in the modeling. They were processed by EPA using SMOKE to generate the temporally varying (i.e., day-of-week and hour-of-day) speciated emissions needed by CAMx, using profiles by source category from the EPA "en" modeling platform.

5.2.2.3 Area and Non-Road Source Emissions

2011 area and non-road emissions were from the 2011 “en” modeling platform. The area and non-road sources were spatially allocated to the grid using an appropriate surrogate distribution (e.g., population for home heating, etc.). The area sources were temporally allocated by month and by hour of day using the EPA source-specific temporal allocation factors. The SMOKE source-specific CB6 speciation allocation profiles were also used.

5.2.2.4 Wildfires, Prescribed Burns, Agricultural Burns

Fire emissions in 2011NEIv2 were developed based on Version 2 of the Satellite Mapping Automated Reanalysis Tool for Fire Incident Reconciliation (SMARTFIRE) system (Sullivan, et al., 2008). SMARTFIRE2 was the first version of SMARTFIRE to assign all fires as either prescribed burning or wildfire categories. In past inventories, a significant number of fires were published as unclassified, which impacted the emissions values and diurnal emissions pattern. Recent updates to SMARTFIRE include improved emission factors for prescribed burning.

5.2.2.5 QA/QC and Emissions Merging

EPA processed the emissions by major source category in several different “streams”, including area sources, on-road mobile sources, non-road mobile sources, biogenic sources, non-CEM point sources, CEM point sources using day-specific hourly emissions, and emissions from fires. Separate Quality Assurance (QA) and Quality Control (QC) were performed for each stream of emissions processing and in each step following the procedures utilized by EPA. SMOKE includes advanced quality assurance features that include error logs when emissions are dropped or added. In addition, we generated visual displays that included spatial plots of the hourly emissions for each major species (e.g., NOX, VOC, some speciated VOC, SO2, NH3, PM and CO).

Scripts to perform the emissions merging of the appropriate biogenic, on-road, non-road, area, low-level, fire, and point emission files were written to generate the CAMx-ready two-dimensional day and domain-specific hourly speciated gridded emission inputs. The point source and, as available elevated fire, emissions were processed into the day-specific hourly speciated emissions in the CAMx-ready point source format.

The resultant CAMx model-ready emissions were subjected to a final QA using spatial maps to assure that: (1) the emissions were merged properly; (2) CAMx inputs contain the same total emissions; and (3) to provide additional QA/QC information.

5.2.3 Use of the Plume-in-Grid (PiG) Subgrid-Scale Plume Treatment

Consistent with the EPA 2011 modeling platform, no PiG subgrid-scale plume treatment will be used.

5.2.4 Future-Year Emissions Modeling

Future-year emission inputs were generated by processing the 2023 emissions data provided with EPA’s “en” modeling platform without exception.

5.3 PHOTOCHEMICAL MODELING INPUTS

5.3.1 CAMx Science Configuration and Input Configuration

This section describes the model configuration and science options used in the GNS 8-hour ozone modeling effort.

The latest version of CAMx (Version 6.40) was used in the GNS ozone modeling. The CAMx model setup used is defined by EPA in its air quality modeling technical support document (EPA, 2016b, 2017).

6.0 MODEL PERFORMANCE EVALUATION

The CAMx 2011 base case model estimates are compared against the observed ambient ozone and other concentrations to establish that the model is capable of reproducing the current year observed concentrations so it is likely a reliable tool for estimating future year ozone levels.

6.1 EPA MODEL PERFORMACE EVALUATION

6.1.1 Overview of EPA Model Performance Evaluation Recommendations

EPA current (EPA, 2007) and draft (EPA, 2014e) ozone modeling guidance recommendations for model performance evaluation (MPE) describes a MPE framework that has four components:

- Operation evaluation that includes statistical and graphical analysis aimed at determining how well the model simulates observed concentrations (i.e., does the model get the right answer).
- Diagnostic evaluation that focuses on process-oriented evaluation and whether the model simulates the important processes for the air quality problem being studied (i.e., does the model get the right answer for the right reason).
- Dynamic evaluation that assess the ability of the model air quality predictions to correctly respond to changes in emissions and meteorology.
- Probabilistic evaluation that assess the level of confidence in the model predictions through techniques such as ensemble model simulations.

EPA's guidance recommends that *"At a minimum, a model used in an attainment demonstration should include a complete operational MPE using all available ambient monitoring data for the base case model simulations period"* (EPA, 2014, pg. 63). And goes on to say *"Where practical, the MPE should also include some level of diagnostic evaluation.* EPA notes that there is no single definite test for evaluation model performance, but instead there are a series of statistical and graphical MPE elements to examine model performance in as many ways as possible while building a *"weight of evidence"* (WOE) that the model is performing sufficiently well for the air quality problem being studied.

Because this 2011 ozone modeling is using a CAMx 2011 modeling database developed by EPA, we include by reference the air quality modeling performance evaluation as conducted by EPA (EPA, 2016b) on the national 12km domain and will include any additional documentation provided in the future on the use of the 2011en modeling configuration.

In summary, EPA conducted an operational model performance evaluation for ozone to examine the ability of the CAMx v6.32 and v.6.40 modeling systems to simulate 2011 measured concentrations. This evaluation focused on graphical analyses and statistical metrics of model predictions versus observations. Details on the evaluation methodology, the calculation of performance statistics, and results are provided in Appendix A of that report.

Overall, the ozone model performance statistics for the CAMx v6.32 2011 simulation are similar to those from the CAMx v6.20 2011 simulation performed by EPA for the final CSAPR Update. The 2011 CAMx model performance statistics are within or close to the ranges found in other recent peer-reviewed applications (e.g., Simon et al, 2012). As described in Appendix A of the AQ TSD, the predictions from the 2011 modeling platform correspond closely to observed concentrations in terms of the magnitude, temporal fluctuations, and geographic differences for 8-hour daily maximum ozone. We fully anticipate that the MPE performed for the 2011en platform will demonstrate similar results and will document final evaluation metrics in the documentation associated with the final SIP revision. Thus, the current model performance results demonstrate the scientific credibility of the 2011 modeling platform chosen and used for this analysis. These results provide confidence in the ability of the modeling platform to provide a reasonable projection of expected future year ozone concentrations and contributions.

7.0 FUTURE YEAR MODELING

This chapter discusses the future year modeling used in the GNS 8-hour ozone modeling effort.

7.1 FUTURE YEAR TO BE SIMULATED

As discussed in Section 1, to support the 2008 ozone NAAQS preliminary interstate transport assessment, EPA conducted air quality modeling to project ozone concentrations at individual monitoring sites to 2023 and to estimate state-by-state contributions to those 2023 concentrations. The projected 2023 ozone concentrations were used to identify ozone monitoring sites that are projected to be nonattainment or have maintenance problems for the 2008 ozone NAAQS in 2023.

7.2 FUTURE YEAR GROWTH AND CONTROLS

In September 2017, EPA released the revised “en” modeling platform that was the source for the 2023 future year emissions in this analysis. This platform has been identified by EPA as the base case for compliance with the final CSAPR update seasonal EGU NOx emission budgets. Additionally, there were several emission categories and model inputs/options that were held constant at 2011 levels as follows:

- Biogenic emissions.
- Wildfires, Prescribed Burns and Agricultural Burning (open land fires).
- Windblown dust emissions.
- Sea Salt.
- 36 km CONUS domain Boundary Conditions (BCs).
- 2011 12 km meteorological conditions.
- All model options and inputs other than emissions.

The effects of climate change on the future year meteorological conditions were not accounted. It has been argued that global warming could increase ozone due to higher temperatures producing more biogenic VOC and faster photochemical reactions (the so called climate penalty). However, the effects of inter-annual variability in meteorological conditions will be more important than climate change given the 12 year difference between the base (2011) and future (2023) years. It has also been noted that the level of ozone being transported into the U.S. from Asia has also increased.

7.3 FUTURE YEAR BASELINE AIR QUALITY SIMULATIONS

A 2023 future year base case CAMx simulation was conducted and 2023 ozone design value projection calculations were made based on EPA’s latest ozone modeling guidance (EPA, 2014).

7.4 CONCLUSIONS FROM 2023 CAMX MODELING

All sites identified in the final CSAPR update are predicted to be well below the 2008 ozone standard by 2023. Table 7-1 provides the GNS 2023 future year average and maximum design value modeling results from this analysis for the eastern state problem monitors identified in Section 1.

Based on these calculations, none of the problem monitors are predicted to be in nonattainment or have issues with maintenance in 2023 and therefore no states are required to estimate their contribution to these monitors.

Table 7-1. GNS Modeling results at Final CSAPR Update-identified problem monitors (ppb).

Monitor ID	State	County	2009-2013 Base Period Average Design Value (ppb)	2009-2013 Base Period Maximum Design Value (ppb)	2023 Base Case Average Design Value (ppb)	2023 Base Case Maximum Design Value (ppb)
Nonattainment Monitors						
90019003	Connecticut	Fairfield	83.7	87	72.7	75.6
90099002	Connecticut	New Haven	85.7	89	71.2	73.9
480391004	Texas	Brazoria	88.0	89	74.0	74.9
484392003	Texas	Tarrant	87.3	90	72.5	74.8
484393009	Texas	Tarrant	86.0	86	70.6	70.6
551170006	Wisconsin	Sheboygan	84.3	87	70.8	73.1
Maintenance Monitors						
90010017	Connecticut	Fairfield	80.3	83	69.8	72.1
90013007	Connecticut	Fairfield	84.3	89	71.2	75.2
211110067	Kentucky	Jefferson	85.0	85	70.1	70.1
240251001	Maryland	Harford	90.0	93	71.4	73.8
260050003	Michigan	Allegan	82.7	86	69.0	71.8
360850067	New York	Richmond	81.3	83	71.9	73.4
361030002	New York	Suffolk	83.3	85	72.5	74.0
390610006	Ohio	Hamilton	82.0	85	65.0	67.4
421010024	Pennsylvania	Philadelphia	83.3	87	67.3	70.3
481210034	Texas	Denton	84.3	87	69.7	72.0
482010024	Texas	Harris	80.3	83	70.4	72.8
482011034	Texas	Harris	81.0	82	70.8	71.6
482011039	Texas	Harris	82.0	84	71.8	73.6

Through this modeling analysis, has all upwind states identified in the final CSAPR Update demonstrated compliance with CAA Section 110(a)(2)(D)(i)(I) for the 2008 Ozone National Ambient Air Quality Standard.

8.0 MODELING DOCUMENTATION AND DATA ARCHIVE

EPA recommends that certain types of documentation be provided along with a photochemical modeling attainment demonstration. Alpine Geophysics is committed to supplying the material needed to ensure that the technical support for this SIP revision is understood by all stakeholders, EPA and states.

Alpine Geophysics plans to archive all documentation and modeling input/output files generated as part of the 8-hour modeling analysis and will maintain a copy for additional internal use. Key participants in this modeling effort will be given data access to the archived modeling information.

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Appendix C

Public Hearing

&

Statement of Consideration

Appendix C-1

Public Hearing

KENTUCKY DIVISION FOR AIR QUALITY
NOTICE OF PUBLIC HEARING
STATE IMPLEMENTATION PLAN REVISION RELATING TO THE 2008 OZONE CAA SECTION 110(a)(2)(D)(i)(I) SUBMITTAL

The Kentucky Energy and Environment Cabinet will conduct a public hearing on March 30, 2018, at 10:00 a.m. (EDT) in Conference Room 111 on the first floor of the 300 Building, located at 300 Sower Boulevard, Frankfort, Kentucky 40601. This hearing is being held to receive comments on a proposed revision to Kentucky's 2008 Ozone Standard Infrastructure State Implementation Plan (SIP) to address Clean Air Act section 110(a)(2)(D)(i)(I), also known as the "Good Neighbor" provision.

This hearing is open to the public and all interested persons will be given the opportunity to present testimony. The hearing will be held at the date, time and place given above. It is not necessary that the hearing be attended in order for persons to comment on the proposed submittal to EPA. To assure that all comments are accurately recorded, the Division requests that oral comments presented at the hearing also be provided in written form, if possible. To be considered part of the hearing record, written comments must be received by the close of the hearing on March 30, 2018. Written comments should be sent to the contact person.

The full text of the proposed SIP revision is available for public inspection and copying during regular business hours (8:00 a.m. to 4:30 p.m.) at the following location: Division for Air Quality, 300 Sower Boulevard, Frankfort, Kentucky 40601. Any individual requiring copies may submit a request to the Division for Air Quality in writing, by telephone or by fax. Requests for copies should be directed to the contact person. In addition, an electronic version of the proposed SIP revision document and relevant attachments can be downloaded from the Division for Air Quality's website at: **http://air.ky.gov/Pages/PublicNoticesandHearings.aspx.**

The hearing facility is accessible to people with disabilities. An interpreter or other auxiliary aid or service will be provided upon request. Please direct these requests to the contact person.

CONTACT PERSON: Lauren Hedge, Environmental Scientist, Evaluation Section, Division for Air Quality, 300 Sower Boulevard, Frankfort, Kentucky 40601. Phone: (502) 782-6561; E-mail: Lauren.Hedge@ky.gov.

The Energy and Environment Cabinet does not discriminate on the basis of race, color, national origin, sex, age, religion or disability and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford an individual with a disability an equal opportunity to participate in all services, programs and activities.

Energy and Environment Cabinet
DIVISION FOR AIR QUALITY
Public Hearing
March 30, 2018

Name: Melissa Duff		**TESTIMONY**			
Affiliation/Company: KY DAQ		**Verbal**	**Written**	**None**	**Time limited?**
Address:				✓	
City:	**State:** **Zip:**	**Copy of SOC?**			

Name: Brian Clark		**TESTIMONY**			
Affiliation/Company: KPMA		**Verbal**	**Written**	**None**	**Time limited?**
Address:				✓	
City:	**State:** **Zip:**	**Copy of SOC?**			

Name: Leslie Poff		**TESTIMONY**			
Affiliation/Company: KY DAQ		**Verbal**	**Written**	**None**	**Time limited?**
Address:				✓	
City:	**State:** **Zip:**	**Copy of SOC?**			

Name: Lauren Hedge		**TESTIMONY**			
Affiliation/Company: KY DAQ		**Verbal**	**Written**	**None**	**Time limited?**
Address:				✓	
City:	**State:** **Zip:**	**Copy of SOC?**			

Name:		**TESTIMONY**			
Affiliation/Company:		**Verbal**	**Written**	**None**	**Time limited?**
Address:					
City:	**State:** **Zip:**	**Copy of SOC?**			

COMMONWEALTH OF KENTUCKY
KENTUCKY DIVISION FOR AIR QUALITY
EVALUATION SECTION

RE: PROPOSED REVISION TO KENTUCKY 2008 OZONE STANDARD INFRASTRUCTURE STATE IMPLEMENTATION PLAN CLEAN AIR ACT SECTION 110(a)(2)(D)(i)(I)

PUBLIC HEARING

* * * * * * * *

10:00 A.M.
March 30, 2018
Sower Building
300 Sower Boulevard
Conference Room 111
Frankfort, Kentucky

* * * * * * * *

APPEARANCES

Hon. Lauren Hedge
MODERATOR

MOORE COURT REPORTING SERVICES
RITA S. MOORE
74 REILLY ROAD
FRANKFORT, KENTUCKY 40601
(502) 223-3507

ALSO PRESENT:

Brian Clark
Melissa Duff
Leslie Poff

MS. HEDGE: Good morning. It is March 30th, 2018 at 10 a.m. My name is Lauren Hedge with the Kentucky Division for Air Quality, Evaluation Section. As your Moderator, I declare this Public Hearing in session.

The Division asks that everyone attending today's hearing provide all the information requested on the attendance roster located at the entrance to the Conference Room. Today's hearing announcement was mailed to everyone on the Division's current mailing list. In addition, the notice was published on the Division's website.

This is a non-adversarial hearing. So, the Division will not respond to comments or questions regarding the proposed actions. And individuals who present testimony will not be questioned by anyone attending this hearing. A Division representative may, however, ask questions in order to clarify the meaning or intent of a comment.

All comments received in an appropriate format by the close of the comment period will receive equal consideration. The Statement of Consideration will be provided to anyone who requests a copy.

Ms. Rita Moore, to my right, is recording today's hearing. Anyone interested in obtaining a copy of the transcript should contact Ms. Moore. Are there any questions?

Today's hearing is being conducted in order to receive public comments concerning a proposed revision to Kentucky's 2008 Ozone Standard Infrastructure State Implementation Plan or SIP to address Clean Air Act Section 110(a)(2)(D)(i)(I), also known as the Good Neighbor Provision.

Since no one has indicated to present testimony at today's hearing, we'll pause the hearing record for ten to 15 minutes to allow for late arrivals and reopen the session. The time is 10:02 a.m., roughly.

(OFF THE RECORD)

MS. HEDGE: It is now 10:12 a.m. The hearing record is reopened. Are there any late arrivals who would like to present testimony? Does anyone present who has not offered comments previously have any final comments before we close the hearing? In the absence of any testimony, this public hearing is adjourned.

(END OF PUBLIC HEARING)

STATE OF KENTUCKY

COUNTY OF FRANKLIN

I, Rita Susan Moore, a notary public in and for the state and county aforesaid, do hereby certify that the foregoing four pages are a true, correct and complete transcript of the public hearing in the above-styled matter taken at the time and place set out in the caption hereof; that said public hearing was taken down by me in shorthand and afterwards transcribed by me.

Given under my hand as notary public aforesaid, this the 9th day of April, 2018.

____
Notary Public
State of Kentucky at Large

My commission expires January 8, 2020.

Appendix C-2

Public Comments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

March 27, 2018

Mr. Sean Alteri, Director
Division for Air Quality
Kentucky Department of
Environmental Protection
300 Sower Blvd, 2nd Floor
Frankfort, Kentucky 40601

Dear Mr. Alteri:

Thank you for your email dated February 27, 2018, transmitting a prehearing package of Kentucky's demonstration related to 110(a)(2)(D)(i)(I) for the 2008 ozone National Ambient Air Quality Standards. We understand that written comments are due by the close of the hearing on March 30, 2018. We have completed our preliminary review of the prehearing package and have no comments at this time.

We look forward to continuing to work with you and your staff. If you have any questions, please contact Ms. Lynorae Benjamin, Chief, Air Regulatory Management Section at (404) 562-9040, or have your staff contact Ms. Ashten Bailey at (404) 562-9164.

Sincerely,

R. Scott Davis

R. Scott Davis
Chief
Air Planning and Implementation Branch

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

March 29, 2018

Ms. Melissa Duff
Assistant Director
Kentucky Energy and Environment Cabinet
Division for Air Quality
300 Sower Boulevard
Frankfort, KY, 40601

Via email to Lauren.Hedge@ky.gov

Subject: Comments on Kentucky's Proposed State Implementation Plan Revision regarding the 2008 Ozone Standard Section CAA 110(a)(2)(D)(i)(I)

Dear Ms. Duff:

The Connecticut Department of Energy and Environmental Protection (CT DEEP) appreciates the opportunity to comment on Kentucky's proposed Good Neighbor State Implementation Plan (SIP) for the 2008 ozone national ambient air quality standard (NAAQS). Kentucky's efforts to date to reduce emissions is a critical step towards meeting Kentucky's obligations. However, CT DEEP disagrees that the proposed SIP is a complete remedy and urges Kentucky to consider additional emission reductions to fully satisfy its obligations under Clean Air Act (CAA) section 110(a)(2)(D)(i)(I).

Kentucky relies on EPA's CSAPR Update modeling for 2017 and 2023, as well as modeling conducted by Alpine Geophysics for 2023, to conclude that it is in full compliance with the CAA Good Neighbor requirements for the 2008 NAAQS. Both CT DEEP and the Ozone Transport Commission have previously expressed strong concerns[1] that EPA's modeling platform, which was also used by Alpine Geophysics,[2] produces overly optimistic projections of future year ozone levels. As shown in Table 1 (attached), actual measured 2017 ozone design values are considerably higher than modeled projections by 5 to 10 ppb at all Connecticut monitoring sites, confirming this concern. Table 1 also shows that ozone contributions from Kentucky sources exceed the one percent significance threshold at two violating Connecticut monitors after scaling contributions relative to the 2017 measured air quality levels. Kentucky's proposed SIP does not address this critical under prediction by the model of current measured ozone levels, which undermines Kentucky's conclusion that it has fully met its Good Neighbor obligations to Connecticut.

Kentucky's proposed SIP also relies on modeling projections that indicate all areas outside California will achieve attainment with the 2008 NAAQS by 2023. We note that some Connecticut monitors are projected to only barely comply by this late date (see Table 7-1 in Appendix B of the proposed SIP). Notwithstanding Connecticut's concerns about model under prediction of future year ozone levels, Kentucky's reliance on the 2023 modeling should be accompanied by enforceable regulations that ensure the lower 2023 emissions are achieved. For example, emissions from electric generating units (EGUs) are assumed in the modeling to decrease between 2017 and 2023, both annually and seasonally. Kentucky's

[1] https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0500-0342, https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0500-0025

[2] Although Kentucky's SIP narrative briefly mentions that adjustments were made to emission inventories, no details are provided. The Alpine Geophysics document included as Appendix B to the TSD indicates in several places that the modeling they conducted did not make any adjustments to EPA's emission inventories. The associated modeling results are identical to those produced by EPA's modeling. Therefore, the Alpine Geophysics modeling also likely under predicts future year ozone levels and does not provide any additional useful information beyond that provided previously by EPA.

2017 actual ozone season emissions (i.e., 20,023 tons) were less than EPA CSAPR Update budget level for the state (21,115 tons[3]). The 2023 modeling assumes ozone season EGU emissions will be even lower (16,954 tons). The projected level of 2023 emissions must be made federally enforceable, especially given the narrow margin by which the EPA/Alpine modeling projects Connecticut monitors will reach compliance in 2023.

Connecticut also challenges the arbitrary selection of using a 2023 timeline for determining Good Neighbor compliance with the 2008 ozone NAAQS. Connecticut was originally designated marginal with compliance expected by the end of the 2014 ozone season. Connecticut's nonattainment areas were last reclassified to moderate, and are currently faced with another reclassification to serious with an attainment deadline of 2020. Connecticut has not met attainment due to overwhelming transport from upwind areas including Kentucky. The arbitrary selection of 2023 only perpetuates the unjust economic and health burdens on Connecticut's citizens suffer due to the failure of Kentucky and other upwind states to fully meet their Good Neighbor obligations in a timely manner.

Connecticut's concerns regarding emissions from Kentucky's sources are buttressed by the recent CAA section 126 petition submitted to the EPA by New York.[4] New York's petition requests EPA to take action regarding stationary sources in nine upwind states, including Kentucky, that continue to interfere with attainment in the NY-NJ-CT nonattainment area for the 2008 ozone standard.

We encourage Kentucky to take proactive steps to adopt additional measures to fully meet its Good Neighbor obligations for the 2008 ozone NAAQS. The Ozone Transport Commission (OTC) recently adopted a statement identifying minimum control strategies that should be in all good neighbor SIPs.[5] Kentucky should ensure all these strategies are included in its SIP, as well as the other points noted in the OTC statement. Additionally, Connecticut believes targeting emissions reductions strategies on high emitting days can be especially effective for achieving maximum air quality benefit and urges Kentucky to adopt such targeted strategies. Together these focused strategies can target the emissions that most effect downwind air quality exceedances.

Connecticut appreciates Kentucky's efforts to date and urges Kentucky to take the final steps to fulfill the Good Neighbor obligations. We look forward to a cleaner future together.

Sincerely,

Richard A. Pirolli, Director
Air Planning and Standards Division

RAP:KK:jad

[3] See: https://www.epa.gov/sites/production/files/2016-11/documents/budgets_ozoneseasonnox.pdf.
[4] See: http://www.dec.ny.gov/press/112981.html.
[5] https://otcair.org/upload/Documents/Formal%20Actions/GoodNeighSIPResolu_Final.pdf

Table 1. EPA Modeled 2017 Air Quality and KY Contributions Scaled to Measured Values

Monitor	State	County	2017 Modeled Average DV (ppb)	KY Contribution to Modeled Value (%)	Monitored 2017 DV (ppb)	Scaled KY Impact (ppb)
Greenwich	Connecticut	Fairfield	74.1	0.5%	79	0.43
Danbury	Connecticut	Fairfield	71.6	1.0%	77	0.80
Stratford	Connecticut	Fairfield	75.5	0.6%	83	0.48
Westport	Connecticut	Fairfield	76.5	0.6%	83	0.49
East Hartford	Connecticut	Hartford	65.1	1.5%	72	1.11
Cornwall	Connecticut	Litchfield	61.4	0.8%	72	0.562866
Middletown	Connecticut	Middlesex	69.5	1.3%	79	1.00
New Haven	Connecticut	New Haven	66.8	0.6%	77	0.43
Madison	Connecticut	New Haven	76.2	0.6%	82	0.47
Groton	Connecticut	New London	70.8	0.4%	76	0.30
Stafford	Connecticut	Tolland	65.7	0.8%	71	0.56

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CATHERINE R. MCCABE
Acting Commissioner

March 29, 2018

Ms. Melissa Duff, Assistant Director
Division for Air Quality
300 Sower Boulevard
Frankfort, KY 40601

Dear Ms. Duff,

The New Jersey Department of Environmental Protection is submitting comments to the proposed revision to the Kentucky State Implementation Plan, "*Demonstration that Kentucky Satisfies the "Good Neighbor" Requirements of Clean Air Act Section 110(a)(2)(D)(i)(I), 2008 Ozone National Ambient Air Quality Standard, March 2018.*". Kentucky does not demonstrate that it has addressed its significant contribution to ozone pollution in New Jersey and its shared, multi-state nonattainment areas in a timely fashion.

The Clean Air Act requires states to attain the ozone health standard as expeditiously as practicable. However, states significantly impacted by ozone pollution from upwind states will be unable to do so if "Good Neighbor" SIPs are not done prior to the attainment deadline of the downwind nonattainment areas. The Clean Air Act recognized this since the "Good Neighbor" provisions (upwind significant contributions to downwind ozone pollution) are required to be addressed ahead of the Attainment Demonstrations by nonattainment areas. Per the Clean Air Act, Kentucky's significant contributions for the 2008 ozone NAAQS should have been addressed by March 2011. The choice of 2023 for future year modeling to meet the Clean Air Act "Good Neighbor" requirements is not appropriate since it is after the Moderate classification attainment deadline of July 2018, as well as, the Serious classification attainment deadline of July 2021.

The northern counties of New Jersey share a Moderate classified nonattainment area with portions of New York and Connecticut, referred to as the NNJ-NY-CT nonattainment area. This area was required to attain the 2008 ozone NAAQS of 75 parts per billion (ppb) by July 20, 2018 based on a 2017 Design Value (DV) using monitoring data from 2015-2017. The highest, preliminary 2017 DVs within the NNJ-NY-CT nonattainment area are 83 ppb at the Stratford monitor (AQS code 90013007) and 82 ppb at the Westport monitor (AQS code 90019003) in Connecticut. The NNJ-NY-CT nonattainment area and its citizens should not have to wait until 2023 to receive the benefits of clean air quality for the human health-based ozone NAAQS. Since the moderate attainment deadline has passed, Kentucky should conduct a modeling run for the next attainment date of July 2021 (2020 DV) for the serious classification.

Kentucky is relying upon reductions made in the state through its adherence to CSAPR and the CSAPR update rule. The USEPA guidance memorandum for the "Good Neighbor" SIP specifically states that "EPA acknowledged in the CSAPR Update that the rule may not fully address the requirements of the good neighbor provision for the 2008 ozone NAAQS for most of the states included and that further analysis was needed of air quality and oxides of nitrogen (NOx) reductions after 2017." The 2023 modeling provided by Kentucky, through Alpine Geophysics, shows that Kentucky significantly contributes to ozone levels in NJ's nonattainment area and has a 1.48 ppb modeled ozone contribution in 2023, greater than the 1% of the NAAQS (0.75 ppb) considered as a significant contribution to ozone. Although the Kentucky 2023 modeling predicts attainment of the 75 ppb NAAQS in Connecticut with a result of 75.9 at the Westport monitor, Kentucky should not presume a bright line of attainment in 2023 or that the Connecticut sites will actually reach attainment by then.

Kentucky's 2017 EGU Point Source Ozone Season NOx Emissions as shown in Table 2 of Alpine's Report are very close to the CSAPR Update allocations. They are not significantly lower as alluded to on page 17 of your SIP. These actual and allocated amounts should be lowered in 2018 to reduce Kentucky's significant contribution to the ozone levels in New Jersey's nonattainment areas now rather than wait 5 more years to make the needed "Good Neighbor" reductions. Kentucky should, therefore, be immediately investigating other measures to reduce its ozone impact on New Jersey and other northeastern States. Specifically, these reductions should consider the following:

- Reasonably Available Control Technology (RACT) NOx levels on Electric Generating Units and other large NOx sources to the same stringent levels as done in the Ozone Transport Region including:
    - Implementation of a High Electric Demand Day (HEDD) program to reduce NOx emissions on high ozone days,
    - Distributed generation unit controls, and
    - Control measures at municipal waste combustors.

- Control measures for Mobile Sources including:
    - An automobile emissions Inspection / Maintenance Program,
    - An anti-idling program to prevent automobiles from idling more than three consecutive minutes, and
    - Implementation of the California Car program.

In summary, Kentucky has not demonstrated that it has reduced its significant contribution to New Jersey's ozone levels in a timely fashion. More needs to be done immediately to reduce NOx emissions in Kentucky to meet its Good Neighbor obligations under the federal Clean Air

Act. Should you have any questions, please call me at (609) 633-8220. Thank you for your consideration of these comments.

Sincerely,

Francis C. Steitz, Director
Division of Air Quality

C:\ Kenneth Ratzman
Sharon Davis
Ray Papalski

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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MAR 3 0 2018

Ms. Lauren Hedge
Environmental Scientist
Evaluation Section
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Dear Ms. Hedge:

The New York State Department of Environmental Conservation (DEC) is submitting comments on the March 2018 State Implementation Plan (SIP) revision proposed by the Kentucky Energy and Environment Cabinet (KEEC) regarding its "good neighbor" obligations under Clean Air Act (CAA) section 110(a)(2)(D)(i)(I) for the 2008 ozone National Ambient Air Quality Standards (NAAQS). This section of the CAA requires states to develop SIPs that contain adequate provisions prohibiting sources from contributing to nonattainment in, or interfering with maintenance by, any other state with respect to a NAAQS. DEC is submitting these comments on Kentucky's March 8th good neighbor SIP because the New York City nonattainment area has been, and continues to be, impacted by significant contributions of ozone precursors from sources in Kentucky.

DEC commends KEEC on the reductions in nitrogen oxide (NOx) emissions (an ozone precursor) that have been obtained from electric generating units (EGUs) as noted in the proposed SIP revision. However, DEC urges KEEC to continue its progress in reducing NOx, and ensure these reductions are sustained through enforceable permit limitations and compliance schedules. While New York has been seeking EPA's assistance in ameliorating the ozone transport issue, DEC continues to enact stringent control measures through enforceable limits in permits and regulations to reduce ozone precursors from its own sources. DEC regularly reviews and updates its nonpoint sector volatile organic compound regulations, and utilizes a $5,500/ton Reasonably Available Control Technology (RACT) threshold for NOx reductions from major EGU and non-EGU point sources, a number that greatly exceeds the $1,400/ton threshold in the Cross-State Air Pollution Rule (CSAPR) Update for the 2008 ozone NAAQS.

DEC notes that KEEC's proposed good neighbor SIP is requesting that EPA find that Kentucky is not required to make any further reductions, beyond those required by the CSAPR Update. While EPA intended for the CSAPR Update rule to serve as a partial Federal Implementation Plan (FIP) for states that had failed to submit adequate SIPs, to obtain emission reductions before the 2018 moderate area attainment date, EPA admitted that the inherent NOx emission budgets "may not be sufficient to fully address these states' good neighbor obligations" (81 FR 74521). More specifically, EPA's focus on short-term reductions at a control cost of only $1,400 per ton of NOx reduced does not fully mitigate Kentucky's significant contribution. Moreover, the CSAPR program budgets are based on cumulative ozone season emissions, a modeling assumption that does not account for the individual hot and stagnant days that are most conducive to ozone formation and therefore, does not assist downwind nonattainment and maintenance areas in New York on these critical days.

KEEC's reliance on EPA's updated transport modeling, dated October 27, 2017, which uses a 2023 inventory projection and modeling analysis, is also inappropriate. The 2023 modeling does not address Kentucky's existing and ongoing contribution to present nonattainment at downwind New York receptors of the 2008 ozone NAAQS, nearly ten years after these standards were promulgated, and it ignores deadlines for downwind areas to attain the NAAQS. *See North Carolina v. EPA*, 531 F.3d 896, 911-12 (D. C. Cir. 2008). EPA Director of the Office of Air Quality Planning and Standards Stephen D. Page provided a memorandum dated October 27, 2017 accompanying EPA's updated transport modeling stating that EPA's technical analysis was made available to "assist states' efforts to develop, supplement or resubmit good neighbor SIPs for the 2008 ozone NAAQS to fully address their transport obligations." However, the memorandum further stated that "the information provided by this memorandum is not a final determination regarding states' remaining obligations under the good neighbor provision." Kentucky may not rely on EPA's arbitrary selection and use of a 2023 projection to satisfy its obligation to develop a SIP that contains adequate provisions prohibiting sources from contributing to nonattainment in, or interfering with maintenance. Considering Kentucky's heavy reliance on the admittedly inadequate CSAPR Update and EPA's overly optimistic 2023 modeling analysis, KEEC's proposed good neighbor SIP does not meet the requirements of the CAA.

Despite EPA's attempted justification for selecting the 2023 modeling year to address the requirements of the "good neighbor" provision for the 2008 NAAQS, the New York metropolitan area (NYMA) failed to attain by the July 20, 2015 attainment deadline for "marginal" areas; will fail to attain the July 20, 2018 attainment deadline for "moderate" areas; and will be elevated to "serious" nonattainment status with a July 20, 2021 attainment deadline. At this point, the NYMA's continuing struggle to attain the 2008 ozone NAAQS is due, in large part, to transported ozone precursors from upwind states such as Kentucky. By not assessing Kentucky's existing contribution to current nonattainment in the NYMA and ignoring the 2021 serious nonattainment area deadline, KEEC cannot conclude that this SIP revision satisfies the requirements of 110(a)(2)(D)(i)(I). The convenience and availability of an arbitrary and, as described below, overly optimistic projection inventory five years in the future falls far short of meeting KEEC's existing CAA good neighbor obligations.

KEEC's reliance on EPA's modeling is also inappropriate because it relies on reductions that are not federally enforceable. For example, as noted on page seven of Appendix A, "[t]he EPA then extended these observed emissions levels forward to 2023, made unit-specific adjustments to account for upcoming retirements, post-combustion control retrofits, coal-to-gas conversions, combustion control upgrades, new units, CSAPR Update compliance, state rules and Best Available Retrofit Technology (BART) requirements." Since KEEC relied on the CSAPR Update as the primary basis to support this submission, it must demonstrate that the additional emission reductions EPA projected, across the modeling domain, are federally enforceable. To the extent that any actions and reductions are not federally enforceable, there is no basis for KEEC to rely upon them in concluding that Kentucky will meet its good neighbor obligations. *See* 40 C.F.R. § 51.260 ("Each [implementation] plan shall contain legally enforceable compliance schedules setting forth the dates by which all stationary and mobile sources or categories of such sources must be in compliance with any applicable requirement of the plan."); *see also* 40 C.F.R. § 51.230 ("requiring a state implementation plan to "show that the State has the legal authority to carry out the plan" including by adopting emission standards and limitations and enforcing applicable laws, regulations and standards").

Furthermore, KEEC's reliance on EPA's assumption in the Page Memo that installation of emission controls would likely take up to 4 years is not supported by any analysis. Additionally, EPA's assumptions only account for the installation of new controls. EPA did not evaluate optimizing existing controls, the ability to switch to lower emitting units, or including permit limits to lock in the assumed emissions reductions.

DEC is also concerned about EPA's continued efforts to repeal and delay existing standards, and if such repeals and delays are effective, the impact EPA's actions will have on the projections relied upon by KEEC. In particular, KEEC must evaluate the emissions impacts of EPA's actions in the transportation sector, including, but not limited to, "glider kits," and the oil-and-gas sector where, for example, EPA's most recent action was to propose the withdrawal of the Control Techniques Guidelines for the Oil and Natural Gas Industry. 83 FR 10478.

KEEC did not perform any modeling analysis to demonstrate that Kentucky's current emissions, from all sectors, do not contribute to nonattainment and interference with maintenance in downwind areas such as the NYMA. Therefore, there is no way to assess whether Kentucky is actually satisfying the state's good neighbor obligations under CAA section 110(a)(2)(D)(i)(I). In the meantime, NYMA will be reclassified to "serious" nonattainment, with an attainment date of July 20, 2021, due to its continued inability to attain the 2008 ozone NAAQS, in large part because of transported precursors from upwind states such as Kentucky. As an upwind state that significantly contributes to nonattainment in the area, Kentucky should expeditiously comply with its good neighbor obligations.

Thank you for the opportunity to comment on KEEC's proposed SIP revision. Should you have any questions, please contact me at (518) 402-8452.

Sincerely,

Steven E. Flint, PE
Director, Division of Air Resources

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March 26, 2018

Ms. Lauren Hedge
Environmental Scientist
Evaluation Section
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Re: Proposed Good Neighbor SIP for the 2008 Ozone NAAQS

Dear Ms. Hedge:

The Midwest Ozone Group ("MOG") is pleased to have the opportunity to offer these comments in support of the agency's proposal entitled "Proposed Kentucky State Implementation Plan (SIP) Revision to address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act."

By way of background, MOG is an affiliation of companies, trade organizations, and associations[1] which have drawn upon their collective resources to advance the objective of seeking solutions to the development of national ambient air quality programs based on sound science and the rule of law. MOG has been actively engaged in a wide variety of issues and initiatives related to the development and implementation of air quality policy including not only the development of National Ambient Air Quality Standards ("NAAQS") but also such programs as transport rules, petitions under 176A and 126 of the Clean Air Act and the development of state-based alternatives to transport rules. MOG members operate 75,000 MW of coal-fired and coal-refuse-fired electric power generation in more than ten states.

As your proposal correctly notes, much has been done by the Commonwealth of Kentucky to discharge its obligations under the Clean Air Act to assure the attainment and maintenance of the NAAQS for ozone. These efforts include a wide-array of VOC and NOx emission control requirements that apply not only to electric generating units, but also industrial and mobile sources, that have allowed the 2008 and 2015 ozone NAAQS to be attained throughout Kentucky.

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[1] The members of and participants in the Midwest Ozone Group include: American Coalition for Clean Coal Electricity, American Electric Power, American Forest & Paper Association, Ameren, Alcoa, ARIPPA, Associated Electric Cooperative, Big Rivers Electric Corp., Citizens Energy Group, City Water Light and Power (Springfield IL), Council of Industrial Boiler Owners, Duke Energy, East Kentucky Power Cooperative, FirstEnergy, Indiana Energy Association, Indiana Utility Group, LGE / KU, Ohio Utility Group and Olympus Power.

The issue being addressed in the proposed Good Neighbor SIP, is whether these existing measures also satisfy the Good Neighbor requirements of Section 110(a)(2)(D)(i)(I) which prohibits a state from significantly contributing to nonattainment or interfering with maintenance of any primary or secondary NAAQS in another state.

The proposed Kentucky SIP revision correctly notes the October 27, 2017, guidance memorandum by EPA's Stephen D. Page[2], in which a four step process is to be used by EPA to address Good Neighbor requirements. These four steps are:

Step 1: identify downwind air quality problems;

Step 2: identify upwind states that contribute enough to those downwind air quality problems to warrant further review and analysis;

Step 3: identify the emissions reductions necessary to prevent an identified upwind state from contributing significantly to those downwind air quality problems; and

Step 4: adopt permanent and enforceable measure needed to achieve those emission reductions.

We support the conclusion stated in the proposed SIP that the state has clearly demonstrated that the measures currently being implemented in Kentucky are the only ones that are economical and economically feasible – a conclusion that alone satisfies Good Neighbor requirements by adequately addressing Step 4 above.

We also support the conclusion reached by Kentucky with respect to Step 4, that there is now overwhelming data, prepared by both Alpine Geophysics, LLC ("Alpine") on behalf of Kentucky and EPA, related to Step 1 which demonstrates that there are no downwind air quality problems related to the 2008 ozone NAAQS. On the basis of these modeling results, there does not appear to be any reason to conduct any further analysis of the four step process. This conclusion is reached not only regarding the monitors linked to Kentucky in the Cross State Air Pollution Rule (CSAPR) Update, but also for all monitors in the East.

In addition to the modeling analysis performed by Alpine for Kentucky that is referenced in the proposed Kentucky SIP revision, Alpine prepared a report for MOG that is consistent with the Kentucky study and corroborates the conclusion that there are no downwind problem areas related to the 2008 Ozone NAAQS. As can be seen in the attached report[3] on the Alpine

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[2] Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I), by Stephen D. Page, October 27, 2017 (https://www.epa.gov/sites/production/files/2017-10/documents/final_2008_o3_naaqs_transport_memo_10-27-17b.pdf).

[3] "Good Neighbor" Modeling for the 2008 8-Hour Ozone State Implementation Plans, Final Modeling Report, by Alpine Geophysics, LLC, December 2017

modeling, all sites identified in the final CSAPR update are predicted to be well below the 2008 ozone standard by 2023. Table 1 below provides the GNS 2023 future year average and maximum design value modeling results from this analysis for the eastern state problem monitors. Based on these calculations, none of the problem monitors are predicted to be in nonattainment or have issues with maintenance in 2023 and therefore no states are required to estimate their contribution to these monitors.

Table 1. GNS Modeling results at Final CSAPR Update-identified problem monitors (ppb).

Monitor ID	State	County	2009-2013 Base Period Average Design Value (ppb)	2009-2013 Base Period Maximum Design Value (ppb)	2023 Base Case Average Design Value (ppb)	2023 Base Case Maximum Design Value (ppb)
Nonattainment Monitors						
90019003	Connecticut	Fairfield	83.7	87	72.7	75.6
90099002	Connecticut	New Haven	85.7	89	71.2	73.9
480391004	Texas	Brazoria	88.0	89	74.0	74.9
484392003	Texas	Tarrant	87.3	90	72.5	74.8
484393009	Texas	Tarrant	86.0	86	70.6	70.6
551170006	Wisconsin	Sheboygan	84.3	87	70.8	73.1
Maintenance Monitors						
90010017	Connecticut	Fairfield	80.3	83	69.8	72.1
90013007	Connecticut	Fairfield	84.3	89	71.2	75.2
211110067	Kentucky	Jefferson	85.0	85	70.1	70.1
240251001	Maryland	Harford	90.0	93	71.4	73.8
260050003	Michigan	Allegan	82.7	86	69.0	71.8
360850067	New York	Richmond	81.3	83	71.9	73.4
361030002	New York	Suffolk	83.3	85	72.5	74.0
390610006	Ohio	Hamilton	82.0	85	65.0	67.4
421010024	Pennsylvania	Philadelphia	83.3	87	67.3	70.3
481210034	Texas	Denton	84.3	87	69.7	72.0
482010024	Texas	Harris	80.3	83	70.4	72.8
482011034	Texas	Harris	81.0	82	70.8	71.6
482011039	Texas	Harris	82.0	84	71.8	73.6

(http://midwestozonegroup.com/files/Ozone_Modeling_Results_Supporting_GN_SIP_Obligations_Final_Dec_2017_.pdf).

This modeling analysis is consistent with the work performed for Kentucky and with the EPA modeling that demonstrates that all upwind states identified in the final CSAPR Update are in compliance with CAA Section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS. Significantly, the October 27, 2017, guidance memorandum by Stephen D. Page discussed above not only includes data that demonstrates that there are no 2008 ozone NAAQS problem areas, it concludes that "states may consider using this modeling to develop SIPs that fully address requirements of the good neighbor provisions for the 2008 ozone NAAQS."

Conclusion

Recent modeling by Alpine Geophysics, LLC for both Kentucky and MOG, as well as modeling by EPA itself, clearly demonstrate that implementation of the CSAPR Update rule in addition to the other on-the-books controls is all that is needed to satisfy requirements related to the 2008 ozone NAAQS. We therefore support the request by Kentucky that EPA approve its Good Neighbor SIP.

Very truly yours,

David M. Flannery

David M. Flannery
Legal Counsel for the
Midwest Ozone Group

Dinsmore

Legal Counsel.

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March 29, 2018

VIA EMAIL: Lauren.Hedge@ky.gov

Lauren Hedge
Environmental Scientist
Evaluation Section
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Re: UIEK Comments on Proposed Good Neighbor SIP for the 2008 Ozone NAAQS

Dear Ms. Hedge:

The Utility Information Exchange of Kentucky (UIEK) appreciates the opportunity to comment on Kentucky's proposed State Implementation Plan (SIP) Revision Relating to the 2008 Ozone CAA Section 110(a)(2)(D)(i)(I) Submittal, also known as the Proposed Good Neighbor SIP. UIEK is a voluntary organization consisting of representatives from the electric generating utilities in the Commonwealth of Kentucky. For more than 20 years, UIEK has provided input to regulatory authorities on key environmental regulatory issues affecting its member companies. This law firm serves as legal counsel to UIEK and submits the following comments on UIEK's behalf.

UIEK supports Kentucky's Proposed SIP Revision. As Kentucky's submittal demonstrates, the Commonwealth has taken a number of steps to assure attainment of the 2008 Ozone NAAQS. These include measures to reduce both VOC and NOx emissions. Annual and ozone season NOx emissions from UIEK member operations have been reduced substantially from 2008 through 2017. The CSAPR Update Rule has further reduced Kentucky's NOx budget to 21,115 tons.

EPA's technical evaluation and Kentucky's independent modeling effort support the conclusion that Kentucky has fulfilled its Good Neighbor SIP obligations. EPA's October 17, 2017 updated modeling showed that no monitoring sites, outside of California, will violate the 2008 Ozone NAAQS in 2023. Kentucky retained Alpine Geophysics, LLC to perform an independent modeling analysis which shows problem monitors previously identified by EPA will attain the standard.

UIEK further adopts the March 26, 2018 comments submitted by the Midwest Ozone Group in support of the proposed SIP revision. (Copy attached.) Kentucky has demonstrated that implementation of the CSAPR Update Rule, along with other measures already in place, are sufficient to satisfy the Good Neighbor requirements of the Clean Air Act. Kentucky's SIP revision should be approved.

If you have any questions, please do not hesitate to contact me.

Sincerely yours,

Carolyn M. Brown
Counsel for UIEK

CMB/ccr
Attachment

cc: Dick Brewer, UIEK Chair

ATTACHMENT

March 26, 2018 Comments Submitted by Midwest Ozone Group

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March 26, 2018

Ms. Lauren Hedge
Environmental Scientist
Evaluation Section
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300 Sower Boulevard
Frankfort, Kentucky 40601

Re: Proposed Good Neighbor SIP for the 2008 Ozone NAAQS

Dear Ms. Hedge:

The Midwest Ozone Group ("MOG") is pleased to have the opportunity to offer these comments in support of the agency's proposal entitled "Proposed Kentucky State Implementation Plan (SIP) Revision to address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act."

By way of background, MOG is an affiliation of companies, trade organizations, and associations[1] which have drawn upon their collective resources to advance the objective of seeking solutions to the development of national ambient air quality programs based on sound science and the rule of law. MOG has been actively engaged in a wide variety of issues and initiatives related to the development and implementation of air quality policy including not only the development of National Ambient Air Quality Standards ("NAAQS") but also such programs as transport rules, petitions under 176A and 126 of the Clean Air Act and the development of state-based alternatives to transport rules. MOG members operate 75,000 MW of coal-fired and coal-refuse-fired electric power generation in more than ten states.

As your proposal correctly notes, much has been done by the Commonwealth of Kentucky to discharge its obligations under the Clean Air Act to assure the attainment and maintenance of the NAAQS for ozone. These efforts include a wide-array of VOC and NOx emission control requirements that apply not only to electric generating units, but also industrial and mobile sources, that have allowed the 2008 and 2015 ozone NAAQS to be attained throughout Kentucky.

[1] The members of and participants in the Midwest Ozone Group include: American Coalition for Clean Coal Electricity, American Electric Power, American Forest & Paper Association, Ameren, Alcoa, ARIPPA, Associated Electric Cooperative, Big Rivers Electric Corp., Citizens Energy Group, City Water Light and Power (Springfield IL), Council of Industrial Boiler Owners, Duke Energy, East Kentucky Power Cooperative, FirstEnergy, Indiana Energy Association, Indiana Utility Group, LGE / KU, Ohio Utility Group and Olympus Power.

The issue being addressed in the proposed Good Neighbor SIP, is whether these existing measures also satisfy the Good Neighbor requirements of Section 110(a)(2)(D)(i)(I) which prohibits a state from significantly contributing to nonattainment or interfering with maintenance of any primary or secondary NAAQS in another state.

The proposed Kentucky SIP revision correctly notes the October 27, 2017, guidance memorandum by EPA's Stephen D. Page[2], in which a four step process is to be used by EPA to address Good Neighbor requirements. These four steps are:

Step 1: identify downwind air quality problems;

Step 2: identify upwind states that contribute enough to those downwind air quality problems to warrant further review and analysis;

Step 3: identify the emissions reductions necessary to prevent an identified upwind state from contributing significantly to those downwind air quality problems; and

Step 4: adopt permanent and enforceable measure needed to achieve those emission reductions.

We support the conclusion stated in the proposed SIP that the state has clearly demonstrated that the measures currently being implemented in Kentucky are the only ones that are economical and economically feasible – a conclusion that alone satisfies Good Neighbor requirements by adequately addressing Step 4 above.

We also support the conclusion reached by Kentucky with respect to Step 4, that there is now overwhelming data, prepared by both Alpine Geophysics, LLC ("Alpine") on behalf of Kentucky and EPA, related to Step 1 which demonstrates that there are no downwind air quality problems related to the 2008 ozone NAAQS. On the basis of these modeling results, there does not appear to be any reason to conduct any further analysis of the four step process. This conclusion is reached not only regarding the monitors linked to Kentucky in the Cross State Air Pollution Rule (CSAPR) Update, but also for all monitors in the East.

In addition to the modeling analysis performed by Alpine for Kentucky that is referenced in the proposed Kentucky SIP revision, Alpine prepared a report for MOG that is consistent with the Kentucky study and corroborates the conclusion that there are no downwind problem areas related to the 2008 Ozone NAAQS. As can be seen in the attached report[3] on the Alpine

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[2] Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I), by Stephen D. Page, October 27, 2017 (https://www.epa.gov/sites/production/files/2017-10/documents/final_2008_o3_naaqs_transport_memo_10-27-17b.pdf).

[3] "Good Neighbor" Modeling for the 2008 8-Hour Ozone State Implementation Plans, Final Modeling Report, by Alpine Geophysics, LLC, December 2017

modeling, all sites identified in the final CSAPR update are predicted to be well below the 2008 ozone standard by 2023. Table 1 below provides the GNS 2023 future year average and maximum design value modeling results from this analysis for the eastern state problem monitors. Based on these calculations, none of the problem monitors are predicted to be in nonattainment or have issues with maintenance in 2023 and therefore no states are required to estimate their contribution to these monitors.

Table 1. GNS Modeling results at Final CSAPR Update-identified problem monitors (ppb).

Monitor ID	State	County	2009-2013 Base Period Average Design Value (ppb)	2009-2013 Base Period Maximum Design Value (ppb)	2023 Base Case Average Design Value (ppb)	2023 Base Case Maximum Design Value (ppb)
Nonattainment Monitors						
90019003	Connecticut	Fairfield	83.7	87	72.7	75.6
90099002	Connecticut	New Haven	85.7	89	71.2	73.9
480391004	Texas	Brazoria	88.0	89	74.0	74.9
484392003	Texas	Tarrant	87.3	90	72.5	74.8
484393009	Texas	Tarrant	86.0	86	70.6	70.6
551170006	Wisconsin	Sheboygan	84.3	87	70.8	73.1
Maintenance Monitors						
90010017	Connecticut	Fairfield	80.3	83	69.8	72.1
90013007	Connecticut	Fairfield	84.3	89	71.2	75.2
211110067	Kentucky	Jefferson	85.0	85	70.1	70.1
240251001	Maryland	Harford	90.0	93	71.4	73.8
260050003	Michigan	Allegan	82.7	86	69.0	71.8
360850067	New York	Richmond	81.3	83	71.9	73.4
361030002	New York	Suffolk	83.3	85	72.5	74.0
390610006	Ohio	Hamilton	82.0	85	65.0	67.4
421010024	Pennsylvania	Philadelphia	83.3	87	67.3	70.3
481210034	Texas	Denton	84.3	87	69.7	72.0
482010024	Texas	Harris	80.3	83	70.4	72.8
482011034	Texas	Harris	81.0	82	70.8	71.6
482011039	Texas	Harris	82.0	84	71.8	73.6

(http://midwestozonegroup.com/files/Ozone_Modeling_Results_Supporting_GN_SIP_Obligations_Final_Dec_2017_.pdf).

This modeling analysis is consistent with the work performed for Kentucky and with the EPA modeling that demonstrates that all upwind states identified in the final CSAPR Update are in compliance with CAA Section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS. Significantly, the October 27, 2017, guidance memorandum by Stephen D. Page discussed above not only includes data that demonstrates that there are no 2008 ozone NAAQS problem areas, it concludes that "states may consider using this modeling to develop SIPs that fully address requirements of the good neighbor provisions for the 2008 ozone NAAQS."

Conclusion

Recent modeling by Alpine Geophysics, LLC for both Kentucky and MOG, as well as modeling by EPA itself, clearly demonstrate that implementation of the CSAPR Update rule in addition to the other on-the-books controls is all that is needed to satisfy requirements related to the 2008 ozone NAAQS. We therefore support the request by Kentucky that EPA approve its Good Neighbor SIP.

Very truly yours,

David M. Flannery
Legal Counsel for the
Midwest Ozone Group

March 30, 2018

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Re: Proposed Kentucky State Implementation Plan (SIP) Revision to address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act submitted by Kentucky Energy and Environment Cabinet on February 28, 2018.

Dear Lauren Hedge:

Sierra Club submits the following comments in response to Kentucky's recent Proposed SIP Revision ("SIP Revision"), subtitled "Demonstration that Kentucky Satisfies the "Good Neighbor" Requirements of Clean Air Act Section 110(a)(2)(D)(i)(I)" regarding the 2008 Ozone National Ambient Air Quality Standard ("Ozone NAAQS"). Sierra Club is a national organization with over 6,000 members in Kentucky and tens of thousands more in downwind states adversely impacted by Kentucky emissions of ozone precursors. As detailed below, the proposed SIP Revision suffers from significant flaws and legal failings that must be addressed before any such Revision is finalized.

The Sierra Club believes that the SIP Revision, which essentially asks approval for inaction, is fundamentally flawed in at least three ways:

(1) The SIP Revision is contrary to law and does not satisfy the requirements of section 110(a)(2)(D). It contains no provisions, let alone "adequate provisions . . . prohibiting . . . any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will . . . contribute significantly to nonattainment in, or interfere with maintenance by, any other State." 42 U.S.C. § 7410(a)(2)(D).

(2) EPA's recent guidance on which Kentucky relies—itself badly flawed—only purports to support avoiding control strategies that take longer than four years to implement. It does not support inaction.

(3) Kentucky's decision to limit its analysis of downwind impacts to a single year, 2023, five years in the future, is arbitrary and capricious. It ignores factors Congress clearly

intended that states consider, such as present and projected significant contributions of in-state emissions activity to downwind nonattainment. Moreover, the predicted conditions in 2023 are uncertain and highly contingent on the survival of regulations EPA is working hard to undo or undermine. In sum, Kentucky has more work to do.

For these reasons, and as explained in more detail below, Kentucky must modify its SIP Revision to adhere to the requirements of the Clean Air Act. In particular, Kentucky must implement the framework EPA historically relied on for assessing good neighbor obligations, introduced (and abandoned) in its recent guidance on section 110(a)(2)(D)(i)(I) SIPS for the 2008 Ozone NAAQS, which Kentucky attached as Appendix A to its SIP Revision. In addition to that framework, Kentucky must focus on applicable statutory deadlines, as follows:

(1) Quantify the extent to which its current and future emissions will interfere with downwind NAAQS attainment or maintenance.
(2) Determine compliance deadlines for affected states, as required by law.
(3) Craft a plan consistent with the provisions of Clean Air Act section 110(a)(2), setting enforceable timelines and limits on in-state emissions activity to ensure compliance with the applicable attainment deadlines faced by downwind states.

Background

A. Statutory Background

The Clean Air Act requires EPA to set national ambient air quality standards (NAAQS) for certain pollutants that endanger public health or welfare. 42 U.S.C. §§ 7408, 7409. These standards must be established at a level that protects public health "with an adequate margin of safety." *Id.* § 7409. States and EPA then must identify areas of the country where air quality fails to meet the standard and designate them as "nonattainment" areas. *Id.* § 7407(d). Nonattainment areas that subsequently attain the standard are called "maintenance" areas. *Nat. Res. Def. Council v. EPA* ("*NRDC*"), 777 F.3d 456, 458-59 (D.C. Cir. 2014).

Within three years of the promulgation of a new or updated NAAQS, states must adopt plans providing for implementation, maintenance, and enforcement of the ambient standards, and submit these plans to EPA for approval. 42 U.S.C. § 7410(a); *see EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. 1584, 94 (2014). If EPA finds that a state has failed to make a required submission or disapproves a plan submitted by a state, EPA must issue a federal implementation plan ("FIP") for the state within two years. *Id.* § 7410(c)(1).

Since substantial amounts of air pollution often travel across state borders and cause harms downwind, state plans must include "good neighbor" provisions in accordance with 42 U.S.C. § 7410(a)(2)(D)(i)(I), which provides:

> Each such plan shall . . . contain adequate provisions prohibiting, consistent with the provisions of this subchapter, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will contribute significantly to

nonattainment in, or interfere with maintenance by, any other State with respect to any such [NAAQS].

Critically, the D.C. Circuit has held that the requirement that good neighbor plans be "consistent" with the provisions of the subchapter—i.e., Title I of the Clean Air Act—means that good neighbor plans must eliminate significant contributions by the deadlines for downwind areas to attain the NAAQS. *North Carolina v. EPA* ("*North Carolina*"), 531 F.3d 896, 911-12 (D.C. Cir. 2008) (quoting 42 U.S.C. § 7410(a)(2)(D)). The deadline for attainment of the ozone NAAQS is "as expeditiously as practicable but not later than" three, six, nine, fifteen, or twenty years—depending on the "classification" of the area—after the date the area is designated nonattainment. 42 U.S.C. § 7511(a)(1) & tbl.1; *NRDC*, 777 F.3d at 460.

B. Regulatory Background

EPA adopted the 2008 ozone NAAQS of 75 parts per billion on March 12, 2008, 73 Fed. Reg. 16,436, triggering EPA's obligation to promulgate nonattainment designations by March 12, 2010. *NRDC*, 777 F.3d at 463. EPA extended the two-year deadline by an additional year, to March 12, 2011, 77 Fed. Reg. 30,088, 30,090-91 (May 21, 2012), then missed the extended deadline. *NRDC*, 777 F.3d at 463. Multiple groups filed suit to compel the designations. In response EPA designated 46 nonattainment areas (many containing multiple counties), effective July 20, 2012-36 of them marginal, three moderate, two serious, three severe, and two extreme. 77 Fed. Reg. 30,160 (May 21, 2012).[1]

Although the Act provides that attainment deadlines are calculated from the date of designation—here, July 20, 2012—EPA attempted to extend those attainment deadlines by several months, to December 31 of the corresponding year. *NRDC*, 777 F.3d at 463; 77 Fed. Reg. 30,160. Conservation groups filed suit once more, and the D.C. Circuit Court rejected the delay of attainment deadlines as "untethered to Congress' approach." *NRDC*, 777 F.3d at 469. In response, EPA affirmed that attainment deadlines for marginal and moderate ozone nonattainment areas are July 20, 2015 and July 20, 2018, respectively. 80 Fed. Reg. 12,264, 12,268/2 (Mar. 6, 2015).[2]

Meanwhile, on July 13, 2015, EPA finally took action on 24 states—Kentucky not among them—that had failed to submit plans adequately fulfilling their good neighbor obligations under 42 U.S.C. section 7410(a) by the statutory deadline of March 12, 2011. 81 Fed. Reg. at 74,512/1. This, in turn, triggered EPA's obligation to issue a federal plan within two years. 42 U.S.C. § 7410(c)(1).

C. The 2016 CSAPR Update

Faced with pressing attainment deadlines and obliged to issue federal implementation plans ("FIPs") for the 2008 Ozone NAAQS, EPA issued the 2016 CSAPR Update (also known

[1] Several areas were subsequently reclassified. *See* 81 Fed. Reg. 90,207 (Dec. 14, 2016).

[2] Several marginal nonattainment areas were subsequently granted one-year extensions of the applicable attainment deadline, to July 20, 2016, pursuant to 42 U.S.C. § 7511(a)(5). *See* 81 Fed. Reg. 26,697 (May 4, 2016).

as the “Transport Rule”). 81 Fed. Reg. 74,504. Rather than fully resolve good neighbor obligations, the CSAPR Update was designed to compel emitters in upwind states to make certain readily achievable reductions in NO_X emissions prior to the 2017 ozone season, the last opportunity for downwind states designated in “moderate” nonattainment to achieve attainment deadlines. 81 Fed. Reg. at 74,507/3. It is was limited to cost-effective measures quickly implementable by electric generating units (“EGU”). *Id.* at 74,508/1-2.

Consequently, the emission budgets that EPA set with the CSAPR Update for the 2017 ozone season—which remain in place—do not actually completely resolve good neighbor obligations for most states. *Id.* 74,508/2-3. Instead, as EPA admitted in when issuing the CSAPR Update, the “action represent a partial remedy to address interstate emission transport for the 2008 ozone NAAQS” and “**additional reductions** may be required to fully address the states' interstate transport obligations.” *Id.* 74, 508/3 (emphasis added).

Kentucky was included in the CSAPR Update because its submission was partially disapproved by the EPA. *Id.* 74,506/2; 78 Fed. Reg. 14,683 (Mar. 7, 2013) (partially disapproving Kentucky's SIP).

These comments focus on a new “Proposed Kentucky State Implementation Plan (SIP) Revision to address the requirements of Section 110(a)(2)(D)(i)(I) of the Clean Air Act” that Kentucky jointly submitted to EPA and released for public comment in Kentucky at the beginning of March 2018. The thrust of the SIP Revision is simple: Kentucky apparently proposes to wash its hands of any further duties under the good neighbor provision. *See, e.g.,* SIP Revision at 1.

Substantive Comments

I. The SIP Revision proposed by Kentucky does not satisfy the Clean Air Act good neighbor requirements because it illegally endorses and ratifies continued contribution to downwind non-attainment of the 2008 NAAQS until 2023

Kentucky's SIP Revision does not satisfy the good neighbor obligations plainly stated in section 110(a)(2)(D)(i)(I) and ignores controlling case law limiting discretion to delay attainment of the Ozone NAAQS. Even granting Kentucky's questionable premise that all downwind states might be in attainment by 2023, the proposed SIP Revision's plan to depend entirely on CSAPR compliance fails to satisfy Kentucky's good neighbor obligation. The Clean Air Act requires that a SIP “contain adequate provisions . . . prohibiting . . . any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will . . . contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard . . . .” 42 U.S.C. § 7410(a)(2)(D). The Proposed SIP does not do this.

Indeed, Kentucky's proposal fails this requirement in at least three regards. First, the attainment deadline for downwind states under the 2008 Ozone NAAQS is July of 2018, not 2023. Second, CSAPR alone—by its terms merely mitigating *some but not all* downwind impacts—does not discharge the requirements of section 110(a)(2)(D)(i)(I). Third, the SIP Revision provides no enforceable mechanism or plan for achieving even 2023 downwind attainment, let alone 2018. Thus, Kentucky's SIP Revision does not prevent its significant contribution to non-attainment downwind, violating the Clean Air Act and leaving those states to face the harms and penalties of non-attainment.

A. *The attainment timeline relied on by the Kentucky SIP Revision violates the plain language of section 110(a)(2)(D)(i) by allowing Kentucky to continue significant contributions of downwind states struggling to meet attainment deadlines under the 2008 Ozone NAAQS*

Kentucky may not wait for some potential compliance to spontaneously occur in 2023. The good neighbor provisions require Kentucky's SIP to resolve its contribution to downwind nonattainment in time to allow downwind states to meet attainment deadlines—by the 2017 ozone season for areas in "moderate" nonattainment. Kentucky's proposed SIP Revision, which contemplates Kentucky taking no further action than complying with CSAPR, leaves downwind states to bear the costs in health and regulatory burden of continued nonattainment. To avoid violating the Clean Air Act in this manner, Kentucky must include in its plan provisions to immediately cease significant contributions to downwind non-attainment.

The plain meaning of section 110(a)(2)(D) requires Kentucky's SIP Revision to prohibit contributing emissions *at least* prior to 2008 Ozone NAAQS attainment deadlines set for downwind states (2018 for areas in "moderate" nonattainment).

> "[SIPs] shall . . . (D) contain adequate provisions--(i) prohibiting, consistent with the provisions of [CAA Title I], any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will--(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard . . . ."[3]

42 U.S.C. 7410(a)(2). Plans that delay eliminating of such emissions past NAAQS attainment deadlines for downwind areas contribute to nonattainment, and are therefore incomplete and contrary to the Clean Air Act.

The D.C. Circuit has adopted this plain reading of section 110(a)(2)(D)(i), finding it unambiguously requires compliance with NAAQS attainment deadlines. *North Carolina*, 531 F.3d at 911-12. The *North Carolina* court remanded an EPA rule (the Clean Air Interstate Rule or CAIR, the predecessor of CSAPR) in part because "EPA did not make any effort to harmonize CAIR's . . . deadline for upwind contributors to eliminate their significant contribution with the attainment deadlines for downwind areas." *Id.* at 912. The court based this conclusion on the section 110(a)(2)(D) requirement that implementing provisions be consistent with Title I of the Clean Air Act, finding that a plan must be consistent both with the substance and procedural requirements of NAAQS compliance. *Id.* at 911. Indeed, the court went further than insisting

[3] 42 U.S.C. 7410(a)(2)(D).

good neighbor deadlines be consistent with compliance deadlines for downwind areas expected to be in non-attainment: compliance must be achieved in time for attainment determinations for downwind states expected to be even close to the NAAQS standard, i.e. to not "interfere with maintenance." *Id.* at 908-09 (finding CAIR inadequate because it focused only on non-attainment, and not on maintenance, thus ignoring part of section 110(a)(2)(D)).

For Kentucky and the 2008 Ozone NAAQS, this means immediate action. The1990 amendments to the Clean Air Act, recent controlling precedent, and EPA clearly establish attainment deadlines for the 2008 Ozone NAAQS as "as expeditiously as practicable but not later than" three, six, nine, fifteen, or twenty years—depending on the "classification" of the area—after the date the area is designated nonattainment. 42 U.S.C. § 7511(a)(1) & tbl.1; *NRDC*, 777 F.3d 456, 458-59 (D.C. Cir. 2014). In fact, *NRDC* specifically dealt with an attempt by EPA to extend 2008 Ozone NAAQS compliance deadlines for several months, to include the 2018 ozone season. The court rejected this delay as "untethered to Congress' approach." *NRDC*, 777 F.3d at 469. The court held that EPA was required to adhere to the 1997 Ozone NAAQS attainment timeline set by the 1990 Clean Air Act amendments, plumbed to the date of attainment designations. As EPA had published attainment designations effective July 20, 2012, 77 Fed. Reg. 30,160 (May 21, 2012), it was compelled to set attainment deadlines for marginal and moderate ozone nonattainment areas are July 20, 2015 and July 20, 2018, respectively. 80 Fed. Reg. 12,264, 12,268/2 (Mar. 6, 2015).

The proposed Kentucky SIP Revision ignores these long-established deadlines for fulfilling section 110(a)(2)(D) obligations. It does not even raise the issue. Instead, it asserts that "downwind monitors previously identified as being impacted by Kentucky's upwind emissions showed compliance with 2023, and that Kentucky will not interfere with any downwind maintenance monitors in 2023." SIP Revision at 4 (emphasis added). But section 110(a)(2)(D)(i)(I) does not allow Kentucky to wait until 2023, nor grant EPA discretion to extend compliance deadlines. *NRDC*, 777 F.3d at 469. By 2023, all the harms that the good neighbor provisions were intended to avoid will have befallen downwind states. Those states will have be forced to either over-control their own sources to offset Kentucky's failure, or will face the steep regulatory cost of a non-attainment designation. Moreover, to avoid contributing to downwind non-attainment in states attempting to demonstrate compliance before the 2018 ozone season, a showing which requires three years of historical data, Kentucky must take steps to offset past over-pollution.[4]

In conclusion, by ignoring downwind attainment deadlines, this SIP Revision fails to satisfy the requirements of section 110(a)(2)(D). *North Carolina*, 531 F.3d at 911-12. This is no

[4] Just as nothing in section 110(a)(2)(D)(i)(I) or controlling precedent like *NRDC* allows delay, Kentucky has no excuse of surprise or inability. Kentucky has been aware of the obligation since at least 2008 and was in fact one of the first states to submit a good neighbor SIP under the updated Ozone NAAQS. Kentucky's own egregious lateness in submitting a SIP (it is now 10 years since the 2008 Ozone NAAQS and 4 years since the *NRDC* decision) does not warrant accommodation. At this late hour, that Kentucky's favored control strategy may allow yet another attainment deadline to pass does not justify inaction. As the D.C. Circuit previously held, the attainment deadlines are "central to the regulatory scheme," *Sierra Club v. EPA*, 294 F.3d 155, 161 (D.C. Cir. 2002), and "leave no room for claims of technological or economic infeasibility." *NRDC*, 777 F.3d at 468 (quoting *Sierra Club*, 294 F.3d at 161).

surprise—the deadlines flow from the plain language of the Clean Air Act, as was recognized by the D.C. Circuit in the *NRDC* decision in 2014. Kentucky must include provision for immediate action in its SIP.

B. Kentucky may not rely only on CSAPR compliance because it is at best a partial resolution of some good neighbor obligations

The CSAPR Update does not fully satisfy section 110(a)(2)(D) for the 2008 Ozone NAAQS and therefore Kentucky must do more. Section 110(a)(2)(D)(i)(I) requires elimination of states' significant contributions to downwind nonattainment before the deadlines discussed above. *See North Carolina*, 531 F.3d at 908. In contrast, the CSAPR Update by design only leads to partial reduction of substantial upwind contributions. This is clear from EPA's statements in the Federal Register, from the CSAPR Update's limited, last-minute nature, and from EPA's current guidance. Rather than punt to the CSAPR Update, Kentucky's SIP Revision must evaluate the State's expected contribution to downwind nonattainment and include provisions to prevent those contributions in a timely fashion. As the *North Carolina* court concluded: "[A] complete remedy to section 110(a)(2)(D)(i)(I) . . . must do more than achieve something measurable; it must actually require elimination of emissions from sources that contribute significantly and interfere with maintenance in downwind nonattainment areas." *Id.* at 908.

The CSAPR Update is a half measure, intended only to "mitigate" upwind contributions. *See* 81 Fed. Reg. at 75,512/1.[5] As EPA explained in the final rule, "when all the emission reductions required by this rule are in place, both attainment and maintenance problems at downwind receptors may remain." *Id.* at 75,520/3. "[T]he emission reductions required by this rulemaking do not fully resolve most of the air quality problems identified in this rule." *Id.* at 75,536/2. Instead, the rule is limited by EPA's focus on "immediately available reductions" and reflects EPA's estimation of "those activities that can be implemented by the 2017 ozone season." *Id.* at 75,521/3; 75,516/3-17/1.[6] Finally, even the EPA's "Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone NAAQS under Clean Air Act Section 110(a)(2)(D)(i)(I)" (the "EPA Memo"), which was attached to the Kentucky proposal as Appendix A, concedes that the CSAPR Update only "partially address[ed] the requirements of the good neighbor provision." EPA Memo at 2.

Therefore, instead of relying on the CSAPR Update, Kentucky must issue a final SIP that independently ensures no contributions to nonattainment or interference with maintenance at downwind sites immediately, to comply with deadlines describe above. *See North Carolina*, 531 F.3d at 908. This means at the very least beginning by assessing its current residual downwind impacts after the CSAPR Update. Accordingly, the Kentucky SIP Revision's exclusive focus on 2023, and not on any of the intervening years,[7] is arbitrary and capricious. *See Motor Vehicle*

[5] Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS, Final Rule, October 26, 2016.
[6] Indeed, the EPA Memo (despite relying on dubious and inaccurate grounds to inaccurately suggest attainment in 2023 might happen all by itself) is itself premised on the reality that the CSAPR Update is insufficient to resolve transport obligations on its own.
[7] Although not part of the proposed SIP itself, Kentucky does make the unsupported and incorrect claim that ozone precursors emitted in Kentucky somehow do not contribute significantly to nonattainment or interfere with maintenance in any other downwind states. *See* SIP Revision, Cover Letter to EPA (Feb. 28, 2018). Notably, this is

Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 103 S. Ct. 2856, 2867 (1983). ("[An action is arbitrary and capricious if the] agency has relied on factors which Congress has not intended it to consider [or] entirely failed to consider an important aspect of the problem . . . .").

Nonetheless, even without data from Kentucky to support its Proposed SIP Revision, an estimate can still be made of their post-CSAPR Update downwind contributions; this assessment confirms that Kentucky continues to cause problems for downwind NAAQS attainment. First, as part of the CSAPR Update technical support materials, EPA reported predictions of 2017 ozone season design values without CSAPR Update-based emission reductions. These values indicated that among Kentucky's largest downwind contributions was a contribution of 10.8 ppb to ozone design value levels at a maintenance monitor in Ohio in 2017. *See* CSAPR Update Technical Support Document (TSD)[8], Appendix C. Second, Kentucky has only reduced NO_x emissions during ozone season by about one third in implementing the CSAPR Update, and accordingly retained a similar majority of its downwind impacts, well above the 0.75 ppb threshold of "significant contributions." *See* SIP Revision at 18-tbl 2, 19; CASPR Update, 81 Fed. Reg. at 74,518/2-3(defining significance threshold). *See also* CSAPR Update TSD, Appendix C (indicating that Kentucky emissions, without CSAPR, would contribute ~2 ppb to maintenance or nonattainment sites in Maryland and Pennsylvania); EPA Memo at 24 (listing monitored 2014-2016 and predicted 2023 ozone design values for linked Maryland site as 73 and 73.3 ppb and for linked Pennsylvania site as 77 and 70.3 ppb).

C. The SIP Revision must include enforceable prohibitions or commitments, not merely list events or actions that could hypothetically produce eventual elimination of downwind contributions

The Kentucky proposed SIP Revision fails to meet the primary SIP requirement of section 110(a)(2), which lists the necessary elements of a state implementation plan:

> (2) . . . Each such plan shall—(A) include enforceable limitations and other control measures . . . , as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this Act . . . .

42 U.S.C. 7410(a)(2). Kentucky points to modeling to assert that downwind non-attainment will hopefully cease to be an issue in 2023 and lists a bevy of unenforceable and aspirational changes that it hopes will lead to that outcome—but makes no commitment or plan for ensuring that result. Thus, even if Kentucky's reliance on 2023 were valid—and it is not—its plan is still fatally flawed in its lack of any proposed enforceable limitations and lack of compliance timelines.

As described in sections I.A and I.B, above, Kentucky does not confront the question of what is necessary, and what emissions must be prohibited, to eliminate its contributions to

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contradicted by the EPA Memo itself. *See* EPA Memo at 24 (indicating continued nonattainment in Philadelphia, Pennsylvania, at a site linked to Kentucky); 81 Fed. Reg. at 74,538 (listing CSAPR Update linkages for Kentucky).

[8] Available at https://www.epa.gov/sites/production/files/2017-05/documents/aq_modeling_tsd_final_csapr_update.pdf.

downwind nonattainment or interference with maintenance. Between now and 2023, when Kentucky hopes it might no longer contribute to downwind non-attainment, Kentucky points to *nothing* that would enforceably require any emission reduction at all. SIP Revision at 4, 18.

Instead, CASPR Update aside, Kentucky alludes to uncertain and external factors as resolving hopefully the issue for the state. For example, Kentucky discusses some generation retirements that it expects to contribute to future reductions of NO_x emissions—but Kentucky's proposed SIP Revision includes no authority to insist that the retirements occur as planned, or that the hoped-for emissions reductions are actually realized. *See SIP Revision* at 4-15, 18. Likewise, Kentucky's hoped-for elimination of transport contributions in 2023 rests on nothing more substantial than a hazy, hopeful line by EPA that notes that "[g]enerally" emissions are "expected" to decline "in the future." *Id.* at 18. Moreover, as discussed further in section II below, the emission reductions predicted by EPA's modeling is dependent on many federal regulatory limits that EPA is currently attempting to rescind.[9] These include CAFE standards, exceptions for glider kits, mercury air toxics, and many others—all likely to lead to increased NO_x emissions if the current EPA achieves its objectives of rolling back these measures so as to allow *greater* levels of NOx pollution, not lesser.

In sum, instead of evaluating current downwind impacts, recognizing deadlines, and producing a plan with enforceable limits and timelines, Kentucky has simply expressed an extra-regulatory hope that the problem will go away. Therefore, even disregarding 2023's irrelevance to Kentucky's good neighbor obligations, Kentucky's failure to include enforceable provisions in its SIP Revision to achieve compliance by 2023 violates the requirements section 110(a)(2)(A).

II. Kentucky' SIP Revision must adhere to the Clean Air Act and may not instead rely on the EPA Memo.

Kentucky's uncritical use of the EPA Memo leads it to ignore the Clean Air Act and controlling precedent, yet at the same time leads it to not take seriously the limits of EPA's exemptions. The SIP Revision fails to satisfy section 110(a)(2) as a result of both flaws. First, where unenforceable EPA guidance clearly conflicts with plain statutory requirements and controlling precedent, a state is bound by the law. Second, even by its own terms the analysis in the EPA Memo is not a carte blanche. It only applies where a state has no means of controlling NO_x emissions that do not take four years to bring into application and does avoid a duty to set enforceable rules.

Merely pointing to the predictions of future ozone levels in the EPA Memo does not allow Kentucky to violate the Clean Air Act or ignore controlling precedent. Agency guidance, like the EPA Memo, which does not pass through notice and comment, cannot be binding. *See Appalachian Power Co. v. EPA*, 208 F.3d 1015, 1027 (D.C. Cir. 2000) (explaining that guidance may not be binding on any party). More to the point, it can create no safe harbor for a party to

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[9] Sierra Club recognizes that Kentucky conducted modeling essentially identical to EPA's, relying on a similar set of flawed assumptions, and the same emissions inventories, and, therefore, producing essentially identical and identically unreliable results.

claim compliance. *See GE v. EPA*, 290 F.3d 377, 383 (D.C. Cir. 2002) (explaining that, even without mandatory language, a guidance document that creates safe harbors is binding on the agency and therefore violate the rulemaking requirements of the APA). It is of course textbook, well-settled law that a mere guidance memorandum, such as the EPA Memo, has no authority to override the legal statutory obligations described in the previous section, or to allow arbitrary and capricious selection of data as described in the next.

Moreover, the EPA Memo, as Kentucky uses it, directly contrasts with the Clean Air Act. In the scheme of the Clean Air Act, attainment with the NAAQS is ensured without the good neighbor clause. The purpose of the good neighbor obligations is to ensure that downwind states do not have to compensate for upwind polluters. Simply waiting for downwind states to achieve attainment despite upwind contributions, as the EPA Memo contemplates, is directly contrary to Clean Air Act section 110(a)(2)(D). Kentucky must instead take the requirements of section 110(a)(2)(D) at face value as described above.

Kentucky could not justify inaction or ignore section 110(a)(2)(D), even if the rationale of the EPA Memo were legally sound. Its guidance only addresses a narrow issue—whether emission controls that take longer than four years to implement are necessary when downwind compliance is expected sooner. The Memo does not (and could not) relieve Kentucky of good neighbor obligations—particularly those that could be addressed through NO_x emission reductions that could be made before downwind states come into compliance. But EPA's unsupported musings that such timely emission reductions might not be readily available are irrelevant. They misstate the inquiry—Kentucky is not on the hook for just the easy, low-hanging fruit of control options that are readily available, but for eliminating its transport contributions. Because the CSAPR Update was limited to *cost-effective* and *easily implemented* controls on EGUs, it is far from an exhaustive program of reductions.[10] There are a wide range of non-EGU controls alone that have not been implemented, from process controls to revocation of operating licenses. Finally, neither Kentucky's nor EPA's entirely irrelevant claim of impossibility is at all supported by a shred of evidence. *See* 5 U.S.C. § 706(2); *Nat'l Clients Council, Inc. v. Legal Servs. Corp.*, 617 F. Supp. 480, 486 (D.D.C. 1985) ("In the eyes of the law an administrative action not supported by evidence or lacking a rational basis is deemed arbitrary and capricious.").

III. The SIP Revision's exclusive focus on downwind attainment in 2023 is arbitrary and capricious because it ignores current, relevant good neighbor problems and relies on flawed and aspirational modeling assumptions

The SIP Revision is arbitrary and capricious because it entirely fails to consider basic aspects of its good neighbor obligations—how much its emissions currently contribute to

[10] Even in the EGU context, the CSAPR Update was far from exhausting readily available control options. For example, Kentucky could require 100% operation of already-installed control equipment. Kentucky could also insist on optimized performance of control equipment. Kentucky could discontinue the use of "banked allowances" included in the CSAPR Update. Finally, CSAPR did not require any re-dispatch, or shifting power generation from higher-emitting to lower-emitting plants, which are also feasible methods of emission reduction in the short term.

downwind nonattainment, what steps are necessary to prohibit such emissions, and when such prohibitions are due—and instead focuses on legally irrelevant estimates by the EPA of emissions five years in the future. Further, the EPA modeling itself—which contemplates attainment of 2008 Ozone NAAQS by only the barest margin in 2023—has at least three serious issues. To predict nationwide attainment, EPA assumed strict compliance with rules EPA is actively seeking to rescind, included biases such as assumed overcompliance with CSAPR, and ignored significant modeling uncertainty. These each make the predictions less dependable and still more irrelevant, each makes Kentucky's unexplained reliance more arbitrary and capricious.

It is textbook administrative law that agency action is arbitrary and capricious when the agency fails to "examine the relevant data and articulate a satisfactory explanation" for its decision. *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 103 S. Ct. 2856, 2866 (1983) (emphasis added). Likewise, an action is arbitrary and capricious if the "agency has relied on factors which Congress has not intended it to consider [or] entirely failed to consider an important aspect of the problem . . . ." *Id.* at 2867. By focusing on speculative and flawed modeling of future conditions to the exclusion of present data, and by failing to address the significant errors in the EPA Memo's approach, this is precisely what Kentucky has done.

A. The Proposed SIP Revision's total reliance on speculative and flawed modeling that suggests attainment by only 0.1 ppb is arbitrary and capricious

Kentucky proposes to rely entirely on projections of future emissions based on a current regulatory framework that EPA is actively attempting to dismantle. This is a critical problem with the EPA Memo: EPA in one breath predicts future ozone levels by assuming that current regulations continue to control, in the next seeks to rescind, weaken, and undo many of those same regulations. Accordingly, a proper SIP revision must actually include provisions to reduce transport-causing pollution.

Among the current EPA actions not accounted for in EPA's modeling, the recently proposed "Repeal of Emission Requirements for Glider Vehicles, Glider Engines, and Glider Kits" stands out. 82 Fed. Reg. 53,442 (Nov. 16, 2017). The rule applies to glider vehicles, which are heavy duty diesel trucks which are constructed from a new body assembly (cab, brakes, front axle, etc.) mated to a previously owned power train (engine and transmission). *Id.* at 53,443/2. Gliders are typically ~25% cheaper than new trucks, mechanically simpler, and more fuel efficient due largely to less stringent emissions controls. *Id.* at 53,443/3-44/2. But the older, less stringently controlled engines that would be allowed in glider vehicles if the repeal were achieved emit extremely significant amounts of NO_x. *See* EPA-420-R-16-901, "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2," Response to Comments for Joint Rulemaking, at 1875-6 (Aug. 2016) (responding to comments on the original regulation of glider vehicles). As discussed in EPA's response to comments on the original rule, EPA estimated that unregulated, glider vehicles would increase emissions from heavy-duty highway vehicles by ~300,000 tons annually in 2025. *Id.* Conversely, the entire CSAPR Update only reduces annual NO_x emissions by 75,000 tons, meaning that EPA's proposed regulatory action would swamp multiple times over the emission reductions from the CSAPR Update—severely undercutting the assumptions baked into the EPA Memo.

See EPA-452/R-16-004, "Regulatory Impact Analysis of the CSAPR Update," at ES-8, tbl. ES-1 (Sept. 2016).

Other ozone significant, deregulatory actions by EPA include efforts to weaken the Corporate Average Fuel Economy (CAFE) standards. 77 Fed. Reg. 62,624 (Oct. 15, 2012). When promulgated, the 2017 and later CAFE standards were anticipated to reduce annual light-duty highway vehicle emissions of NO_x by 904 tons in 2020 and 6,509 tons in 2030, and emissions of VOCs, another ozone precursor, by 11,712 and 123,070 tons in 2020 and 2030. *Id.* at 62,900. EPA is also considering rescinding 2016 Control Techniques Guidelines for the Oil and Natural Gas Industry, which are estimated to reduce VOC emissions by 80,000 tons annually. 81 Fed. Reg. 74,798 (Oct. 27, 2016); Final Control Techniques Guidelines Fact Sheet[11] at 3.

None of these actions are accounted for by EPA or Kentucky's modeling. *See* EPA, "Technical Support Document, Additional Updates to Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform for the Year 2023," ("2023 Model TSD") at 96, tbl 4-1 (Oct. 2017). These steps by EPA would doubtless ensure that the exceedingly narrow compliance margins assumed by its modeling in 2023 are not achieved. Kentucky should therefore include provisions, such as enforceable timelines and regular progress assessments to ensure that good neighbor compliance is both achieved and permanent. To the extent that Kentucky stakes good neighbor compliance entirely on an unenforced and actively undercut prediction, its reliance is arbitrary and capricious.

B. *Reliance on modeling that predicts future compliance by 0.1 ppb when inherent uncertainties are much larger that such a margin is arbitrary and capricious*

The EPA Memo speculatively suggests ozone NAAQS attainment without performance of any sensitivity analyses and through incorporation of a series of dubious assumptions, and even then projects attainment on only the narrowest of margins: by 0.1 ppb. Electing to rely on such modeling, and in the process ignoring all other data, is the very essence of arbitrary and capricious agency decision-making. The uncertainty in the EPA Memo's projection is immense.

EPA's recent prediction of near-nationwide compliance in 2023—by a margin of 0.1 ppb—is the product of thousands upon thousands of inputs, assumptions, and simplifications. *See generally* 2023 Model TSD. Emission inventories may be drawn from reported data or based on separate models, and even sub-models. Quantities like future power consumption, fuel prices, and vehicle miles traveled must be predicted. Meteorological conditions must be assumed and simplified, along with atmospheric mixing dynamics. Chemical reactions that involve thousands of species and complex interactions with airborne particles, clouds droplets, and sunlight must be reduced to highly simplified approximations.

Natural gas prices—which have been low in recent history, causing significant reduction in coal generation and NO_x emissions—are a great example of the huge degree of uncertainty in

[11] Available at https://www.epa.gov/sites/production/files/2016-10/documents/fact-sheet-2016-oil-and-gas-ctg.pdf.

this prediction. Even before the photochemical model runs, 2023 emissions must be predicted. An element in the emissions modeling predicts power plant fuel utilization based on a guess of future fuel prices in 2023. If gas prices are higher than predicted, the model will predict greater dependence on coal-fired generation, predicting higher NO_x emissions, and ultimately under - predict ozone formation.

In sum, Kentucky proposes to rely on an uncertain prediction of compliance by inches, and—worse—relies on it exclusively, to justify inaction. Kentucky must include provisions in its plan, like regular monitoring and assessment, to ensure that any its predictions hold. Kentucky's failure to do anything other than uncritically assume that EPA's flawed modeling somehow absolves Kentucky from any further need to address its good neighbor obligations is an arbitrary and capricious rejection of relevant data in favor of speculation.

Conclusion

For the foregoing reasons, the proposed SIP Revision is improper and contrary to the Clean Air Act. It contains no provisions that prevent emissions in Kentucky from making significant contributions to nonattainment or interfering with maintenance of the 2008 Ozone NAAQS in downwind states as required by section 110(a)(2)(D)(i)(I) of the Clean Air Act. Nor does the CSAPR Update, on which Kentucky wishes to rely, resolve all good neighbor obligations under the act; by its own terms it is a partial, provisional solution. Therefore, Kentucky must revise its proposal to take account of current conditions, squarely confront the terms of the Clean Air Act, and acknowledge controlling precedent. Kentucky's proposed inaction based on future downwind attainment avoids these duties and violates the Act.

Sincerely,

/s/

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Appendix C-3

Statement of Consideration

STATEMENT OF CONSIDERATION
Relating to Proposed SIP Revision
Good Neighbor Provision for the 2008 Ozone NAAQS

Energy and Environment Cabinet
Kentucky Department for Environmental Protection
Division for Air Quality

Response to Comments for Kentucky's proposed SIP submittal to address Clean Air Act Section 110(a)(2)(D)(i)(I), also known as the "Good Neighbor" provision, regarding the 2008 ozone NAAQS.

I. Beginning March 2, 2018, until March 30, 2018, the Cabinet provided an opportunity for the public to review and comment on the proposed SIP revision addressing the Good Neighbor provision for the 2008 ozone NAAQS (hereafter known as the "Good Neighbor SIP"). The Cabinet made available the public notice of the comment period and public hearing on the Division for Air Quality's website, and mailed the public notice to interested individuals registered on the regulatory mailing lists maintained by the Cabinet.

II. The following people submitted written statements during the public comment period:

Name and Title	Agency/Organization/Entity/Other
Scott Davis……………………………	U.S. EPA
Richard Pirolli………………………..	Director, Air Planning and Standards Division of Connecticut Department of Energy & Environmental Protection
Francis Steitz………………………….	Director, New Jersey Division of Air Quality
Steven Flint…………………………..	Director, Division of Air Resources of New York State Department of Environmental Conservation
David Flannery………………………..	Legal Counsel for the Midwest Ozone Group
Carolyn Brown………………………..	Counsel for the Utility Information Exchange of Kentucky (UIEK)
Nathan Taylor, Matthew Miller, and Zachary Fabish……………………	Legal Fellow, Staff Attorney, and Senior Attorney of Sierra Club

III. A public hearing was conducted March 30, 2018, at 10:00 a.m. at 300 Sower Boulevard in Frankfort, Kentucky.

The following people attended this public hearing:

Name and Title	Agency/Organization/Entity/Other	Testimony
Brian Clark	Kentucky Petroleum Marketing Association	No

IV. The following people from the Division for Air Quality attended this public hearing:

Name and Title

Melissa Duff, Assistant Director
Leslie Poff, Environmental Control Supervisor
Lauren Hedge, Environmental Scientist*

*Cabinet Representative

Appendix C of this final SIP Revision package includes all comments as received during the public comment period, as well as the transcript from the public hearing.

V. Summary of Comments and Responses

1. Comment: "Kentucky relies on EPA's CSAPR Update modeling for 2017 and 2023, as well as modeling conducted by Alpine Geophysics for 2023, to conclude that it is in full compliance with the CAA Good Neighbor requirements for the 2008 NAAQS. Both CT DEEP and the Ozone Transport Commission have previously expressed strong concerns that EPA's modeling platform, which was also used by Alpine Geophysics, produces overly optimistic projections of future year ozone levels. As shown in Table 1 (attached), actual measured 2017 ozone design values are considerably higher than modeled projections by 5 to 10 ppb at all Connecticut monitoring sites, confirming this concern. Table 1 also shows that ozone contributions from Kentucky sources exceed the one percent significance threshold at two violating Connecticut monitors after scaling contributions relative to the 2017 measured air quality levels. Kentucky's proposed SIP does not address this critical under prediction by the model of current measured ozone levels, which undermines Kentucky's conclusion that it has fully met its Good Neighbor obligations to Connecticut."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut Department of Energy & Environmental Protection)

Response: The Cabinet does not concur. The modeling conducted by EPA relied upon up-to-date data, which incorporated stakeholder feedback into its electric generating units (EGUs) and non-EGU emissions projections and its modeling platform. As detailed in the October 27, 2017 memo from Stephen Page, EPA's updated modeling projecting to 2023 accounted for upcoming retirements, post-combustion control retrofits, coal-to-gas conversions, combustion controls upgrades, new units, Cross-State Air Pollution Rule (CSAPR) Update compliance, state rules, Best Available Retrofit Technology (BART) requirements and updates to the oil and gas sector.

The Cabinet finds the basis for EPA and Alpine Geophysics modeling to be conservative and EPA's use of apportionment modeling to determine which states contribute pollution to nonattainment or maintenance area air quality problems in other states a reliable method to determine Kentucky's influence on downwind receptors. For instance, EPA's modeled results did not account for the local emission control strategies implemented as a result of RACT requirements. Related to Connecticut's "Scaled KY Impact" contributions in Table 1 of their comment letter, the Cabinet does not agree with Connecticut's methodology nor the results of that methodology. Without an explanation as to how these numbers were determined, the Cabinet cannot provide a meaningful response to the methodology used to extrapolate to a "scaled" figure.

2. Comment: "Kentucky's proposed SIP also relies on modeling projections that indicate all areas outside California will achieve attainment with the 2008 NAAQS by 2023. We note that some Connecticut monitors are projected to only barely comply by this late date"
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet acknowledges the comment. EPA's model demonstrates that Connecticut monitors attain the standard.

3. Comment: "Notwithstanding Connecticut's concerns about model under prediction of future year ozone levels, Kentucky's reliance on the 2023 modeling should be accompanied by enforceable regulations that ensure the lower 2023 emissions are achieved. For example, emissions from electric generating units (EGUs) are assumed in the modeling to decrease between 2017 and 2023, both annually and seasonally. Kentucky's 2017 actual ozone emissions (i.e., 20,023 tons) were less than EPA CSAPR Update budget level for the state (21,115 tons). The 2023 modeling assumes ozone season EGU emissions will be even lower (16,954 tons). The projected level of 2023 emissions must be made federally enforceable, especially given the narrow margin by which the EPA/Alpine modeling projects Connecticut monitors will reach compliance in 2023."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet does not concur. The assumptions applied in EPA's modeling utilize the best available projections of electric generation and emissions. As noted in response to comment No. 1, EPA's modeling does not fully account for Connecticut's local reductions through RACT.

4. Comment: "Connecticut also challenges the arbitrary selection of using a 2023 timeline for determining Good Neighbor compliance with the 2008 ozone NAAQS. Connecticut was originally designated marginal with compliance expected by the end of the 2014 ozone season. Connecticut's nonattainment areas were last reclassified to moderate, and are currently faced with another reclassification to serious with an attainment deadline of 2020. Connecticut has not met attainment due to overwhelming transport from upwind areas including Kentucky. The arbitrary selection of 2023 only perpetuates the unjust economic and health burdens on Connecticut's citizens suffer due to the failure of Kentucky and other upwind states to fully meet their Good Neighbor obligations in a timely manner."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet does not concur. EPA's October 27, 2017 memo provides an explanation as to why EPA chose 2023 even though it is later than the attainment date for nonattainment areas classified as Serious (July 20, 2021), or prior to the attainment date for areas classified as Severe (July 20, 2027). Specifically, "In selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."

Further, in EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP, "EPA proposes that 2023 is an appropriate future analytic year because it is the first ozone season for which significant new cost-effective post-combustion controls to reduce NOx could be feasibly installed across the CSAPR Update region, and thus represents the timeframe that is as expeditious as practicable for upwind states to implement additional emission reductions."[1] Therefore, the Cabinet determines that 2023 is an appropriate future analytical year.

5. Comment: "Connecticut's concerns regarding emissions from Kentucky's sources are buttressed by the recent CAA section 126 petition submitted to the EPA by New York. New York's petition requests EPA to take action regarding stationary sources in nine upwind states, including Kentucky, that continue to interfere with attainment in the NY-NJ-CT nonattainment area for the 2008 ozone standard."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet does not concur with New York's modeling results and technical analysis applied in the CAA section 126 Petition relating to Kentucky's alleged contributions to the New York, Richmond County monitor. In the CAA section 126 Petition that NYDEC filed on March 12, 2018, New York failed to include EPA's updated modeling platform released in October of 2017.

For instance, Kentucky's actual 2017 NO_x emissions from EGUs totaled 7,444.1 tons; whereas, the New York model used a projected emissions rate of 10,543.6 tons of NO_x for Kentucky EGUs in 2017, which is a considerable difference. If New York had performed modeling with the actual 2017 NO_x data, it would demonstrate no modeled significant contribution from Kentucky. Section V within the proposed Kentucky 2008 ozone Good Neighbor SIP details the downward trend in NOx emissions since the implementation of trading programs such as CAIR and CSAPR (Table 1).

6. Comment: "The Ozone Transport Commission (OTC) recently adopted a statement identifying minimum control strategies that should be in all good neighbor SIPs.[5] Kentucky should ensure all these strategies are included in its SIP, as well as the other points noted in the OTC statement."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet acknowledges the comment. It should be noted that Section IV of the proposed Kentucky 2008 ozone Good Neighbor SIP lists regulations, specifically RACT rules that apply to stationary sources. Additionally, 401 KAR 50:012 mandates the use of reasonable and available controls for all major sources of VOC emissions in a nonattainment area for ozone.

Not all OTC states have adopted these minimum control strategies, therefore it should not be expected that Kentucky bear all of the weight for NO_x reduction strategies. The U.S. Supreme

[1] 83 FR 17125

Court and D.C. Circuit Court held that EPA may not require emissions reductions greater than necessary, thus avoiding over-control of states to achieve attainment and maintenance of the NAAQS in downwind areas.[2]

7. Comment: "Connecticut believes targeting emissions reductions strategies on high emitting days can be especially effective for achieving maximum air quality benefit and urges Kentucky to adopt such targeted strategies."
(Richard Pirolli, Director, Air Planning and Standards Division of Connecticut DEEP)

Response: The Cabinet concurs with the recommendation to apply local controls, specifically on peak demand days. The use of uncontrolled, peak-demand electric generators during high emitting days should be limited, as they are more conducive to ground-level ozone formation.

8. Comment: "Per the Clean Air Act, Kentucky's significant contributions for the 2008 ozone NAAQS should have been addressed by March 2011."
(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet acknowledges the comment. On July 17, 2012, the Cabinet submitted the required Infrastructure SIP for the 2008 ozone NAAQS. At the time of the submittal, EPA had not met their statutory obligation of determining Kentucky's significant contribution to downwind monitors. Beginning January 1, 2009, Kentucky sources were required to comply with the CAIR ozone season budgets, as adopted into the Kentucky SIP. Therefore, Kentucky met its Good Neighbor obligation.

9. Comment: "The choice of 2023 for future year modeling to meet the Clean Air Act "Good Neighbor" requirements is not appropriate since it is after the Moderate classification attainment deadline of July 2018, as well as, the Serious classification attainment deadline of July 2021."
(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet does not concur. EPA's October 27, 2017 memo provides an explanation as to why EPA chose 2023 even though it is later than the attainment date for nonattainment areas classified as Serious (July 20, 2021), or prior to the attainment date for areas classified as Severe (July 20, 2027). Specifically, "In selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."

Further, in EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP, "EPA proposes that 2023 is an appropriate future analytic year because it is the first ozone season for which significant new cost-effective post-combustion controls to reduce NOx could be feasibly installed across the CSAPR Update region, and thus represents the timeframe that is as expeditious

[2] *EPA v. EME Homer City Generation, L.*P., 134 S. Ct. 1584, 1600-01 (2014); *EME Homer City Generation, L.P. v. EPA*, 795 F. 3d 118, 127 (D.C. Circ. 2015).

as practicable for upwind states to implement additional emission reductions."[3] Therefore, the Cabinet determines that 2023 is an appropriate future analytical year.

10. Comment: "The NNJ-NY-CT nonattainment area and its citizens should not have to wait until 2023 to receive the benefits of clean air quality for the human health-based ozone NAAQS. Since the moderate attainment deadline has passed, Kentucky should conduct a modeling run for the next attainment date of July 2021 (2020 DV) for the serious classification."
(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet acknowledges the comment. The Cabinet finds EPA's modeling projections to be more appropriate for national consistency. As noted in EPA's CSAPR Update Rule, "section 110(a)(2)(D)(i)(I) of the CAA only requires upwind states to prohibit emissions that will significantly contribute to nonattainment or interfere with maintenance of the NAAQS in other states. It does not shift to upwind states the full responsibility for ensuring that all areas in downwind states attain and maintain the NAAQS."[4]

11. Comment: "Kentucky is relying upon reductions made in the state through its adherence to CSAPR and the CSAPR update rule. The USEPA guidance memorandum for the "Good Neighbor" SIP specifically states that "EPA acknowledged in the CSAPR Update that the rule may not fully address the requirements of the good neighbor provision for the 2008 ozone NAAQS for most of the states included and that further analysis was needed of air quality and oxides of nitrogen (NOx) reductions after 2017."
(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet does not concur. The Cabinet's proposed Good Neighbor SIP does not rely solely upon reductions made through the adherence to CSAPR and the CSAPR Update rule. Section IV within the Kentucky 2008 ozone Good Neighbor SIP lists State and Local regulations used to control the release of emissions from Kentucky sources. Section IV also discusses upcoming Federal programs that will effectively lower emissions throughout the nation. Section V lists several EGU facilities that are scheduled to retire while others plan to switch from coal to natural gas. The SIP concludes by stating that "no additional control strategies beyond what is "on the books" are necessary to fully address the requirements of Section 110(a)(2)(i)(I) of the Clean Air Act."

12. Comment: "The 2023 modeling provided by Kentucky, through Alpine Geophysics, shows that Kentucky significantly contributes to ozone levels in NJ's nonattainment area and has a 1.48 ppb modeled ozone contribution in 2023, greater than the 1% of the NAAQS (0.75 ppb) considered as a significant contribution to ozone. Although the Kentucky 2023 modeling predicts attainment of the 75 ppb NAAQS in Connecticut with a result of 75.9 at the Westport monitor, Kentucky should not presume a bright line of attainment in 2023 or that the Connecticut sites will actually reach attainment by then."
(Francis Steitz, Director, New Jersey Division of Air Quality)

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[3] 83 FR 17125
[4] 81 FR 74515

Response: The Cabinet acknowledges the comment. The 2023 modeling conducted by Alpine Geophysics does not indicate that Kentucky emissions significantly contribute to ozone levels in New Jersey's nonattainment area and predicts attainment of the 75 ppm ozone standard at Connecticut's Westport monitor (monitor ID 90019003) in 2023 with a design value of 75.6.

13. Comment: "Kentucky's 2017 EGU Point Source Ozone Season NOx Emissions as shown in Table 2 of Alpine's Report are very close to the CSAPR Update allocations. They are not significantly lower as alluded to on page 17 of your SIP."
(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet does not concur. Table 2, which displays Kentucky's 2017 EGU Point Source Ozone Season NOx Emissions, is located on page 18 of Kentucky's Good Neighbor SIP and not in Alpine's Report, as stated by the Commenter. The significantly lower actual ozone season NOx emissions referred to on page 17 of Kentucky's Good Neighbor SIP pertains to the overall reduction in NOx emissions over the course of the 2015 – 2017 time period; this 3-year period produced an average reduction in NOx emissions of 25% when compared to the allotted budgets. Furthermore, 2023 NOx emissions are projected to be even lower than the 20,053.01 tons emitted in Kentucky in the year 2017.

14. Comment: "These actual and allocated amounts should be lowered in 2018 to reduce Kentucky's significant contribution to the ozone levels in New Jersey's nonattainment areas now rather than wait 5 more years to make the needed "Good Neighbor" reductions. Kentucky should, therefore, be immediately investigating other measures to reduce its ozone impact on New Jersey and other northeastern States. Specifically, these reductions should consider the following:

- Reasonable Available Control Technology (RACT) NOx levels on Electric Generating Units and other large NOx sources to the same stringent levels as done in the Ozone Transport Region including:
    - Implementation of a High Electric Demand Day (HEDD) program to reduce NOx emissions on high ozone days,
    - Distributed generation unit controls, and
    - Control measures at municipal waste combustors.

- Control measures for Mobile Sources including:
    - An automobile emissions Inspection/Maintenance Program,
    - An anti-idling program to prevent automobiles from idling more than three consecutive minutes, and
    - Implementation of the California Car program."

(Francis Steitz, Director, New Jersey Division of Air Quality)

Response: The Cabinet does not concur. The modeling completed by EPA, and confirmed by Alpine Geophysics, "indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone

NAAQS of 75 ppb in 2023."[5] In addition, EPA's CSAPR Update Rule states "section 110(a)(2)(D)(i)(I) of the CAA only requires upwind states to prohibit emissions that will significantly contribute to nonattainment or interfere with maintenance of the NAAQS in other states. It does not shift to upwind states the full responsibility for ensuring that all areas in downwind states attain and maintain the NAAQS."[6]

15. Comment: "DEC commends KEEC on the reductions in nitrogen oxide (NOx) emissions (an ozone precursor) that have been obtained from electric generating units (EGUs) as noted in the proposed SIP revision. However, DEC urges KEEC to continue its progress in reducing NOx, and ensure these reductions are sustained through enforceable permit limitations and compliance schedules. While New York has been seeking EPA's assistance in ameliorating the ozone transport issue, DEC continues to enact stringent control measures through enforceable limits in permits and regulations to reduce ozone precursors from its own sources. DEC regularly reviews and updates its nonpoint sector volatile organic compound regulations, and utilizes a $5,500/ton Reasonable Available Control Technology (RACT) threshold for NOx reductions from major EGU and non-EGU point sources, a number that greatly exceeds the $1,400/ton threshold in the Cross-State Air Pollution Rule (CSAPR) Update for the 2008 ozone NAAQS.
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet acknowledges the comment. The Cabinet includes enforceable limitations in the title V operating permits issued to Kentucky EGUs, including the regulatory requirements of CSAPR under 40 CFR Part 97. Additionally, Section IV of the proposed Kentucky 2008 ozone Good Neighbor SIP lists the Kentucky Administrative Regulations that include standards of performance for new and existing facilities, as well as RACT requirements, applicable to VOC and NOx-emitting facilities.

For EGUs, EPA explained in the CSAPR Update rule the reasoning behind the $1,400 per ton cost threshold, "emission budgets reflecting the $1,400 per ton cost threshold do not over-control upwind states' emissions relative to either the downwind air quality problems to which they are linked or the 1 percent contribution threshold that triggered further evaluation."[7]

16. Comment: DEC notes that KEEC's proposed good neighbor SIP is requesting that EPA find that Kentucky is not required to make any further reductions, beyond those required by the CSAPR Update. While EPA intended for the CSAPR Update rule to serve as a partial Federal Implementation Plan (FIP) for states that had failed to submit adequate SIPs, to obtain emission reductions before the 2018 moderate area attainment date, EPA admitted that the inherent NOx emission budgets "may not be sufficient to fully address these states' good neighbor obligations" (81 FR 74521). More specifically, EPA's focus on short-term reductions at a control cost of only $1,400 per ton of NOx reduced does not fully mitigate Kentucky's significant contribution. Moreover, the CSAPR program budgets are based on cumulative ozone season emissions, a

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[5] Memorandum, Stephen D. Page, Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I) (October 2017 Transport Memo)
[6] 81 FR 74515
[7] 81 FR 74508

modeling assumption that does not account for the individual hot and stagnant days that are most conducive to ozone formation and therefore, does not assist downwind nonattainment and maintenance areas in New York on these critical days.
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet does not concur. The Cabinet's proposed Kentucky 2008 ozone Good Neighbor SIP does not rely solely upon reductions made through the adherence to CSAPR and the CSAPR Update rule. Section IV within the Good Neighbor SIP lists State and Local regulations used to control the release of emissions from Kentucky sources. Section IV also discusses upcoming Federal programs that will effectively lower emissions throughout the nation. Section V lists several EGU facilities that are scheduled to retire while others plan to switch from coal to natural gas. The SIP concludes by stating that "no additional control strategies beyond what is "on the books" are necessary to fully address the requirements of Section 110(a)(2)(i)(I) of the Clean Air Act."

Additionally, the Cabinet determines the use of local, uncontrolled, peak-demand electric generators during high emitting days should be limited, as they are more conducive to ground-level ozone formation.

17. Comment: "KEEC's reliance on EPA's updated transport modeling, dated October 27, 2017, which uses a 2023 inventory projection and modeling analysis, is also inappropriate. The 2023 modeling does not address Kentucky's existing and ongoing contribution to present nonattainment at downwind New York receptors of the 2008 ozone NAAQS, nearly ten years after these standards were promulgated, and it ignores deadlines for downwind areas to attain the NAAQS. See *North Carolina v. EPA*, 531 F.3d 896, 911-12 (D. C. Cir. 2008). EPA Director of the Office of Air Quality Planning and Standards Stephen D. Page provided a memorandum dated October 27, 2017 accompanying EPA's updated transport modeling stating that EPA's technical analysis was made available to "assist states' efforts to develop, supplement or resubmit good neighbor SIPs for the 2008 ozone NAAQS to fully address their transport obligations." However, the memorandum further stated that "the information provided by this memorandum is not a final determination regarding states' remaining obligations under the good neighbor provision." Kentucky may not rely on EPA's arbitrary selection and use of a 2023 projection to satisfy its obligation to develop a SIP that contains adequate provisions prohibiting sources from contributing to nonattainment in, or interfering with maintenance. Considering Kentucky's heavy reliance on the admittedly inadequate CSAPR Update and EPA's overly optimistic 2023 modeling analysis, KEEC's proposed good neighbor SIP does not meet the requirements of the CAA."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet does not concur. EPA's October 27, 2017 memo provides an explanation as to why they chose 2023 even though it is later than the attainment date for nonattainment areas classified as Serious (July 20, 2021), or prior to the attainment date for areas classified as Severe (July 20, 2027). Specifically, "In selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."

Further, in EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP, "EPA proposes that 2023 is an appropriate future analytic year because it is the first ozone season for which significant new cost-effective post-combustion controls to reduce NOx could be feasibly installed across the CSAPR Update region, and thus represents the timeframe that is as expeditious as practicable for upwind states to implement additional emission reductions."[8] Therefore, the Cabinet determines that 2023 is an appropriate future analytical year.

18. Comment: "Despite EPA's attempted justification for selecting the 2023 modeling year to address the requirements of the "good neighbor" provisions for the 2008 NAAQS, the New York metropolitan area (NYMA) failed to attain by the July 20, 2015 attainment deadline for "marginal" areas; will fail to attain the July 20, 2018 attainment deadline for "moderate" areas; and will be elevated to "serious" nonattainment status with a July 20, 2021 attainment deadline. At this point, the NYMA's continuing struggled to attain the 2008 ozone NAAQS is due, in large part, to transported ozone precursors from upwind states such as Kentucky. By not assessing Kentucky's existing contribution to current nonattainment in the NYMA and ignoring the 2021 serious nonattainment area deadline, KEEC cannot conclude that this SIP revision satisfies the requirements of 110(a)(2)(D)(i)(I). The convenience and availability of an arbitrary and, as described below, overly optimistic projection inventory five years in the future falls far short of meeting KEEC's existing CAA good neighbor obligations."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet does not concur. EPA's October 27, 2017 memo provides an explanation as to why they chose 2023 even though it is later than the attainment date for nonattainment areas classified as Serious (July 20, 2021), or prior to the attainment date for areas classified as Severe (July 20, 2027). Specifically, "In selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."

Further, in EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP, "EPA proposes that 2023 is an appropriate future analytic year because it is the first ozone season for which significant new cost-effective post-combustion controls to reduce NOx could be feasibly installed across the CSAPR Update region, and thus represents the timeframe that is as expeditious as practicable for upwind states to implement additional emission reductions."[9] Therefore, the Cabinet determines that 2023 is an appropriate future analytical year.

19. Comment: "KEEC's reliance on EPA's modeling is also inappropriate because it relies on reductions that are not federally enforceable. For example, as noted on page seven of Appendix A, "[t]he EPA then extended these observed emissions levels forward to 2023, made unit-

[8] 83 FR 17125
[9] 83 FR 17125

specific adjustments to account for upcoming retirements, post-combustion control retrofits, coal-to-gas conversions, combustion control upgrades, new units, CSAPR Update compliance, state rules and Best Available Retrofit Technology (BART) requirements." Since KEEC relied on the CSAPR Update as the primary basis to support this submission, it must demonstrate that the additional emission reductions EPA projected, across the modeling domain, are federally enforceable. To the extent that any actions and reductions are not federally enforceable, there is no basis for KEEC to rely upon them in concluding that Kentucky will meet its good neighbor obligations. *See* 40 C.F.R. § 51.260 ("Each [implementation] plan shall contain legally enforceable compliance schedules setting forth the dates by which all stationary and mobile sources or categories of such sources must be in compliance with any applicable requirement of the plan."); *see also* 40 C.F.R. §51.230 ("requiring a state implementation plan to "show that the State has the legal authority to carry out the plan" including by adopting emission standards and limitations and enforcing applicable laws, regulations and standards")."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet acknowledges the comment. The Cabinet includes enforceable limitations in the title V operating permits issued to Kentucky EGUs, including the regulatory requirements of CSAPR under 40 CFR Part 97. Additionally, Section IV of the proposed Kentucky 2008 ozone Good Neighbor SIP lists the Kentucky Administrative Regulations that include standards of performance for new and existing facilities, as well as RACT requirements, applicable to VOC and NOx-emitting facilities.

20. Comment: "KEEC's reliance on EPA's assumption in the Page Memo that installation of emission controls would likely take up to 4 years is not supported by any analysis. Additionally, EPA's assumptions only account for the installation of new controls. EPA did not evaluate optimizing existing controls, the ability to switch to lower emitting units, or including permit limits to lock in the assumed emissions reductions."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet does not concur. EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP provides insight to their analysis of control measures and implementation schedules. EPA assessed the time in which it takes to install and run selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) control technologies and the cost-effectiveness of turning on existing idled SNCRs. EPA concluded "implementation of any of the control strategies considered herein is likely not feasible until during or after the 2022 ozone season. Considering the time to implement the controls with the time to promulgate a final rule, EPA believes that such reductions are unlikely to be implemented for a full ozone season until 2023."[10]

21. Comment: "DEC is also concerned about EPA's continued efforts to repeal and delay existing standards, and if such repeals and delays are effective, the impact EPA's actions will have on the projections relied upon by KEEC. In particular, KEEC must evaluate the emission impacts of EPA's actions in the transportation sector, including, but not limited to, "glider kits," and the oil-and-gas sector where, for example, EPA's most recent action was to propose the

[10] 83 FR 17128

withdrawal of the Control Techniques Guidelines for the Oil and Natural Gas Industry. 83 FR 10478."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet acknowledges the comment. Through the promulgation process, EPA determines the environmental impact of each action. As required by the CAA, those rulemakings must provide an opportunity for public participation and comment.

22. Comment: "KEEC did not perform any modeling analysis to demonstrate that Kentucky's current emissions, from all sectors, do not contribute to nonattainment and interference with maintenance in downwind areas such as the NYMA. Therefore, there is no way to assess whether Kentucky is actually satisfying the state's good neighbor obligations under CAA section 110(a)(2)(D)(i). In the meantime, NYMA will be reclassified to "serious" nonattainment, with an attainment date of July 20, 2021, due to its continued inability to attain the 2008 ozone NAAQS, in large part because of transported precursors from upwind state such as Kentucky. As an upwind state that significantly contributes to nonattainment in the area, Kentucky should expeditiously comply with its good neighbor obligations."
(Steven Flint, Director, New York Division of Air Resources)

Response: The Cabinet acknowledges this comment. As stated on page 9 of EPA's October 27 memo, "The EPA believes that states may consider using this national modeling to develop SIPs that fully address requirements of the good neighbor provision for the 2008 ozone NAAQS. States may also be able to use this information to address other CAA obligations." Therefore, the Cabinet relied upon EPA's most recent modeling assessment.

23. Comment: "The Sierra Club believes that the SIP Revision, which essentially asks for approval for inaction, is fundamentally flawed…"
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The commenter fails to recognize the control strategies identified in the proposed Kentucky 2008 ozone Good Neighbor SIP revision that limit NOx and VOC emissions from Kentucky sources. Further, the commenter does not acknowledge the significant decline in emissions from Kentucky sources as detailed in Section IV of the proposed SIP.

24. Comment: (1) The SIP Revision is contrary to law and does not satisfy the requirements of section 110(a)(2)(D). It contains no provisions, let alone "adequate provisions…prohibiting…any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will…contribute significantly to nonattainment in, or interfere with maintenance by, any other State." 42 U.S.C. § 7410(a)(2)(D).
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. Section IV of the proposed Kentucky 2008 ozone Good Neighbor SIP lists Federal, State, and Local regulations used to control the release of emissions from Kentucky stationary sources. Additionally, Section V lists several EGU facilities that are scheduled to retire, while others plan to switch from coal to natural gas.

The proposed SIP concludes by stating that "no additional control strategies beyond what is "on the books" are necessary to fully address the requirements of Section 110(a)(2)(i)(I) of the Clean Air Act." Further, the Cabinet agrees with EPA's ruling "that section 110(a)(2)(D)(i)(I) of the CAA only requires upwind states to prohibit emissions that will significantly contribute to nonattainment or interfere with maintenance of the NAAQS in other states. It does not shift to upwind states the full responsibility for ensuring that all areas in downwind states attain and maintain the NAAQS."[11]

25. Comment: (I) The SIP Revision proposed by Kentucky does not satisfy the Clean Air Act good neighbor requirements because it illegally endorses and ratifies continued contribution to downwind non-attainment of the 2008 NAAQS until 2023.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The proposed Good Neighbor SIP does not rely solely upon reductions made through the adherence to CSAPR and the CSAPR Update rule. Section IV within the proposed Kentucky 2008 ozone Good Neighbor SIP lists Federal, State, and Local regulations used to control the release of emissions from Kentucky sources. Section V lists several EGU facilities that are scheduled to retire while others plan to switch from coal to natural gas. Section V also demonstrates the downward trend in NOx emissions since the implementation of trading programs such as CAIR and CSAPR (Table 1). The Cabinet expects this trend to continue with the implementation of future federal and state programs.

26. Comment: (I.A) The attainment timeline relied on by the Kentucky SIP Revision violates the plain language of section 110(a)(2)(D)(i) by allowing Kentucky to continue significant contributions of downwind states struggling to meet attainment deadlines under the 2008 Ozone NAAQS.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. On July 17, 2012, the Cabinet submitted the required Infrastructure SIP for the 2008 ozone NAAQS. At the time of the submittal, EPA had not met their statutory obligation of determining Kentucky's significant contribution to downwind monitors. Beginning January 1, 2009, Kentucky sources were required to comply with the CAIR ozone season budgets, as adopted into the Kentucky SIP. Therefore, Kentucky met its SIP obligations, specifically the Good Neighbor provision.

27. Comment: (I.B) Kentucky may not rely only on CSAPR compliance because it is at best a partial resolution of some good neighbor obligations.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

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[11] 81 FR 74515

Response: The Cabinet does not concur. The proposed Kentucky 2008 ozone Good Neighbor SIP does not rely solely upon reductions made through the adherence to CSAPR and the CSAPR Update rule. Section IV within the proposed SIP lists Federal, State, and Local regulations used to control the release of emissions from Kentucky sources.

28. Comment: (I.C) The SIP Revision must include enforceable prohibitions or commitments, not merely list events or actions that could hypothetically produce eventual elimination of downwind contributions.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. Section IV within the proposed Kentucky 2008 ozone Good Neighbor SIP lists Federal, State, and Local regulations used to control the release of emissions from Kentucky sources.

29. Comment: (2) EPA's recent guidance on which Kentucky relies – itself badly flawed – only purports to support avoiding control strategies that take longer than four years to implement. It does not support inaction.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. EPA's proposal to approve Kentucky's 2008 ozone Good Neighbor SIP provides insight to their analysis of control measures and implementation schedules. EPA assessed the time in which it takes to install and run SCR and SNCRs and the cost-effectiveness of turning on existing idled SNCRs. EPA concluded "implementation of any of the control strategies considered herein is likely not feasible until during or after the 2022 ozone season. Considering the time to implement the controls with the time to promulgate a final rule, EPA believes that such reductions are unlikely to be implemented for a full ozone season until 2023."[12]

Further, Section IV of the proposed Kentucky 2008 ozone Good Neighbor SIP lists Federal, State, and Local regulations used to control the release of emissions from Kentucky sources. Section V lists several EGU facilities that are scheduled to retire while others plan to switch from coal to natural gas. Section V also demonstrates the downward trend in NOx emissions since the implementation of trading programs such as CAIR and CSAPR (Table 1).

30. Comment: (II) Kentucky's SIP Revision must adhere to the Clean Air Act and may not instead rely on the EPA Memo.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet acknowledges the comment. The commenter does not specifically identify which portions of the memo conflict with the CAA. The proposed SIP revision meets all the statutory and regulatory requirements of the CAA.

[12] 83 FR 17128

31. Comment: (3) Kentucky's decision to limit its analysis of downwind impacts to a single year, 2023, five years in the future, is arbitrary and capricious. It ignores factors Congress clearly intended that states consider, such as present and projected significant contributions of instate emissions activity to downwind nonattainment. Moreover, the predicted conditions in 2023 are uncertain and highly contingent on the survival of regulations EPA is working hard to undo or undermine. In sum, Kentucky has more work to do.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The Cabinet determines the basis for 2023 as the future analytic year to be appropriate. The EPA states in its 2017 Memorandum that, "Thus, in selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."[13]

32. Comment: (III) The SIP Revision's exclusive focus on downwind attainment in 2023 is arbitrary and capricious because it ignores current, relevant good neighbor problems and relies on flawed and aspirational modeling assumptions.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The Cabinet determines the basis for 2023 as the future analytic year appropriate. The EPA states in its 2017 Memorandum that, "Thus, in selecting its future analytic year for the air quality modeling, the EPA balanced considerations such as attainment dates in downwind states, including the obligation to attain as expeditiously as practicable, the EPA's obligation to avoid unnecessary over-control of upwind state emissions, the timeframe in which any necessary emissions reductions could be feasibly implemented, and the timeframe required for rulemaking to impose any such emissions reductions that might be required."[14]

33. Comment: (III.A) The Proposed SIP Revision's total reliance on speculative and flawed modeling that suggests attainment by only 0.1 ppb is arbitrary and capricious.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The modeling completed by EPA, and confirmed by Alpine Geophysics, "indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone NAAQS of 75 ppb in 2023."[15]

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[13] Stephen D. Page Memorandum, p.6
[14] Ibid.
[15] Stephen D. Page Memorandum, p.1

34. Comment: (III.B) Reliance on modeling that predicts future compliance by 0.1 ppb when inherent uncertainties are much larger that such a margin is arbitrary and capricious.
(Nathan F. Taylor, Legal Fellow; Matthew E. Miller, Staff Attorney; Zachary M. Fabish, Senior Attorney, Sierra Club)

Response: The Cabinet does not concur. The Cabinet finds the basis for EPA and Alpine Geophysics modeling to be conservative and EPA's use of apportionment modeling to determine which states contribute pollution to nonattainment or maintenance area air quality problems in other states a reliable method to determine Kentucky's influence on downwind receptors.

35. Comment: "As your proposal correctly notes, much has been done by the Commonwealth of Kentucky to discharge its obligations under the Clean Air Act to assure the attainment and maintenance of the NAAQS for ozone. These efforts include a wide-array of VOC and NOx emission control requirements that apply not only to electric generating units, but also industrial and mobile sources, that have allowed the 2008 and 2015 ozone NAAQS to be attained throughout Kentucky."
(David M. Flannery, Legal Counsel, Midwest Ozone Group)

Response: The Cabinet acknowledges this comment.

36. Comment: "We support the conclusion stated in the proposed SIP that the state has clearly demonstrated that the measures currently being implemented in Kentucky are the only ones that are economical and economically feasible – a conclusion that alone satisfies Good Neighbor requirements by adequately addressing Step 4 above."
(David M. Flannery, Legal Counsel, Midwest Ozone Group)

Response: The Cabinet acknowledges this comment.

37. Comment: "We also support the conclusion reached by Kentucky with respect to Step 4, that there is now overwhelming data, prepared by both Alpine Geophysics, LLC (Alpine) on behalf of Kentucky and EPA, related to Step 1 which demonstrates that there are no downwind air quality problems related to the 2008 ozone NAAQS. On the basis of these modeling results, there does not appear to be any reason to conduct any further analysis of the four step process. This conclusion is reached not only regarding the monitors linked to Kentucky in the Cross State Air Pollution Rule (CSAPR) Update, but also for all monitors in the East."
(David M. Flannery, Legal Counsel, Midwest Ozone Group)

Response: The Cabinet acknowledges this comment.

38. Comment: "In addition to the modeling analysis performed by Alpine for Kentucky that is referenced in the proposed Kentucky SIP revision, Alpine prepared a report for MOG that is consistent with the Kentucky study and corroborates the conclusion that there are no downwind problem areas related to the 2008 Ozone NAAQS. As can be seen in the attached report on the Alpine modeling, all sites identified in the final CSAPR update are predicted to be well below the 2008 ozone standard by 2023."
(David M. Flannery, Legal Counsel, Midwest Ozone Group)

Response: The Cabinet acknowledges this comment.

39. Comment: "Recent modeling by Alpine Geophysics, LLC for both Kentucky and MOG, as well as modeling by EPA itself, clearly demonstrate that implementation of the CSAPR Update rule in addition to the other on-the-books controls is all that is needed to satisfy requirements related to the 2008 ozone NAAQS. We therefore support the request by Kentucky that EPA approve its Good Neighbor SIP."
(David M. Flannery, Legal Counsel, Midwest Ozone Group)

Response: The Cabinet acknowledges this comment.

40. Comment: "UIEK supports Kentucky's Proposed SIP Revision. As Kentucky's submittal demonstrates, the Commonwealth has taken a number of steps to assure attainment of the 2008 Ozone NAAQS. These include measures to reduce both VOC and NOx emissions. Annual and ozone season NOx emissions from UIEK member operations have been reduced substantially from 2008 through 2017. The CSAPR Update Rule has further reduced Kentucky's NOx budget to 21,115 tons."
(Carolyn M. Brown, Legal Counsel, Utility Information Exchange of Kentucky)

Response: The Cabinet acknowledges this comment.

41. Comment: "EPA's technical evaluation and Kentucky's independent modeling effort support the conclusion that Kentucky has fulfilled its Good Neighbor SIP obligations. EPA's October 17, 2017 updated modeling showed that no monitoring sites, outside of California, will violate the 2008 Ozone NAAQS in 2023."
(Carolyn M. Brown, Legal Counsel, Utility Information Exchange of Kentucky)

Response: The Cabinet acknowledges this comment.

42. Comment: "UIEK further adopts the March 26, 2018 comments submitted by the Midwest Ozone Group in support of the proposed SIP revision. (Copy attached.) Kentucky has demonstrated that implementation of the CSAPR Update Rule, along with other measures already in place, are sufficient to satisfy the Good Neighbor requirements of the Clean Air Act. Kentucky's SIP revision should be approved."
(Carolyn M. Brown, Legal Counsel, Utility Information Exchange of Kentucky)

Response: The Cabinet acknowledges this comment.