Attachment A

U.S. Environmental Protection Agency's Preliminary Air Quality (AQ) Transport Modeling Assessment for 2018

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JAN 22 2015

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

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)

FROM: Stephen D. Page
Director
Stephen Page

TO: Regional Air Division Directors, Regions 1 – 10

The purpose of this memorandum is to provide information to states regarding state implementation plans (SIPs) to address the interstate transport "Good Neighbor" Provision of the Clean Air Act (CAA) as it pertains to the 2008 ozone National Ambient Air Quality Standards (NAAQS). This information consists of:

- Discussion of elements that have been used previously to address interstate transport, and
- The EPA's preliminary air quality modeling data for ozone for the year 2018.

The EPA anticipates that this information, together with additional steps described below, will be helpful to states developing "Good Neighbor" SIPs for the 2008 ozone NAAQS. The EPA and states are behind schedule in addressing the "Good Neighbor" Provision for the 2008 ozone standards, due to factors such as the EPA's reconsideration of the standards and protracted litigation related to previous actions [most recently the Cross-State Air Pollution Rule (CSAPR)] under the "Good Neighbor" Provision. This document is part of the process of working with states to offer support and information to enable the EPA and states to move forward to address the requirements of the "Good Neighbor" Provision for this NAAQS as soon as possible.

In addition to the information being shared today, the EPA will hold a webinar in early February and a workshop in the spring of 2015. The webinar will focus on the content of this memo and the attached preliminary air quality modeling data. For the workshop, the EPA plans to facilitate discussions with states on: (1) available emission controls; (2) potential state-by-state electric generating unit (EGU) nitrogen oxides (NO_X) reductions based on those controls; and (3) potential EGU emissions budgets informed by those reductions. More information on the webinar and workshop will be forthcoming.

The EPA's goal is to provide information and to initiate discussions that will inform state development and EPA review of "Good Neighbor" SIPs, and, where appropriate, to facilitate state efforts to supplement or resubmit their "Good Neighbor" SIPs. At this time, there are a number of states that may not have submitted "Good Neighbor" SIPs for the 2008 ozone NAAQS. In addition, there are a number

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of pending "Good Neighbor" SIPs for the 2008 ozone NAAQS that the EPA will review and take action on. While our goal is to facilitate SIP development, the EPA also recognizes its backstop role in the SIP development process—that is, our obligation to develop and promulgate federal implementation plans, as appropriate. We plan to take this action, if necessary. It is our intention that any federal rule developed to satisfy this obligation would provide ample opportunity for states to pursue alternatives.

The "Good Neighbor" Provision

Under CAA sections 110(a)(1) and 110(a)(2), each state[1] is required to submit a SIP[2] that provides for the implementation, maintenance and enforcement of each primary or secondary NAAQS. Moreover, section 110(a)(1) requires each state to make this new SIP submission within 3 years after promulgation of a new or revised NAAQS.[3] This type of SIP submission is commonly referred to as an "infrastructure SIP." The conceptual purpose of an infrastructure SIP submission is to assure that the state's SIP contains the necessary structural requirements for the implementation of the new or revised NAAQS, whether by establishing that the SIP already contains or sufficiently addresses the necessary provisions, or by making a substantive SIP revision to update the SIP.

CAA section 110(a)(2)(D)(i)(I) requires each state in its SIP to prohibit emissions that will significantly contribute to nonattainment of a NAAQS, or interfere with maintenance of a NAAQS, in a downwind state. Under section 110(a)(2)(D)(i)(I), each state is required 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." For purposes of this document, we refer to section 110(a)(2)(D)(i)(I) as the "Good Neighbor Provision" and to SIP revisions addressing this requirement as "Good Neighbor SIPs."

Elements That Have Been Used Previously to Address the "Good Neighbor" Provision

The EPA notes that a consistent framework for addressing transport for certain NAAQS, involving a number of basic steps, has been developed in several previous federal rulemakings.[4] These basic steps include: (1) identifying downwind air quality problems, (2) identifying upwind states that contribute enough to those downwind air quality problems to warrant further review and analysis, (3) identifying

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[1] The term "state" as used in this memorandum has the same meaning as provided in CAA section 302(d). These CAA sections and this information may also apply, as appropriate under the Tribal Authority Rule (TAR) in 40 CFR part 49, to an Indian tribe that receives a determination of eligibility for treatment in a similar manner as a state for purposes of administering a tribal air quality management program under section 110(a) of the CAA. Tribes should look to the TAR and engage their respective EPA regional offices in discussing how this information may impact the development and approvability of their tribal implementation plans (TIPs). We encourage states to provide outreach and engage in discussions with tribes about their SIPs as they are being developed.

[2] In the CAA and in this memorandum, "plan," "SIP" and "TIP" may, depending on context, refer either to (i) all or part of the existing state (or tribal) implementation plan (*i.e.*, the collection of all submissions previously approved by the EPA as meeting CAA requirements) or (ii) a submission that adds to or modifies the existing plan as directed by section 110(a)(l).

[3] The Administrator may specify a shorter period.

[4] *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. 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).

the emissions reductions necessary to prevent an identified upwind state from contributing significantly to those downwind air quality problems and (4) adoption of permanent and enforceable measures needed to achieve those emissions reductions.

Efforts to address ozone transport by the EPA and states under the "Good Neighbor" Provision have focused on reductions of NO_X as the precursor pollutant for which emissions in upwind states have the greatest impacts on transported ozone.[5]

In CSAPR, downwind air quality problems were assessed based on modeled future air quality concentrations for a year aligned with attainment deadlines for a particular NAAQS. The assessment of future air quality conditions generally accounted for on-the-books emissions reductions[6] and the most up-to-date forecast of future baseline emissions. The locations of downwind air quality problems were identified as those receptors that were projected to be unable to attain or maintain the standard. More detail on the methods for identifying problem receptors in CSAPR is contained in the attachment.

CSAPR used a screening threshold (1 percent of the NAAQS) to identify contributing upwind states warranting further review and analysis. States whose air quality impact[7] to at least one downwind problem receptor was greater than or equal to the threshold were identified as needing further evaluation for actions to address transport. States whose air quality impacts to all downwind problem receptors were below this threshold were identified as states not requiring further evaluation for actions to address transport—that is, these states had no emissions reduction obligation under the "Good Neighbor" Provision.

In order to quantify emissions reductions needed to eliminate significant contributions to a downwind air quality problem, CSAPR's apportionment of responsibility evaluated air quality and included consideration of cost, an approach that was recently upheld by the U.S. Supreme Court.[8] The selection of cost criteria was informed by air quality considerations. For example, the approach in CSAPR for sulfur dioxide contributions to fine particulate matter ($PM_{2.5}$) placed states into two groups based on differing air quality considerations at downwind receptors. For states within each group, however, a uniform cost level was used to determine needed emissions reductions.

The EPA's preliminary air quality modeling analysis (*see* attachment and the Air Quality Modeling Technical Support Document for the 2008 Ozone NAAQS Transport Assessment located at *www.epa.gov/airtransport*) applies the CSAPR approach to the 2008 ozone NAAQS, including the approach for identifying nonattainment and maintenance receptors and for identifying upwind states that contribute to these receptors based on the 1 percent screening threshold. Following the CSAPR approach, a state could either demonstrate that its contribution is below the screening threshold, or it could evaluate the scope of its transport obligation and identify measures to achieve any needed emissions reductions. The discussions at the spring 2015 workshop are intended to help states with their evaluation of such emissions reductions.

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[5] *See* discussion in preamble to the CSAPR Final Rule. 76 FR 48222 (August 8, 2011).

[6] The exception being CAIR, which CSAPR was designed to replace and therefore was not considered on-the-books.

[7] For ozone the impacts would include those from volatile organic compounds (VOC) and NO_X, and from all sectors.

[8] *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. 1584, 1606-07 (2014).

CSAPR and its predecessor transport rules, the NO_X SIP Call and CAIR, were designed to address the collective contributions from the 37 states in the Eastern U.S. and were not formally evaluated for applicability to the 11 states in the Western U.S.[9] The EPA's preliminary modeling indicates that most western states contribute less than 1 percent to downwind nonattainment or maintenance receptors, a level the EPA considered to not need further evaluation for actions to address transport in CSAPR. There are a few receptors in the West where 1 to 3 western states may contribute amounts potentially exceeding the 1 percent threshold (*See* Technical Support Document). Due to the possibility that additional considerations may impact the EPA's and state's evaluation of transport from these potentially linked states in the Western U.S., we expect that the EPA and states will continue to evaluate these western transport linkages (not included in the attachment) on a case-by-case basis. We recommend that states consult with their EPA regional offices regarding these specific situations.

For Further Information

If you have any questions concerning this information, please contact Tim Smith, at (919) 541-4718, *smith.tim@epa.gov*, or Gobeail McKinley, at (919) 541-5246, *mckinley.gobeail@epa.gov*.

Attachment

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[9] For the purposes of this information document, we include the 37 states and the District of Columbia in the region from Texas northward to North Dakota and eastward to the East Coast as comprising the Eastern U.S. The Western U.S. refers to the 11 states in the contiguous U.S. west of those states (AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA and WY).

Attachment

Air Quality Modeling Results

A. Background

The EPA performed photochemical air quality modeling to project ozone concentrations at air quality monitoring sites to 2018, the moderate area attainment date for the 2008 ozone National Ambient Air Quality Standards (NAAQS), and to estimate state-by-state contributions to those 2018 concentrations. We then used the air quality modeling results, and the methods we used for Cross-State Air Pollution Rule (CSAPR), to identify ozone monitoring sites expected to be nonattainment or maintenance receptors for the 2008 ozone NAAQS in 2018. We used the contribution information to quantify projected interstate contributions from emissions in each upwind state to ozone concentrations at each identified 2018 nonattainment and maintenance receptor in downwind states. The EPA's air quality modeling used the 2011-based air quality modeling platform. This platform includes emissions for a 2011 base year and a 2018 future base case as well as meteorology for 2011. The 2011 meteorology was used in air quality model simulations for both 2011 and 2018. We selected 2011 as the base year because it reflected the most current National Emissions Inventory (NEI) available. Details on the construct and evaluation of the 2011-based air quality modeling platform are provided in the Air Quality Modeling Technical Support Document for the 2008 Ozone NAAQS Transport Assessment (AQMTSD).

The 2011 base year emissions in the 2011-based air quality modeling platform were derived from the 2011 NEI, as described in the Technical Support Document: Preparation of Emissions Inventories for the Version 6.0, 2011 Emissions Modeling Platform.[10] This document also describes the control and growth assumptions by source type that were used to create the 2018 base case emissions inventory.[11] The EPA released the 2011 and 2018 emissions inventory for public review on

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[10] Available on the EPA's website at: *http://www.epa.gov/ttnchie1/emch.*

[11] For electric generating units (EGUs), the 2018 base case emissions were obtained from the Integrated Planning Model (IPM version 5.13, *http://www.epa.gov/powersectormodeling/BaseCasev513.html*). The 2018 base case EGU projections include the Acid Rain Program, Clean Air Interstate Rule (CAIR), and Mercury and Air Toxics Standards. The base case does not include CSAPR, the proposed Clean Power Plan or the proposed 2015 ozone NAAQS, because of the time the projections were developed.

November 27, 2013 (78 FR 70935), and January 14, 2014 (79 FR 2437), respectively. The air quality modeling presented in this transport information document pre-dated, and therefore does not reflect, comments received from this public review process of the 2011 and 2018 emissions inventories. We note that the EPA plans to re-model 2011 and 2018 to provide updated projections of 2018 design values and contributions, using revised inventories created in response to comments on this public review process and other emissions updates.

The EPA used the Comprehensive Air Quality Model with Extensions (CAMx version 6.10)[12] for modeling the 2011 base year and 2018 base case emissions scenarios to identify sites with projected nonattainment and maintenance problems in 2018. As shown in Figure 1, the air quality model runs were performed for a modeling domain that covers the 48 states in the contiguous U.S. along with adjacent portions of Canada and Mexico. The spatial resolution (i.e., grid size) for this modeling domain is 12 km x 12 km. The 2011 and 2018 scenarios were also both modeled for the full year with 2011 meteorology.

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[12] Environ, April 4, 2014 (*http://www.camx.com*).

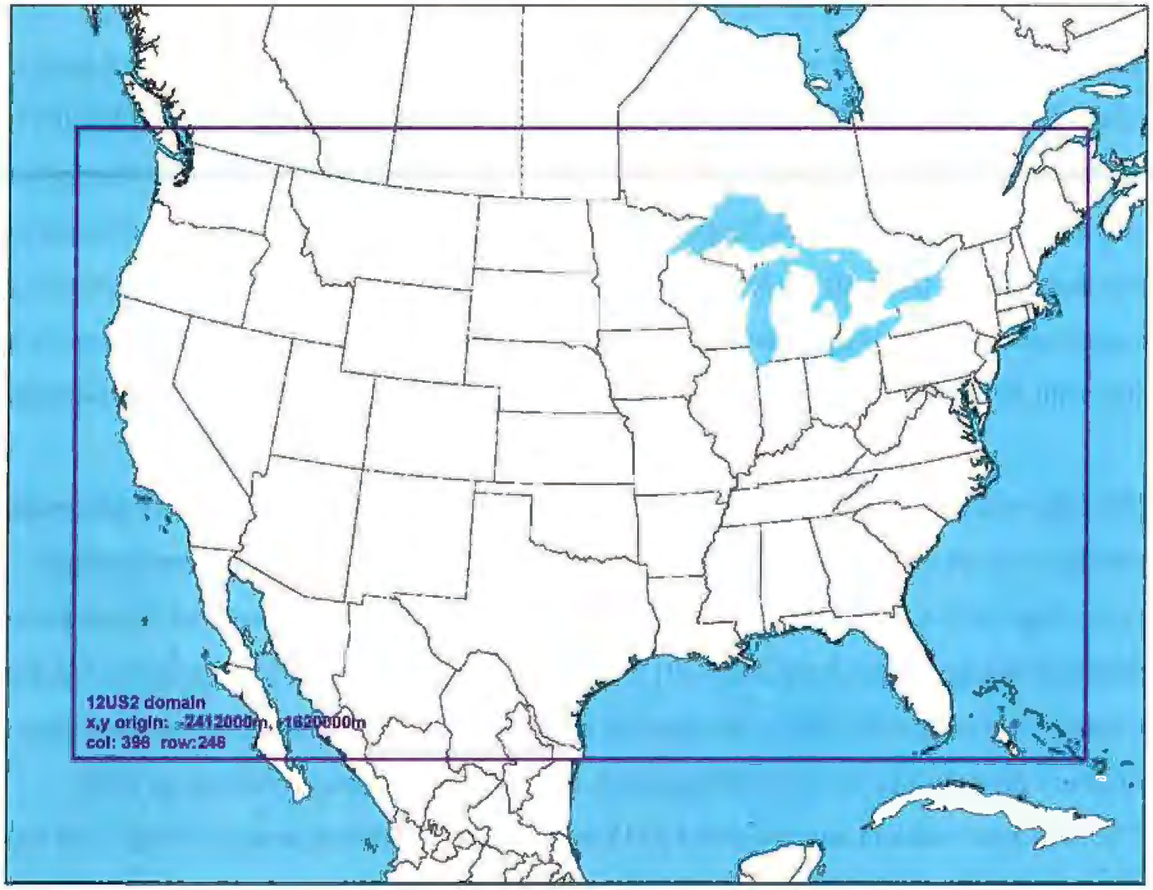

Figure 1. Air quality modeling domain (area within the purple lines).

B. Identification of Future Nonattainment and Maintenance Receptor Sites

The ozone predictions from the 2011 and 2018 CAMx model runs were used to project ambient (i.e., measured) ozone design values to 2018 following the approach described in the EPA's draft information for attainment demonstration modeling.[13] We selected 2011 as the base year to reflect the most recent NEI, and we selected 2018 to coincide with the attainment date for moderate areas under the 2008 ozone NAAQS. The draft modeling information recommends using 5-year weighted average

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[13] The December 3, 2014, draft ozone, fine particulate matter and regional haze SIP modeling guidance is available at *http://www.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

ambient design values[14] centered on the base year as the starting point for projecting design values to the future. Because 2011 is the base year of emissions, we started with the average ambient 8-hour ozone design values for the period 2009 through 2013 (i.e., the average of design values for 2009-2011, 2010-2012 and 2011-2013). The 5-year weighted average ambient design value at each site was projected to 2018 using model-predicted Relative Response Factors (RRFs)[15] which were calculated based on procedures described in the draft modeling information. The 2018 projected average ozone design values were evaluated to identify those sites with design values that exceed the 2008 ozone NAAQS.[16] Those sites with 2018 average design values that exceed the NAAQS are projected to be nonattainment in 2018.

We followed the CSAPR approach to identify sites with projected maintenance problems in 2018 (76 FR 48208). As part of the approach for identifying sites with projected future maintenance problems, the highest (i.e., maximum) ambient design value from the 2011-centered 5-year period (i.e., the maximum of design values from 2009-2011, 2010-2012 and 2011-2013) was projected to 2018 for each site using the site-specific RRFs. Monitoring sites with a 2018 maximum design value that exceeds the NAAQS are projected by the CSAPR approach to have a maintenance problem in 2018.

The base year ambient and projected 2018 average and maximum design values at all monitoring sites are provided in the AQMTSD. In 2018 there are 11 projected nonattainment sites and 18 projected maintenance sites in the East (*See* Table 1). These are the sites that are indicated from the EPA's preliminary modeling as warranting the evaluation of contributions from upwind states. The projected 2018 nonattainment sites in the East are located in four nonattainment areas: Baltimore, MD; New York City, NY (sites in both NY and CT); Dallas, TX; and Houston, TX. Note that several of these nonattainment areas also contain additional sites that are projected as maintenance receptors. Also, there are several projected maintenance-only areas in the East: Holland, MI; Louisville, KY; Philadelphia, PA (including sites in both NJ and PA); St. Louis, MO; and Sheboygan, WI (*See* Table 2).

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[14] The air quality design value for a site is the 3-year average annual fourth-highest daily maximum 8-hour average ozone concentration.

[15] In brief, the RRF for a particular location is the ratio of the 2018 ozone model prediction to the 2011 ozone model prediction. The RRFs were calculated using model outputs for the May through September period.

[16] In determining compliance with the NAAQS, ozone design values are truncated to integer values. For example, a design value of 75.9 ppb is truncated to 75 ppb which is attainment. In this manner, design values at or above 76.0 ppb are considered nonattainment.

Table 1. Ambient and 2018 projected average and maximum 8-hour ozone design values (DVs) at 2018 nonattainment receptors in the East (nonattainment receptors have a 2018 average design value of ≥ 76.0 ppb). Units are ppb.

State	County	Site ID	2009 - 2013 Avg DVs	2009 - 2013 Max DVs	2018 Avg DVs	2018 Max DVs
Connecticut	Fairfield	90013007	84.3	89.0	76.7	81.0
Connecticut	Fairfield	90019003	83.7	87.0	77.5	80.6
Maryland	Harford	240251001	90.0	93.0	79.4	82.1
New York	Suffolk	361030002	83.3	85.0	78.2	79.8
Texas	Brazoria	480391004	88.0	89.0	80.5	81.4
Texas	Denton	481210034	84.3	87.0	77.0	79.5
Texas	Harris	482010024	80.3	83.0	76.4	79.0
Texas	Harris	482011034	81.0	82.0	76.6	77.6
Texas	Harris	482011039	82.0	84.0	77.7	79.6
Texas	Tarrant	484392003	87.3	90.0	79.7	82.2
Texas	Tarrant	484393009	86.0	86.0	78.3	78.3

Table 2. Ambient and 2018 projected average and maximum 8-hour ozone design values (DVs) at 2018 maintenance receptors in the East (maintenance receptors have a 2018 maximum design value of ≥ 76.0 ppb). Units are ppb.

State	County	Site ID	2009 - 2013 Avg DVs	2009 - 2013 Max DVs	2018 Avg DVs	2018 Max DVs
Connecticut	Fairfield	90010017	80.3	83.0	74.1	76.6
Connecticut	New Haven	90099002	85.7	89.0	75.8	78.8
Kentucky	Jefferson	211110067	82.0	85.0	73.7	76.4
Michigan	Allegan	260050003	82.7	86.0	74.5	77.5
Missouri	Saint Charles	291831002	82.3	86.0	74.1	77.4
New Jersey	Camden	340071001	82.7	87.0	72.3	76.0
New Jersey	Gloucester	340150002	84.3	87.0	74.0	76.3
New York	Richmond	360850067	81.3	83.0	74.6	76.2
Pennsylvania	Philadelphia	421010024	83.3	87.0	74.7	78.0
Texas	Collin	480850005	82.7	84.0	75.0	76.2
Texas	Dallas	481130069	79.7	84.0	73.7	77.7
Texas	Dallas	481130075	82.0	83.0	75.2	76.1
Texas	Denton	481211032	82.7	84.0	75.1	76.3

State	County	Site ID	2009 - 2013 Avg DVs	2009 - 2013 Max DVs	2018 Avg DVs	2018 Max DVs
Texas	Harris	482010029	83.0	84.0	75.4	76.3
Texas	Harris	482010055	81.3	83.0	75.0	76.6
Texas	Tarrant	484390075	82.0	83.0	75.5	76.4
Texas	Tarrant	484393011	80.7	83.0	74.2	76.3
Wisconsin	Sheboygan	551170006	84.3	87.0	75.4	77.8

C. *Quantification of Interstate Ozone Contributions*

The EPA performed nationwide,[17] state-level ozone source apportionment modeling using the CAMx Ozone Source Apportionment Technology/Anthropogenic Precursor Culpability Analysis (OSAT/APCA) technique[18] to quantify the contribution of 2018 base case nitrogen oxides (NO_X) and volatile organic compound (VOC) emissions from all sources in each state to projected 2018 ozone concentrations at air quality monitoring sites. In the source apportionment model run, we tracked the ozone formed from each of the following contribution categories (i.e., "tags"):

- States – anthropogenic NO_X and VOC emissions from each state tracked individually (emissions from all anthropogenic sectors in a given state were combined),
- Biogenics – biogenic NO_X and VOC emissions domainwide (i.e., not by state),
- Boundary Concentrations – concentrations transported into the nationwide modeling domain,
- Tribes – the aggregate of emissions from those tribal lands for which we have point source inventory data in the 2011 NEI (i.e., we did not model the contributions from individual tribes), and
- Other – combined emissions from wild and prescribed fires, offshore emissions from marine vessels, offshore drilling platforms and anthropogenic emissions from the portions of Canada and Mexico within the modeling domain.

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[17] As shown in Figure 1, the EPA's nationwide modeling includes the 48 contiguous states.

[18] As part of this technique, ozone formed from reactions between biogenic VOC and NO_x with anthropogenic NO_x and VOC are assigned to the anthropogenic emissions.

The CAMx OSAT/APCA model run was performed for the period May 1 through September 30 using the projected 2018 base case emissions and 2011 meteorology for this time period. The hourly contributions[19] from each tag were processed to obtain the 8-hour average contributions corresponding to the time period of the 8-hour daily maximum concentration on each day in the 2018 model simulation. This step was performed for those model grid cells containing monitoring sites in order to obtain 8-hour average contributions for each day at the location of each site. The model-predicted contributions were then applied in a relative sense to quantify the contributions to the 2018 average design value at each site. First, the daily 8-hour contributions were averaged across the subset of days with 2018 model predictions exceeding the 2008 ozone NAAQS (i.e., 8-hr daily maximum $\geq$ 76 ppb). For those sites with fewer than 5 predicted exceedance days in 2018, we averaged the contributions for the top five concentrations days.[20] For each site, the multi-day average contribution from each tag was normalized by the sum of the contribution from all tags, combined. The resulting fractional contributions at each site were then applied to the 2018 average design value to quantify (i.e., "apportion") the design value into contributions from each tag. This process was performed for each monitoring site with a projected 2018 design value. Additional details on the source apportionment modeling and the calculation of contributions can be found in the AQMTSD. The resulting 2018 contributions from each tag to each monitoring site are provided in the AQMTSD. The largest contributions from each state to 2018 downwind nonattainment receptors and to downwind maintenance receptors are provided in Table 3.

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[19] Contributions from anthropogenic emissions under "NO_X-limited" and "VOC-limited" chemical regimes were combined to obtain the net contribution from NO_X and VOC anthropogenic emissions in each state.

[20] If a site did not have at least 5 days with a modeled 2018 8-hour daily maximum concentration $\geq$ 60 ppb, then contributions were not calculated at the monitor.

Table 3. Largest ozone contributions from each state to downwind 2018 projected nonattainment and to 2018 projected maintenance receptors. Units are ppb.

Upwind State	Largest Contribution to a 2018 Nonattainment Site in Downwind States	Largest Contribution to a 2018 Maintenance Site in Downwind States
Alabama	1.06	1.39
Arizona	1.47[a]	0.44
Arkansas	1.25	2.19
California	0.23	1.16[a]
Colorado	0.35	0.33
Connecticut	0.41	0.08
Delaware	0.63	2.46
District of Columbia	0.69	0.29
Florida	0.87	1.05
Georgia	0.71	0.73
Idaho	0.09	0.22
Illinois	0.87	22.29
Indiana	1.93	11.41
Iowa	0.62	0.89
Kansas	0.70	1.15
Kentucky	1.94	2.40
Louisiana	3.38	4.37
Maine	0.01	0.00
Maryland	2.59	6.96
Massachusetts	0.21	0.12
Michigan	1.48	3.63
Minnesota	0.43	0.34
Mississippi	0.83	1.52
Missouri	1.53	4.12
Montana	0.14	0.17
Nebraska	0.36	0.56
Nevada	0.70	0.44
New Hampshire	0.03	0.02
New Jersey	9.21	9.95
New Mexico	0.26	0.20
New York	16.05	16.14
North Carolina	0.57	0.55
North Dakota	0.13	0.19
Ohio	4.06	4.41
Oklahoma	1.50	2.59
Oregon	0.69	0.73
Pennsylvania	9.85	18.76
Rhode Island	0.04	0.03

Upwind State	Largest Contribution to a 2018 Nonattainment Site in Downwind States	Largest Contribution to a 2018 Maintenance Site in Downwind States
South Carolina	0.36	0.35
South Dakota	0.09	0.12
Tennessee	0.69	0.99
Texas	0.92	2.74
Utah	0.29	1.43[a]
Vermont	0.02	0.02
Virginia	4.42	3.27
Washington	0.21	0.13
West Virginia	2.79	2.88
Wisconsin	0.34	2.49
Wyoming	0.37	1.29[a]

[a] These four western states (i.e., AZ, CA, UT, and WY) contribute above the 1 percent threshold to projected 2018 nonattainment or maintenance sites in the West, as identified in the AQMTSD.

Table 4 indicates the projected state "linkages" to downwind 2018 nonattainment receptors in the Eastern U.S.[21] identified in the air quality modeling using a threshold of 1 percent of the 2008 ozone NAAQS (0.76 ppb), consistent with CSAPR. Table 5 provides the same information for states that contribute at or above the 1 percent threshold to identified 2018 maintenance receptors in the Eastern U.S. (States in the Eastern U.S. that are not listed in these tables contribute below 1 percent at all receptors).

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[21] For the purposes of this information document, we include the 37 states and the District of Columbia in the region from Texas northward to North Dakota and eastward to the East Coast as comprising the Eastern U.S. The Western U.S. refers to the 11 states in the contiguous U.S. west of those states (AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA and WY).

Table 4. Ozone contributions at or above a 1 percent threshold from upwind states to 2018 nonattainment receptors in the Eastern U.S. Units are ppb.

2018 Nonattainment Receptors		Upwind States – Part 1 (AL through MS)									
County	Site ID	AL	AR	FL	IL	IN	KY	LA	MD	MI	MS
Fairfield, CT	90013007								2.11	0.93	
Fairfield, CT	90019003								2.60		
Harford, MD	240251001					1.93	1.95			0.86	
Suffolk, NY	361030002				0.79	1.02			1.50	1.49	
Brazoria, TX	480391004		1.00		0.88			3.25			0.81
Denton, TX	481210034	1.06	0.95					3.13			
Harris, TX	482010024			0.87				2.24			
Harris, TX	482011034		1.06		0.81			3.39			
Harris, TX	482011039		1.25					2.93			0.84
Tarrant, TX	484392003	0.82	0.97					2.94			
Tarrant, TX	484393009		1.19					2.29			
Number of Linkages =>		2	6	1	3	2	1	7	3	3	2

2018 Nonattainment Receptors		Upwind States – Part 2 (MO through WV)									
County	Site ID	MO	NJ	NY	OH	OK	PA	TX	VA	WV	
Fairfield, CT	90013007		6.72	15.58	1.92		9.86		1.92	0.97	
Fairfield, CT	90019003		8.17	16.06	1.50		9.30		2.17	0.89	
Harford, MD	240251001				4.07		6.93	0.92	4.43	2.80	
Suffolk, NY	361030002		9.21		2.52		9.79	0.80	1.72	0.99	
Brazoria, TX	480391004	1.20				0.77					
Denton, TX	481210034					1.12					
Harris, TX	482010024										
Harris, TX	482011034	1.53				1.51					
Harris, TX	482011039	1.06				0.99					
Tarrant, TX	484392003					1.22					
Tarrant, TX	484393009					1.25					
Number of Linkages =>		3	3	2	4	6	4	2	4	4	

Table 5. Ozone contributions at or above a 1 percent threshold from upwind states to 2018 maintenance receptors in the Eastern U.S. Units are ppb.

2018 Maintenance Receptors		Upwind States – Part 1 (AL through LA)									
County	Site ID	AL	AR	DE	FL	IL	IN	IA	KS	KY	LA
Fairfield, CT	90010017					0.79	1.04				
New Haven, CT	90099002						0.81				
Jefferson, KY	211110067					1.09	11.42				
Allegan, MI	260050003		2.19			22.30	8.17	0.89	1.15		
Saint Charles, MO	291831002	0.87	1.53			7.07					0.78
Camden, NJ	340071001			1.85		1.33	1.66			0.87	
Gloucester, NJ	340150002			2.47		0.86	1.01			1.22	
Richmond, NY	360850067			1.14			0.90			1.21	
Philadelphia, PA	421010024			1.36		0.78	2.01			2.41	
Collin, TX	480850005		1.06								1.91
Dallas, TX	481130069		1.07								1.55
Dallas, TX	481130075		1.13								1.55
Denton, TX	481211032		1.40								3.05
Harris, TX	482010029	0.77			1.05						4.32
Harris, TX	482010055	1.40	0.82								4.37
Tarrant, TX	484390075		0.94						1.03		2.33
Tarrant, TX	484393011		1.87						0.99		2.55
Sheboygan, WI	551170006					15.87	7.92		0.88		1.12
Number of Linkages =>		3	9	4	1	8	9	1	4	4	10

2018 Maintenance Receptors		Upwind States – Part 2 (MD through TN)									
County	Site ID	MD	MI	MS	MO	NJ	NY	OH	OK	PA	TN
Fairfield, CT	90010017	2.01				7.64	15.49	1.93		9.28	
New Haven, CT	90099002	1.74				5.58	16.15	1.86		8.70	
Jefferson, KY	211110067		1.23					3.93			
Allegan, MI	260050003				4.13				1.70		
Saint Charles, MO	291831002								0.89		0.77
Camden, NJ	340071001		1.58		0.95		1.54	4.42		18.76	
Gloucester, NJ	340150002	6.97	1.03				1.34	3.71		16.20	
Richmond, NY	360850067	3.59				9.95		2.10		16.19	
Philadelphia, PA	421010024	5.14				1.38		3.84			1.00
Collin, TX	480850005								0.91		
Dallas, TX	481130069								1.06		
Dallas, TX	481130075								1.07		

2018 Maintenance Receptors		Upwind States – Part 2 (MD through TN)									
County	Site ID	MD	MI	MS	MO	NJ	NY	OH	OK	PA	TN
Denton, TX	481211032								1.22		
Harris, TX	482010029			0.79							
Harris, TX	482010055			1.52	0.95						
Tarrant, TX	484390075								2.59		
Tarrant, TX	484393011				0.81				2.55		
Sheboygan, WI	551170006		3.64		1.81				1.64		
Number of Linkages =>		5	4	2	5	4	4	7	9	5	2

2018 Maintenance Receptors		Upwind States – Part 3 TX through WI			
County	Site ID	TX	VA	WV	WI
Fairfield, CT	90010017		1.88	0.87	
New Haven, CT	90099002		1.39	0.83	
Jefferson, KY	211110067				
Allegan, MI	260050003	2.75			2.49
Saint Charles, MO	291831002	2.38			
Camden, NJ	340071001	1.45		1.17	
Gloucester, NJ	340150002	0.97	2.95	2.23	
Richmond, NY	360850067		3.28	2.03	
Philadelphia, PA	421010024	1.01	2.39	2.88	
Collin, TX	480850005				
Dallas, TX	481130069				
Dallas, TX	481130075				
Denton, TX	481211032				
Harris, TX	482010029				
Harris, TX	482010055				
Tarrant, TX	484390075				
Tarrant, TX	484393011				
Sheboygan, WI	551170006	2.26			
Number of Linkages =>		6	5	6	1