New Mexico Good Neighbor State Implementation Plan Certification for the 2015 Ozone NAAQS, Submitted on Behalf of Albuquerque - Bernalillo County

I: Introduction

This submittal to the U.S. Environmental Protection Agency (EPA) demonstrates that emissions from New Mexico, including Albuquerque and Bernalillo County, do not contribute significantly to difficulties in downwind states attaining or maintaining compliance with the federal ambient air quality standard for ozone. This introduction provides background material necessary to understand the context of this submittal. The remainder of this document then reviews the evidence supporting an assessment of no significant New Mexico contribution to downwind problems in meeting the federal ozone standard.

This document is submitted to become part of New Mexico's State Implementation Plan (SIP). A SIP identifies how a state will attain and maintain the primary and secondary National Ambient Air Quality Standards (NAAQS)[1] set by EPA. Primary NAAQS are ambient pollutant concentrations that EPA deems "requisite to protect the public health" based on available science.[2] "Requisite" means sufficient to protect health, including the health of sensitive populations. Secondary NAAQS are "requisite to protect the public welfare," referring to protection of the environment and property.[3] EPA has specified NAAQS for six substances known as criteria pollutants. The one addressed here is ozone.

In October 2015, EPA set the NAAQS at 0.070 parts per million (2015 Ozone NAAQS) or 70 parts per billion, based on eight hour averages of ozone concentrations (for clarity and ease of use, all subsequent discussion will use ppb as the unit of measurement for ozone). [4] Based on these averages, air quality agencies calculate an ozone design value (DV), which is a measurement of ozone concentrations according to EPA-specified methods. EPA compares the design value to the standard of 70 ppb to assess whether or not an area is in compliance with the 2015 Ozone NAAQS. In EPA's initial assessment of compliance following issuance of a new NAAQS, including

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[1] See background information available online from EPA regarding the National Ambient Air Quality Standards.

[2] 42 U.S.C. § 7409(b)(1).

[3] 42 U.S.C. § 7409(b)(2).

[4] 80 Fed. Reg. 65,291 (Oct. 26, 2015).

the 2015 Ozone NAAQS, areas that do not meet the standard would be designated as nonattainment and would be required to develop SIPs with control measures to improve air quality. The EPA completed area designations for the 2015 Ozone NAAQS on August 3, 2018, through a separate state submittal and regulatory action.[5] EPA has determined that Albuquerque - Bernalillo County is in attainment with the 2015 Ozone NAAQS.

A SIP for implementing a NAAQS contains regulations, source-specific requirements, non-regulatory items such as plans and inventories, and in some cases additional requirements to satisfy regulations promulgated by EPA for attaining and maintaining the NAAQS. SIPs have been a Clean Air Act requirement since 1970. EPA approved the initial SIPs for states on May 31, 1972.[6] Once a state has an EPA-approved SiP, it may revise its SIP with EPA approval, as necessary.[7]

Sections 110(a)(1) and 110(a)(2) of the federal Clean Air Act (CAA)[8] require states to submit to EPA, as a component of their SIPs, an "infrastructure SIP" document that provides for the implementation, maintenance and enforcement of new or revised NAAQS, including any new legally enforceable mechanisms that may be necessary. If the existing state regulatory framework and resources are already sufficient without the need for new legally enforceable mechanisms, the state may instead submit an infrastructure SIP "certification."

In 2018, the New Mexico Environment Department (NMED) and the City of Albuquerque Environmental Health Department (EHD) submitted an infrastructure SIP certification, which EPA approved on September 18, 2019 for the 2015 Ozone NAAQS. [9] However, that SIP certification did not address two requirements of section 110(a)(2)(D)(i)(I). These requirements, referred to collectively as the "Good Neighbor" or "interstate transport" provision of the CAA,

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[5] (83 Fed. Reg. 25776, June 4, 2018) (designations of attainment and nonattainment effective August 3, 2018). For a complete, detailed explanation of the standard, calculation methods used to determine compliance, and the designation process, see EPA's 2015 Ozone NAAQS website.

[6] 37 Fed. Reg. 10,842 (not available online; the electronic version of the Federal Register only covers editions published since 1994).

[7] The federally enforceable SIP for New Mexico, including Albuquerque - Bernalillo County, is compiled in 40 CFR Part 52 Subpart GG.

[8] 42 U.S.C. § 7410(a)(1) and (2).

[9] 84 Fed. Reg. 49,057 (Sept. 18, 2019).

require a SIP to demonstrate that an upwind state will not cause problems in downwind states attaining or maintaining a NAAQS. This document is a Good Neighbor SIP certification that addresses these requirements, in regard to the revised 8-hour Ozone (ozone) NAAQS promulgated by EPA in October 2015.

This Good Neighbor SIP certification, in combination with the document submitted by NMED, fulfills New Mexico's obligation to address the Good Neighbor provision. It demonstrates that New Mexico does not significantly contribute to nonattainment or interfere with maintenance of the 2015 Ozone NAAQS in any other state. These elements, referred to as prong 1 (significantly contributing to nonattainment) and prong 2 (interfering with maintenance) of the Good Neighbor provisions, respectively, must be evaluated independently when assessing downwind air quality problems.[10]

Because the City of Albuquerque and Bernalillo County is a separate jurisdiction from the rest of New Mexico for air quality regulatory purposes, NMED and EHD are responsible for separate submittals to EPA for the 2015 Ozone NAAQS Good Neighbor requirements. While these are separate submittals, NMED and EHD worked together and applied a common analytical framework to address the compliance of the entire state with the Good Neighbor provision.

Legislative authority for New Mexico's air quality program is codified in Chapter 74 (Environmental Improvement) of the New Mexico Statutes Annotated 1978 (NMSA 1978), which gives the State Environmental Improvement Board and NMED the authority to implement the CAA in New Mexico. Legislative authority for the Albuquerque - Bernalillo County Air Quality Control Board and the City of Albuquerque Environmental Health Department (EHD) is codified in NMSA 1978 §§ 74-2-1 to 74-2-17 and in local ordinances, Revised Ordinances of the City of Albuquerque §§ 9-5-1-1 to 9-5-1-99, and Bernalillo County Ordinances, Article II, §§ 30-31 to 30-47. The detailed air quality requirements for Albuquerque - Bernalillo County and the rest of the state may be found in the New Mexico Administrative Code (NMAC), specifically Title 20, Chapter 2 - Air Quality (Statewide) and Chapter 11 - Albuquerque -Bernalillo County Air Quality Control Board (Albuquerque and Bernalillo County). These statutes and regulations are part of the approved New Mexico SIP and cited in 40 CFR Part 52.1620(c).

This SIP certification document relies upon EPA memoranda and supporting materials, including photochemical modeling of nationwide ozone transport.[11] They include EPA memoranda issued

[10] *North Carolina v. EPA*, 531 F.3d 896, 909-911, 2008.

[11] Available online from EPA.

on March 27, 2018, August 31, 2018, and October 19, 2018, as well as supplemental information that describes in detail how photochemical modeling accounted for emissions of ozone precursors, changes in those emissions over time, ozone formation based on seasonal variability in meteorology, and the presence of existing and future legally enforceable emission control measures. Unless otherwise noted, this EPA documentation is the basis for the analytical framework and data presented below in tables, charts, and discussion of New Mexico's Good Neighbor obligations under section 110(a)(2)(D)(i)(I) of the CAA.

Summary of the evidence

This SIP certification presents three major lines of evidence, collectively referred to by EPA as a "weight of evidence demonstration," which together show that New Mexico does not contribute to downwind attainment or maintenance issues regarding the 2015 Ozone NAAQS. The evidence addresses two ambient air quality monitor sites located near Denver, Colorado -- for purposes of the Good Neighbor provision, EPA refers to such sites as "receptors." This document will use the same terminology. EPA computer modeling revealed that these two Colorado receptors were the only locations in the United States where New Mexico emissions might potentially contribute to future issues meeting the NAAQS in a downwind state.

EPA photochemical modeling shows that New Mexico contributes approximately 1% of the 2015 Ozone NAAQS at two receptors in the Denver/Front Range area. NMED and EHD determined that these New Mexico emissions do not make a significant contribution , for the following reasons.

1) EPA modeling indicates that emissions from all upwind states combined at the two receptors are heavily outweighed by Colorado contributions.

2) Modeling and meteorological data from EPA and the state of Colorado indicate that topography and airflow in the Denver/Front Range area are important factors contributing to local ozone formation.

3) Ozone concentrations and ozone precursor emissions data over the last decade or more for Colorado and upwind contributing states do not exhibit an increasing trend that would raise concerns about ozone Good Neighbor compliance.

A detailed discussion of this evidence follows.

II: EPA's Analytical Framework for Ozone Transport

Through previous rulemakings, including the Cross State Air Pollution Rule (CSAPR)[12] for the 1997 Ozone NAAQS[13] and the CSAPR Update for the 2008 Ozone NAAQS,[14] EPA worked with states to develop the following four-step framework to address the requirements of the Good Neighbor provision for the Ozone NAAQS:[15]

1) identify potential downwind air quality problems at receptors ;

2) identify upwind states that contribute significantly to nonattainment or interference with maintenance at receptors;

3) identify emissions reductions needed to prevent significant contributions to nonattainment or interference with maintenance at receptors; and

4) adopt permanent and enforceable emission reductions.

National modeling conducted by EPA may be used to assist states in developing Good Neighbor SIPs by providing data to address steps 1 and 2 to identify each state's Good Neighbor obligation. On March 27, 2018 EPA provided such assistance for the 2015 Ozone NAAQS, via modeling data and a guidance memorandum for use in preparing Good Neighbor SIP

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[12] See background information about CSAPR and its successor, the CSAPR Update rule, is available online from EPA. Note that the CSAPR rule applies to eastern states (as defined by EPA). It does not apply in the west and does not apply to either New Mexico or Colorado.

[13] See background information about the 1997 Ozone NAAQS available online from EPA.

[14] See background information about the 2008 Ozone NAAQS available online from EPA.

[15] For additional background on the CSAPR rule and its successors, see 84 Fed. Reg. 65,878 (Dec. 21, 2018) (CSAPR closeout final rule).

submissions.[16] EPA provided further memoranda and supporting data in August[17] and October 2018.[18]

EPA used 2023 as the analytic year for the modeling analyses (using a 2011 base year emissions inventory and meteorology), considering that 2023 aligns with the anticipated attainment year for Moderate ozone nonattainment areas and allows for timeframes that may be required for implementing further emissions reductions.[19] The EPA modeling analysis identified ambient air quality monitoring sites that are projected to have air quality problems attaining or maintaining the NAAQS in 2023.

The EPA memorandum issued on March 27, 2018 identified nonattainment receptors at those monitoring sites with current measured design values exceeding the NAAQS that also have projected (i.e., in 2023) average design values exceeding the NAAQS. Further, the memo identified maintenance receptors as those receptors with maximum design values exceeding the NAAQS. This included receptors with current measured values below the NAAQS with projected average and maximum design values exceeding the NAAQS, and receptors with

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[16] Peter Tsirigotis, Information on the Interstate Transport State Implementation Plan Submissions for the 2015 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I), March 27, 2018 ("Tsirigotis March 2018"), available at the EPA webpage containing reference materials about Good Neighbor obligations under the 2015 Ozone NAAQS.

[17] Peter Tsirigotis, "Analysis of Contribution Thresholds for Use in Clean Air Act Section 110(a)(2)(D)(i)(I) Interstate Transport State Implementation Plan Submissions for the 2015 Ozone National Ambient Air Quality Standards," August 31, 2018 ("Tsirigotis August 2018"), available at the EPA webpage containing reference materials about Good Neighbor obligations under the 2015 Ozone NAAQS.

[18] Peter Tsirigotis, "Considerations for Identifying Maintenance Receptors for Use in Clean Air Act Section 110(a)(2)(D)(i)(I) Interstate Transport State Implementation Plan Submissions for the 2015 Ozone National Ambient Air Quality Standards," October 19, 2019 ("Tsirigotis October 2018"), available at the EPA webpage containing reference materials about Good Neighbor obligations under the 2015 Ozone NAAQS

[19] Tsirigotis March 2018, p. 3. The attainment year for moderate areas is 2024. EPA describes its reasoning for choosing 2023 as the modelled year as follows: "A first step in the modeling process is selecting a future analytic year that considers both the relevant attainment dates of downwind nonattainment areas impacted by interstate transport and the timeframes that may be required for implementing further emissions reductions as expeditiously as practicable. For the 2015 Ozone NAAQS, EPA selected 2023 as the analytic year in our modeling analyses primarily because it aligns with the anticipated attainment year for Moderate ozone nonattainment areas.")

projected average design values below the NAAQS but with projected maximum design values exceeding the NAAQS.[20]

After identifying nonattainment and maintenance receptors, EPA used CSAPR's Anthropogenic Precursor Culpability Analysis (APCA) approach to quantify contributions of anthropogenic nitrogen oxides (NO_x) and volatile organic compound (VOC) emissions to ozone formation in downwind states. In their modeling analysis, EPA identified "links" between upwind state's contributions to downwind receptor sites with future design values greater than or equal to 70 ppb.[21] In past rulemakings (e.g., the CSAPR Update Rule), EPA considered 1% of the NAAQS, or 0.70 ppb in this case, a potentially significant contribution to nonattainment or interference with maintenance.[22]

However, the CSAPR rule and its successors applied to eastern states of the United States, and EPA never developed a parallel rule for specifically analyzing and addressing ozone transport in the western United States. In the eastern United States, electric generating units are the primary contributors to downwind ozone air quality problems due to their close geographic proximity to one another. In the western United States, by contrast, long distances separate sources with high mountains and drastic elevation changes, hindering regional concentrations of ozone and its precursors. This widely varying topography does not support a single, all-encompassing approach to ozone transport. Thus, upwind western states contributions' to linked receptors require additional analysis beyond the 1% of the NAAQS threshold to determine the significance of transported pollution in downwind states.[23]

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[20] *Id*. at p. 4.

[21] EPA's modeling is described in Tsirigotis, March 2018. For further detailed technical information EPA's modeling, see also EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, "Air Quality Modeling Technical Support Document for the Updated 2023 Projected Ozone Design Values," available online from EPA.

[22] See, e.g., 81 Fed. Reg. 74,508 (Oct. 26, 2016) (CSAPR Update final rule).

[23] On EPA's decision not to develop a western states counterpart to CSPAR, see, e.g.,80 Fed. Reg 75,706, 75,708-75,709, 75,715-75,716 (Dec. 3, 2015) (CSAPR Update proposed rule); 81 Fed. Reg. 74,508, 74,523 (Oct. 26, 2016) (CSAPR Update final rule); 82 Fed. Reg. 1,733 (Jan. 6, 2017) (notice of data availability regarding Good Neighbor obligations for 2015 Ozone NAAQS). In the latter document, EPA stated: "While the 1 percent screening threshold has been traditionally applied to evaluate upwind state linkages in eastern states… the EPA noted in the CSAPR update that, as to western states, there may be geographically specific factors to consider in determining whether the 1 percent screening threshold is appropriate. For certain receptors, where the collective contribution of emissions from one or more upwind states may not be a considerable portion of the ozone concentration at the

In the western states, EPA recommends that a case-specific analysis of Good Neighbor requirements for an upwind state focus on the collective factors that contribute to attainment or maintenance issues in a downwind state. Specifically, whether collective contribution of upwind states is an important part of the problem with nonattainment or interference with maintenance.[24]

EPA applied this approach in approving Arizona's Good Neighbor SIP certification for the 2008 Ozone NAAQS. In that case, EPA's modeling linked Arizona, using the 1% of the NAAQS threshold, to two receptors in the downwind state of California. A receptor at El Centro, California showed an Arizona contribution equivalent to 2.4% of the NAAQ, a receptor at Los Angeles a contribution at 1.1% of the NAAQS. However, in its approval of the Arizona SIP, EPA noted that contributions from upwind states collectively were not primarily the cause of nonattainment issues at the two California receptors. To the contrary, the collective contribution of all upwind states was only 4.4% for one receptor and 2.5% for the other, in contrast to the situation seen in the eastern states, where upwind collective contributions ranged from 17% to 67%. Thus, the modeled nonattainment and maintenance issues at the two California receptors were primarily a result of contributions from within California. EPA concluded that Arizona met its Good Neighbor obligations and its contribution to downwind air quality, although greater than 1% of the NAAQS at two receptors, was not significant.[25]

downwind receptor, the EPA and states have considered, and may continue to consider, other factors to evaluate those states' planning obligation pursuant to the Good Neighbor provision." 82 Fed. Reg. at 1,741.

[24] See the sources cited in footnote 23, above. In an action reviewing a Good Neighbor SIP certification by Arizona, discussed in the main text above, EPA noted that the collective contribution of upwind states may be an important part of downwind air quality problems where that contribution is modeled to be a "relatively large portion" of downwind ozone concentrations. In the eastern context, EPA assessed a "relatively large portion" as between 17% and 67%, contributed by four to 12 upwind states. EPA stated: "EPA used the 1% threshold in the East because prior analysis showed that, in general, nonattainment problems result from a combined impact of relatively small individual contributions from upwind states, along with contributions from in-state sources. EPA has observed that a relatively large portion of the air quality problem at most ozone nonattainment and maintenance receptors in the East is the result of the collective contribution from a number of upwind states. Specifically, EPA found the total upwind states' contribution to ozone concentration (from linked and unlinked states) based on modeling for 2017 ranges from 17% to 67% to identified downwind air quality problems in the East, with between 4 and 12 states each contributing to above 1% to the downwind air quality problem." 81 Fed. Reg. 15,201, 15,2014 (Mar. 22, 2016) (proposed rule approving Arizona Good Neighbor SIP certification submittal).

[25] 81 Fed. Reg. 15,201 (Mar. 22, 2016) (proposed rule approving Arizona Good Neighbor SIP certification submittal) and 81 Fed. Reg. 31,513, (May 19, 2016) (final rule approving Arizona Good Neighbor SIP certification submittal).

Similarly, NMED and EHD have demonstrated that New Mexico fulfills its Good Neighbor obligations under the CAA and does not contribute significantly to nonattainment or interfere with maintenance of the 2015 Ozone NAAQS in another state, as discussed below.

III: EPA Modeling Results: Good Neighbor Requirements for the 2015 Ozone NAAQS

The photochemical modeling described in EPA's March 27, 2018 memorandum estimated New Mexico's contributions to ozone measurements at every EPA approved ambient air quality monitor in the 48 contiguous United States. The EPA identified two Colorado receptors linked to emissions originating in New Mexico at a contribution threshold of 0.70 ppb or above. These two receptors (Table 1) are within the Denver Metro/North Front Range ozone nonattainment area (Denver/NFR NAA).

Table 1. Monitored and projected design values of receptors linked to New Mexico emissions[26]

Receptor	AQS ID	2015-2017 DV[27] (ppb)	2023 Avg DV (ppb)	2023 Max DV (ppb)	NM Contribution (ppb)
Weld County Tower	081230009	70	70.2	71.4	0.77 (1.1% of NAAQS)
Rocky Flats-N	080590006	77	71.3	73.7	0.70 (1.0% of NAAQS)

EPA's Good Neighbor framework identified the Rocky Flats-N site as a nonattainment receptor based on 2015-2017 monitoring data that measured ozone concentrations above the 2015 Ozone NAAQS. This receptor is projected to remain in nonattainment in 2023.[28] EPA recognized the Weld County Tower site as a maintenance receptor because 2015-2017 monitoring data and the 2023 Projected Average Design Value showed attainment of the 2015 Ozone NAAQS, however the 2023 Projected Maximum Design Value was above the standard.[29] Based on EPA's identification of these receptors and the modeled linkage to New Mexico emissions, NMED and

[26] Tsirigotis March 2018, p. B-3; EPA spreadsheet of ozone DVs at EPA web site for 2015 ozone Good Neighbor data.

[27] This column reflects actual measured concentrations of ozone. The remaining columns to the right show modeled ozone contributions for 2023.

[28] EPA's definition of a nonattainment receptor is at Tsirigotis March 2018, p. 4.

[29] EPA's definition of a maintenance receptor is at Tsirigotis March 2018, p. 4.

EHD conducted further analysis to determine whether New Mexico's emissions contribute significantly under EPA's Good Neighbor framework and thus warrant consideration of new emission control measures within the state.

The remainder of this SIP certification evaluates the available modeling, monitoring, and emissions data provided through EPA memoranda, technical support documents, the Air Quality System Data Mart, and the National Emissions Inventory (NEI) to determine if New Mexico contributes significantly to nonattainment or interferes with maintenance in the Denver/NFR NAA. NMED and EHD conclude that emissions reductions within New Mexico are not necessary to prevent downwind air quality problems, as discussed below.

IV: New Mexico's Modeled Ozone Emissions Contribution at Colorado Receptors, Topography, Monitoring Data, and Emission Trends

To determine if New Mexico emissions contribute significantly to nonattainment or interfere with maintenance at receptors in Colorado, NMED and EHD used a weight-of-evidence approach. Adopting EPA's approach in the above-discussed Arizona SIP approval, the weight of evidence approach in this SIP certification examines the magnitude of collective contributions from upwind states compared to the emissions from within Colorado. As was the case with Arizona, the collective upwind state contributions are far outweighed by in-state contributions. The approach in this SIP certification also considers the complex topography and particular meteorology that play a role in ozone formation in the Denver/NFR NAA. The resulting analysis demonstrates that New Mexico emissions do not contribute significantly to nonattainment or interfere with maintenance at the two receptors in the Denver/NFR NAA.

Upwind State vs. In-state Contributions to Ozone Formation in Colorado

Table 2, below, presents EPA's modeled 2023 ozone contribution from each upwind state meeting the 1% threshold at the two Colorado receptors of concern. For the Weld County Tower site, three states meet this threshold: California, New Mexico, and Texas. For the Rocky Flats-N receptor, five states meet this threshold: California, New Mexico, Texas, Utah, and Wyoming. Note that Colorado's contributions to each receptor (highlighted in red) far exceed the contribution of any other state. For the Weld County Tower and Rocky Flats-N receptors, Colorado's contribution (~25 ppb) is more than 30 times larger than New Mexico's contribution (<1 ppb).

Table 2. contributions to projected 2023 DV by individual states[30]

Receptor	2023 Avg DV (ppb)	2023 Max DV (ppb)	CO (ppb)	CA (ppb)	NM (ppb)	TX (ppb)	UT (ppb)	WY (ppb)
Weld County Tower	70.2	71.4	**24.44**	**0.95**	**0.77**	**1.05**	0.54	0.58
Rocky Flats-N	71.3	73.7	**25.52**	**1.32**	**0.70**	**1.02**	**0.83**	**0.81**

Table 3, below, presents additional information. It shows the collective contribution to modeled 2023 design values by Colorado, comparing them to contributions from all upwind states combined and by all upwind states meeting the 1% of the NAAQS threshold. In both instances, Colorado's contribution is far greater than the indicated categories of upwind states.

Table 3. contributions to projected 2023 DV by Colorado compared to categories of states[31]

Receptor	2023 Avg DV (ppb)	2023 Max DV (ppb)	CO (ppb)	All Upwind States (ppb)	Linked (1%) Upwind States (ppb)
Weld County Tower	70.2	71.4	**24.44** **(35% of avg. DV)**	5.63 (8% of avg. DV)	2.77 (4% of avg. DV)
Rocky Flats-N	71.3	73.7	**25.52** **(36% of avg. DV)**	7.06 (10% of avg. DV)	4.68 (7% of avg. DV)

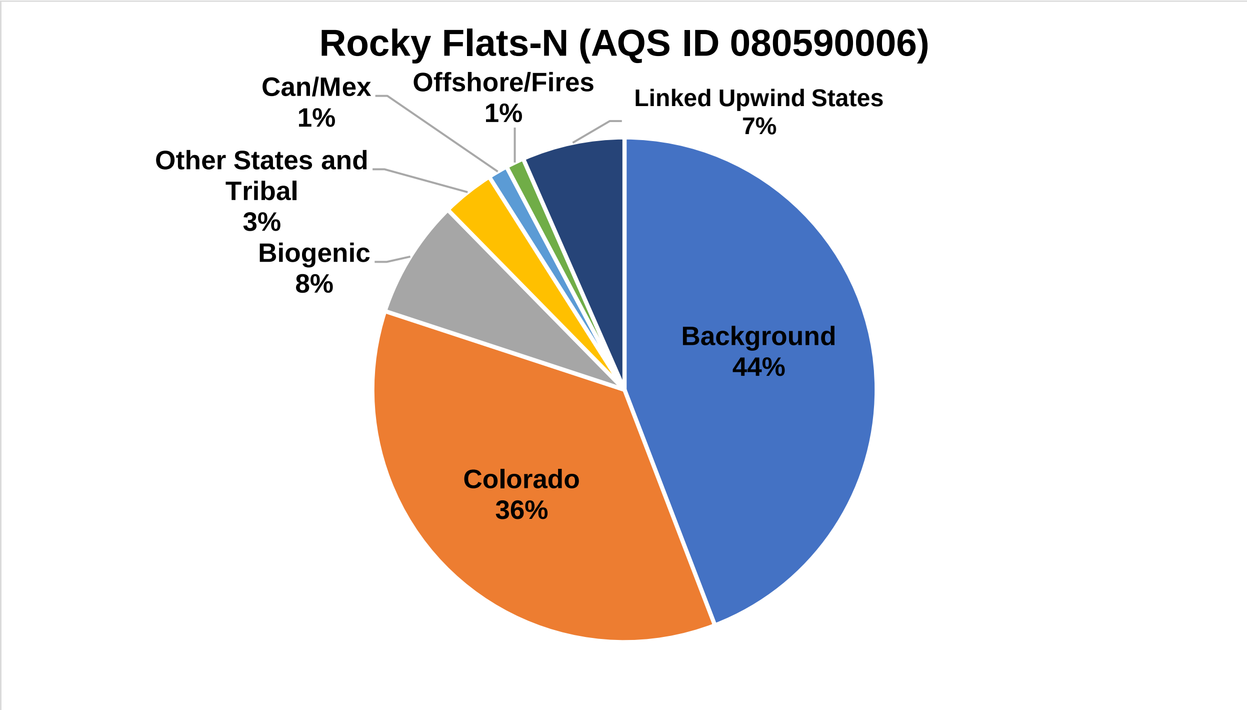
At the Rocky Flats-N receptor, EPA identifies background concentrations (44%) and anthropogenic emissions from Colorado (36%) as contributing nearly 80% of modeled future year design values, with 7% of contributions attributed to linked upwind states and 3% attributed to the remainder of upwind states and tribes (Figure 1). Colorado's emissions

[30] Tsirigotis March 2018, Attachment C.

[31] *Id.*

account for approximately three and a half times the contribution to the future year design value as all other states combined and nearly five and a half times as much as linked states.

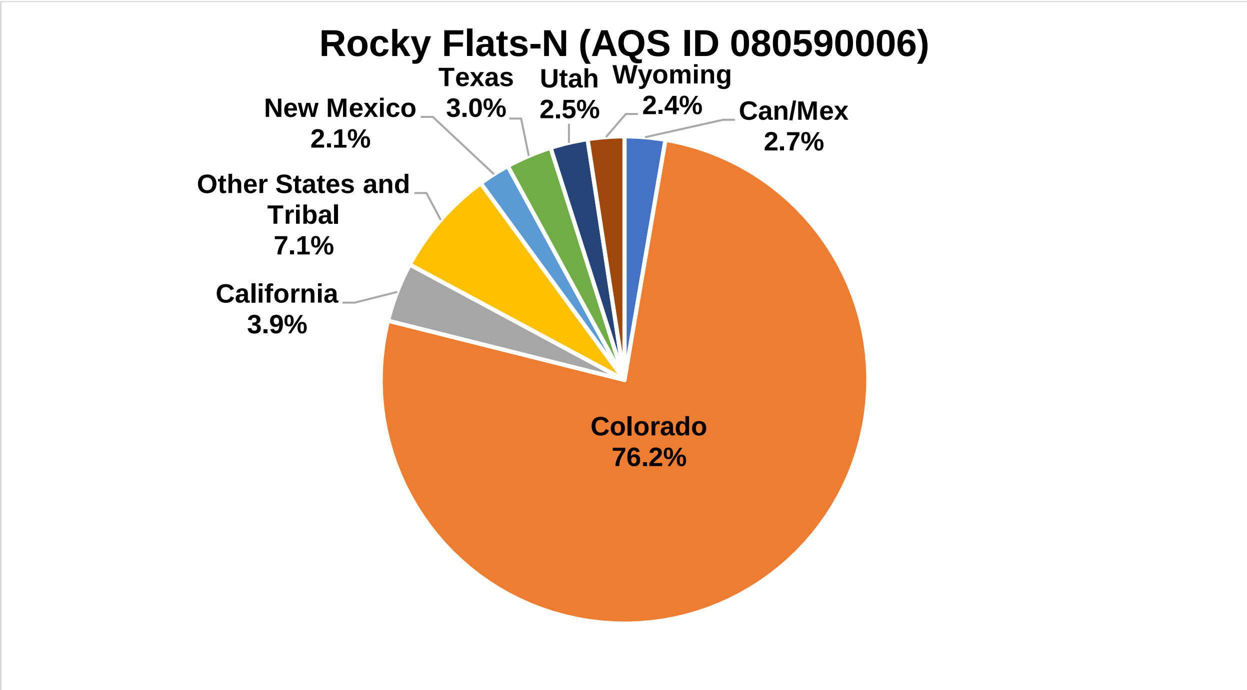
Figure 1. Percent contribution of all sources to projected 2023 DV at Rocky Flats-N[32]



When considering controllable anthropogenic emissions and removing background, offshore, fire and biogenic emissions from consideration (Figure 2), Colorado alone contributes over 75% to the projected DV. The five linked upwind states individually contribute from 2 to 4%, with other states contributing about 7%, and international emissions from Canada and Mexico contributing about 3% to the2023 DV.

[32] *Id.*

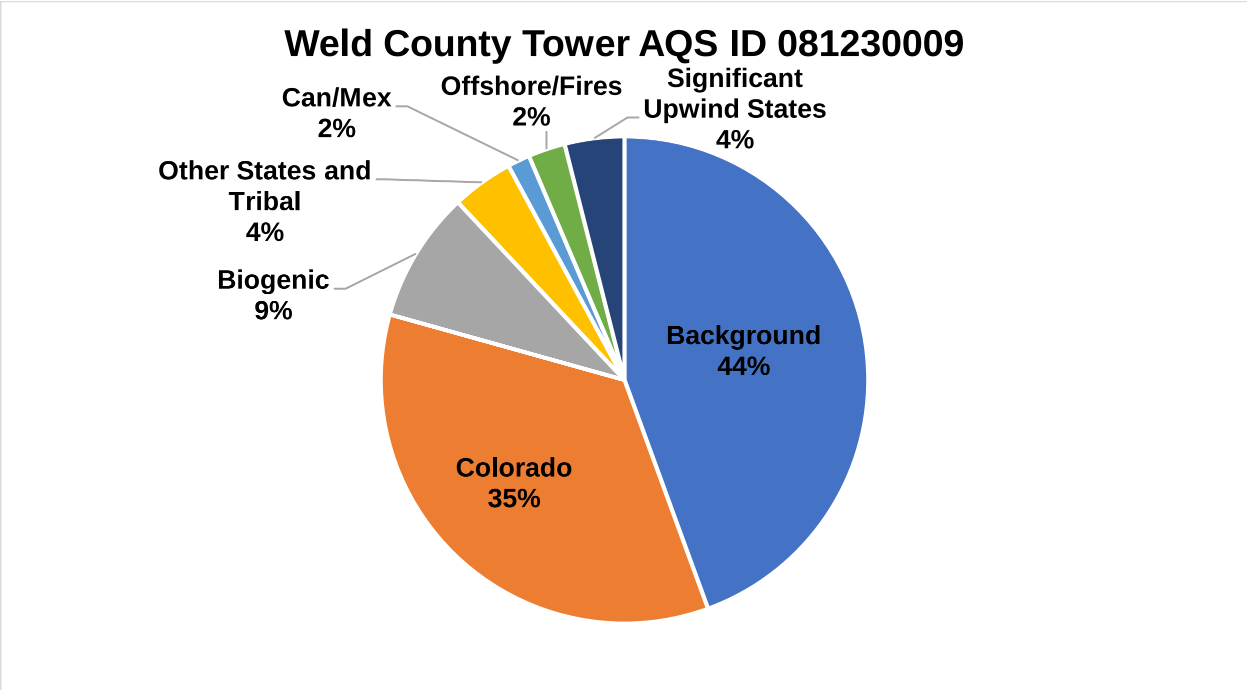
Figure 2. Percent contribution of controllable anthropogenic sources to projected 2023 DV at Rocky Flats-N[33]



At the Weld County Tower receptor, EPA identifies background concentrations (44%) and anthropogenic emissions from Colorado (35%) contributing to approximately 79% of modeled future year design values, with 8% of contributions attributed to upwind states and tribes (Figure 3). Colorado's emissions account for greater than four times the contribution to the future year design value as all other states combined.

[33] *Id*.

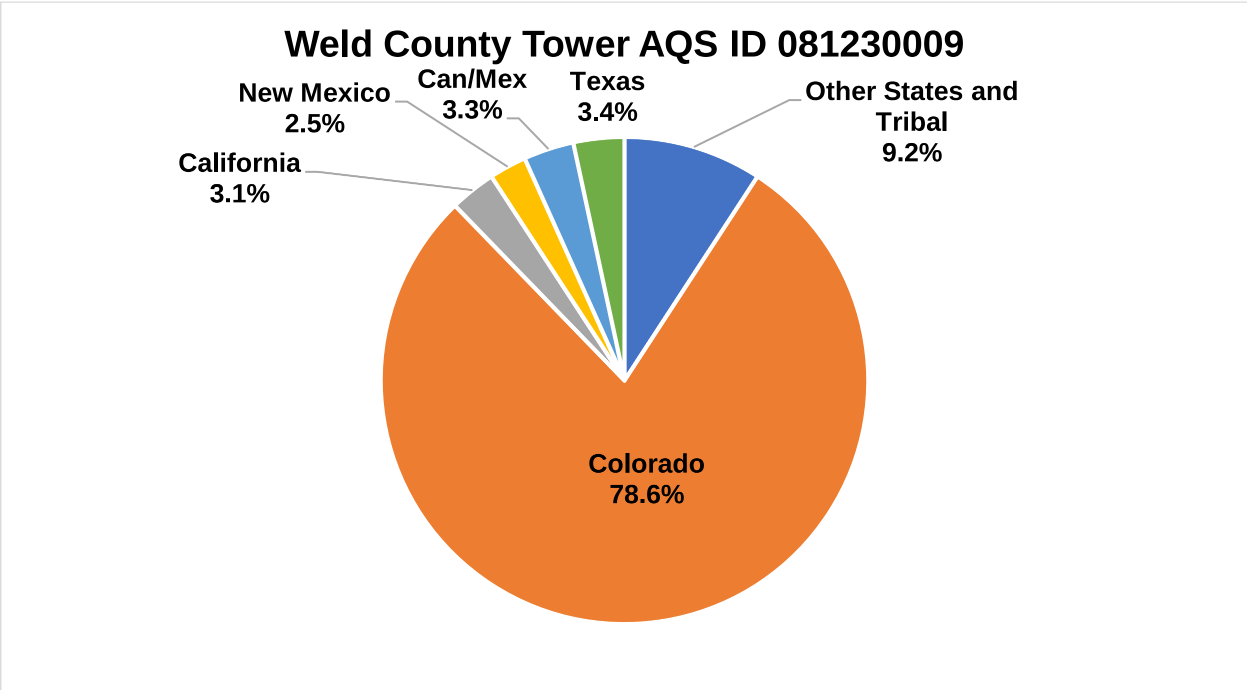
Figure 3. Percent contribution of all sources to projected 2023 DV at Weld County Tower[34]



When background, offshore, fire and biogenic emissions are removed from consideration (Figure 4), Colorado alone contributes approximately 79%, with the linked states of California, Texas and New Mexico individually contributing 3.4%, 3.1%, and 2.5%, respectively. For the remaining anthropogenic emissions from North America, other states contribute 9% and emissions from Canada and Mexico contribute 3.3% to the future year DV. Similar to the Rocky Flats-N receptor, Colorado' emissions far outweigh emissions from any other state.

[34] *Id.*

Figure 4. Percent contribution of controllable anthropogenic sources to projected 2023 DV at Weld County Tower[35]



Nonattainment History and Topography of the Denver/North Front Range Area

EPA ozone Good Neighbor guidance suggests that states may consider the local air quality context of downwind monitors as a supplement to EPA's 2023 modeling. In particular, the EPA guidance suggests examining "the role of designations issued in FY 2018 based on approved air quality monitors."[36] This SIP certification examines data presented in EPA's designation of nonattainment areas for the 2015 Ozone NAAQS in June 2018.[37] This data shows the important role that local topography and meteorology play in ozone formation in the Denver/NFR NAA.

[35] *Id*.

[36] *Id*. at p. A-2.

[37] 83 Fed. Reg. 25,776 (Jun. 4, 2018).

This area has a history of elevated ozone levels. EPA designated the Denver/NFR NAA as nonattainment for the 1997,[38] 2008[39] and 2015 8-hour Ozone NAAQS.[40] The Denver/NFR NAA includes seven entire counties and two partial counties surrounding Denver (Figure 5). EPA has reclassified the area to "Serious" nonattainment under the 2008 standard.[41]

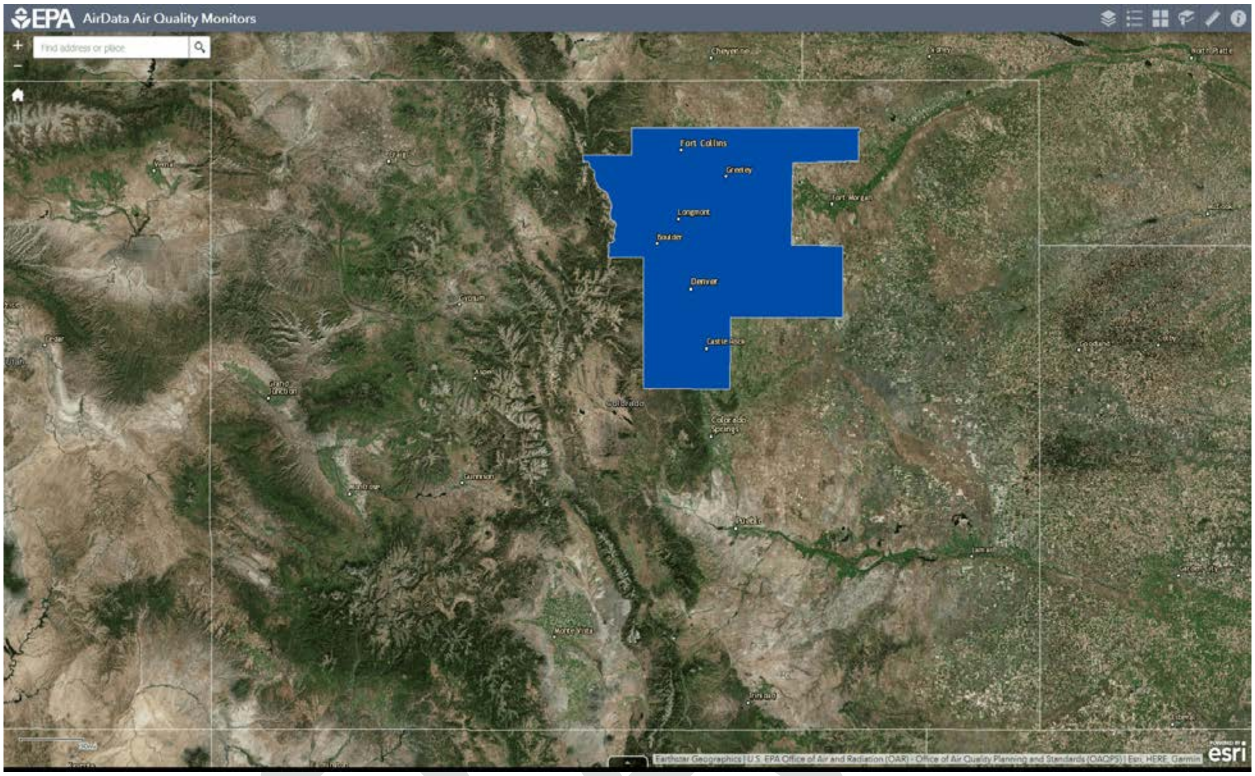
[38] 69 Fed. Reg. 23,857 (Apr. 30, 2004).

[39] 77 Fed. Reg. 30,087 (May 21, 2012).

[40] 83 Fed. Reg. 25,776 (Jun. 4, 2018).

[41] 84 Fed. Reg. 41,674 (Aug. 15, 2019) (proposed rule reclassifying Denver NFR/NAA to serious nonattainment for the 2008 Ozone NAAQS). At the time this document was drafted, EPA had announced a final rule on the reclassification but had not yet published it in the Federal Register. See the EPA press release of December 16, 2019.

Figure 5. Map of Colorado with the Denver/NFR NAA highlighted in blue[42]



In the process of making the nonattainment designation for the 2015 NAAQS, the State of Colorado provided a five-factor analysis to determine an appropriate boundary for the Denver/NFR recommended nonattainment area.[43] This analysis concluded that unique topography and meteorological conditions in and around Denver, tend to "magnify and constrain the influence of local emissions on air quality" resulting in elevated ozone levels.[44] Emissions within the air basin tend to recirculate within the area, making them a significant cause of ozone formation. EPA agreed with Colorado’s conclusions in the agency's Technical

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[42] Map from EPA's AirData Air Quality Monitors application.

[43] Colorado Department of Public Health and Environment, State of Colorado Technical Support Document for Recommended 8-Hour Ozone Designation, Adopted by Colorado Air Quality Control Commission September 15, 2016 ("Colorado TSD"). Available at EPA web site for 2015 Ozone NAAQS designation documents.

[44] Colorado TSD, pp. 33-44.

Support Document for designating the Denver/NFR area nonattainment for the 2015 Ozone NAAQS without expanding the existing boundary.[45]

Both EPA and Colorado agreed that the topography, comprised of mountains and ridges in the Denver/Front Range region, serve as a bowl that traps local NO_X and VOC emissions during the May through September ozone season. [46] These topographical features include the Rocky Mountains to the west, the Cheyenne Ridge to the north, and the Palmer Divide to the south, walling off the Denver/NFR NAA on three sides. During warm weather months, these three barriers constrain airflow in a way that effectively creates an invisible, fourth wall to the east. These four walls trap local NO_X and VOC emissions during the ozone season. Because of this topography, emissions from within the Denver/NFR NAA are the primary driver of ozone formation. EPA and Colorado based this assessment on measurements of prevailing airflow patterns and on modeling of airflow patterns around monitors violating the 2015 Ozone NAAQS.

EPA performed HYSPLIT back trajectory modeling of airflow patterns at four monitoring sites on all days with an exceedance of the O_3 NAAQS. Colorado further focused their modeling on the four highest exceedance days and combined the results of their frequency analysis. The results found fewer than 5 trajectory hours outside of the Denver/NFR NAA boundary during these periods of elevated ozone levels.[47] The HYSPLIT modeling did not address interstate transport so it does not preclude interstate transport as a significantly contributing factor to nonattainment. It does, however, suggest that interstate transport may be a less significant factor.

In describing the meteorological effects responsible for this, Colorado and EPA identified four circulation patterns that affect ozone levels within the Denver/NFR NAA as:[48]

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[45] EPA, Colorado: Denver Metro/North Front Range Nonattainment Area, Final Designations for the 2015 Ozone National Ambient Air Quality Standards, Technical Support Document, undated ("EPA TSD"). For EPA's final rule designating attainment status of areas under the 2015 Ozone NAAQS see 83 Fed. Reg. 25,776 (June 4, 2018). EPA's technical support document assessing Colorado's attainment designation status is available from EPA's rulemaking docket for the designation process, docket number EPA-HQ-OAR-2017-0548-0408. Other documents related to the designation process are available by searching the foregoing docket number at regulations.gov.

[46] Colorado TSD, pp. 33-48; EPA TSD, pp. 22-34.

[47] Colorado TSD, pp. 35-44; EPA TSD, pp.22-32. The HYSPLIT modeling showed where air parcels within the Denver/NFR NAA came from, by tracing their backward trajectories to a point of origin.

[48] Colorado TSD, pp. 34-35; EPA TSD, p. 28.

- nighttime and early-morning down-valley drainage flow;
- thermally-driven upslope flow;
- mountain-plains solenoid circulation; and
- the “Denver Cyclone.”

These air circulation patterns and the surface topography of the NAA trap emissions and produce ozone within the air basin. These patterns compound the problem as prior day emissions recirculate to form ozone that is carried west up the slopes of the Rocky Mountains during the day, returning the polluted air to surface as lofted air recirculates to the east as temperatures subside in the evening and nighttime hours. The “Denver Cyclone” is a separate meteorological phenomena that independently creates a circulation pattern that impacts localized pollution transport due to mesoscale winds.

Thus, EPA’s and Colorado’s assessments demonstrate that topography and related wind patterns in the Denver/NFR NAA cause local emissions to build up in the area, resulting in significant locally driven ozone formation due to physical conditions within the NAA boundaries. Although the Colorado and EPA assessments did not assess interstate transport of ozone and its precursors, the assessments do provide further evidence of the significance of local conditions in Colorado driving ozone formation within the NAA.

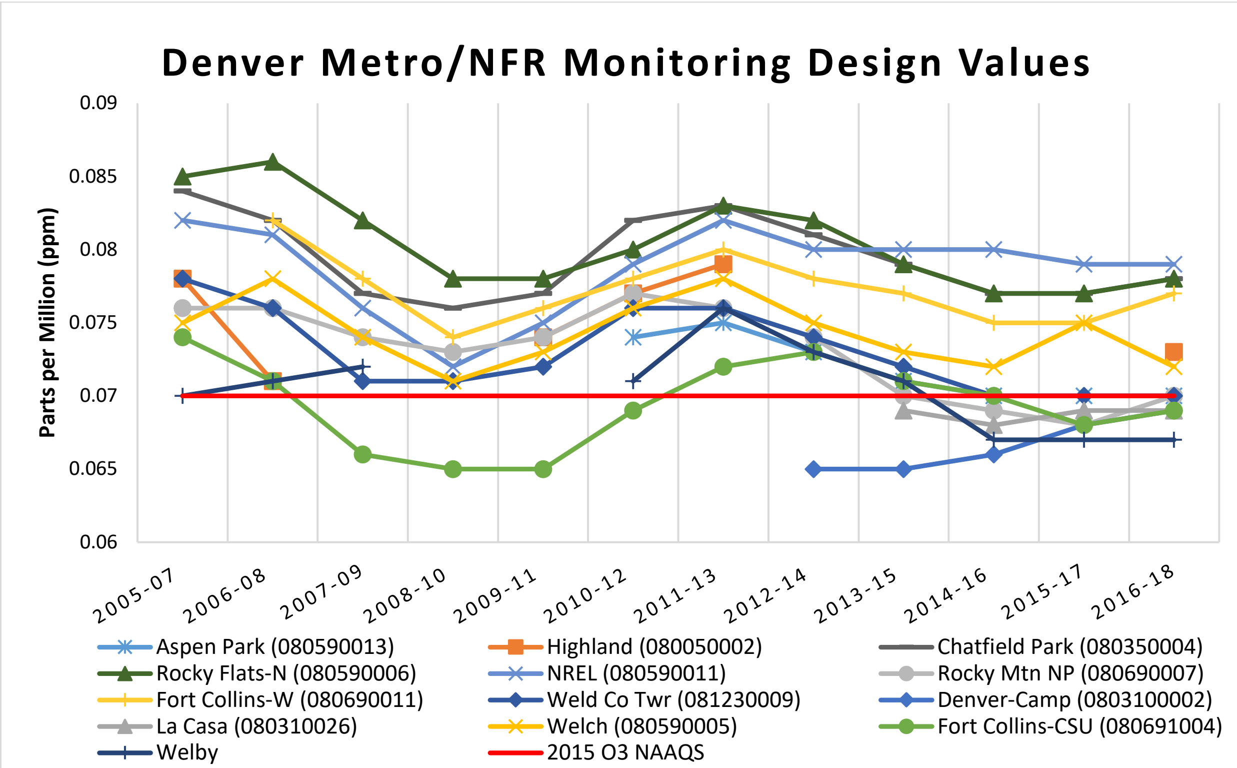
Air Quality Monitoring Data and Design Values

To further understand the significance and potential impact of New Mexico emissions on the two Colorado receptors, this certification examines trends in monitored ozone concentrations within the Denver/NFR NAA. Doing so provides additional context for assessing the ozone Good Neighbor modeling performed by EPA.

Figure 6A shows DV trends at the 14 receptor sites in the Denver/NFR NAA, dating back to the 2005-2007 period, and comparing them to the 70 ppb level of the 2015 Ozone NAAQS. Although EPA has designated the area as nonattainment for the 2015 Ozone NAAQS, only two of the 14 receptors (the Rocky Flats-N and Weld County Tower sites examined in this SIP certification were linked to New Mexico in EPA's 2023 modeling for assessing 2015 Ozone NAAQS Good Neighbor considerations.

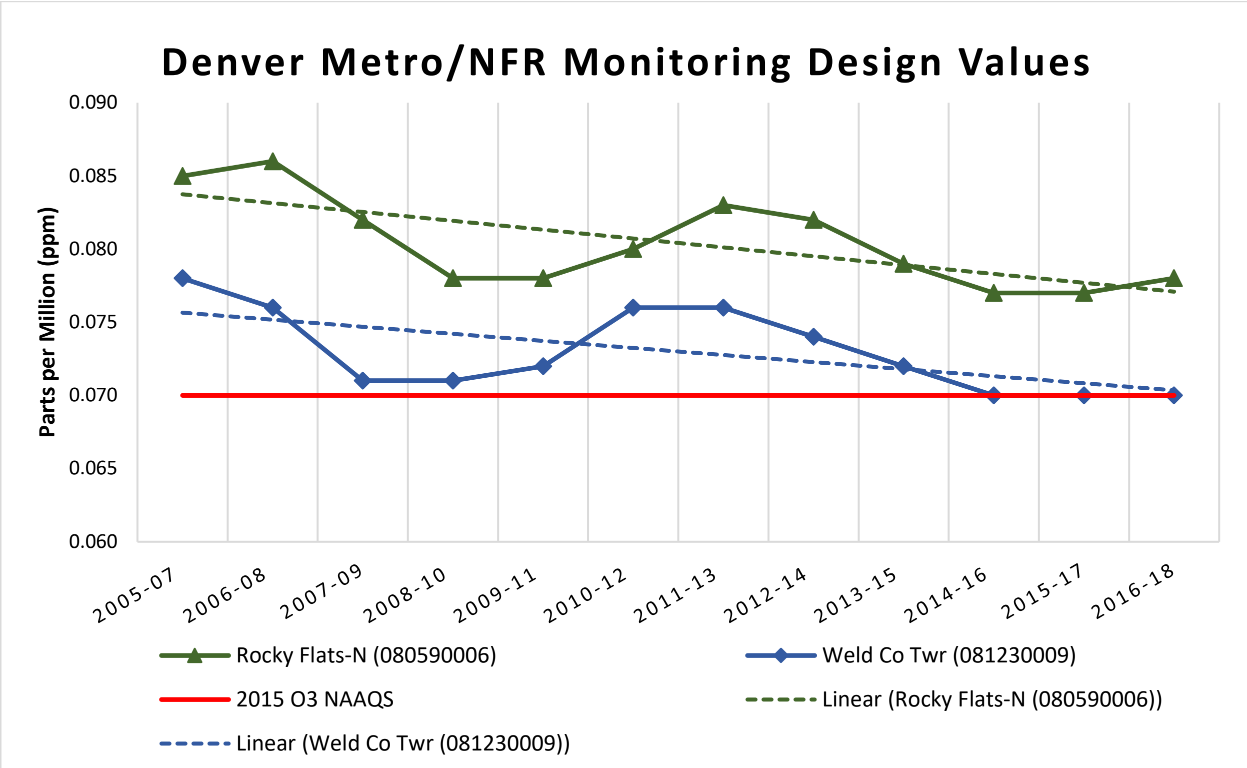
Figure 6B focuses on these two receptors, subtracting the other 12 to show trends in measured concentrations of ozone on the receptors of interest in this SIP certification. Ozone design values for these receptors show an overall downward trend. The design value at Rocky Flats-N dropped from 86 ppb in 2008 to 78 ppb in 2018. The Weld County Tower design value shows a similar improvement, dropping from 76 ppb in 2013 to 70 ppb in 2016 where it has remained steady through 2018.

Figure 6A. Ozone DV trends at Denver Metro/NFR NAA monitoring sites[49]



[49] EPA Air Quality System, available online from EPA.

Figure 6B. Ozone DV trends at receptors of concern, Rocky Flats-N and Weld Co. Tower[50]



The Rocky Flats-N receptor shows a stable to improving trend over the last ten years. not only in overall design values but in frequency of NAAQS exceedances, as illustrated in Figure 7. In 2012, this receptor measured a peak of forty-nine days with a recorded NAAQS exceedance, along with a fourth highest maximum 8-hour ozone average of 84 ppb.[51] By 2017, the number of days with an exceedance fell to 18, with a fourth maximum 8-hour ozone average of 75 ppb. In 2018 the receptor recorded an uptick in concentrations with the number of exceedance days increasing to 33 and the fourth maximum 8-hour ozone average increasing to 81 ppb. This resulted in the slight increase in the DV at the receptor from 77 ppb in 2017 to 78 ppb in 2018 (shown in Figure 6B).

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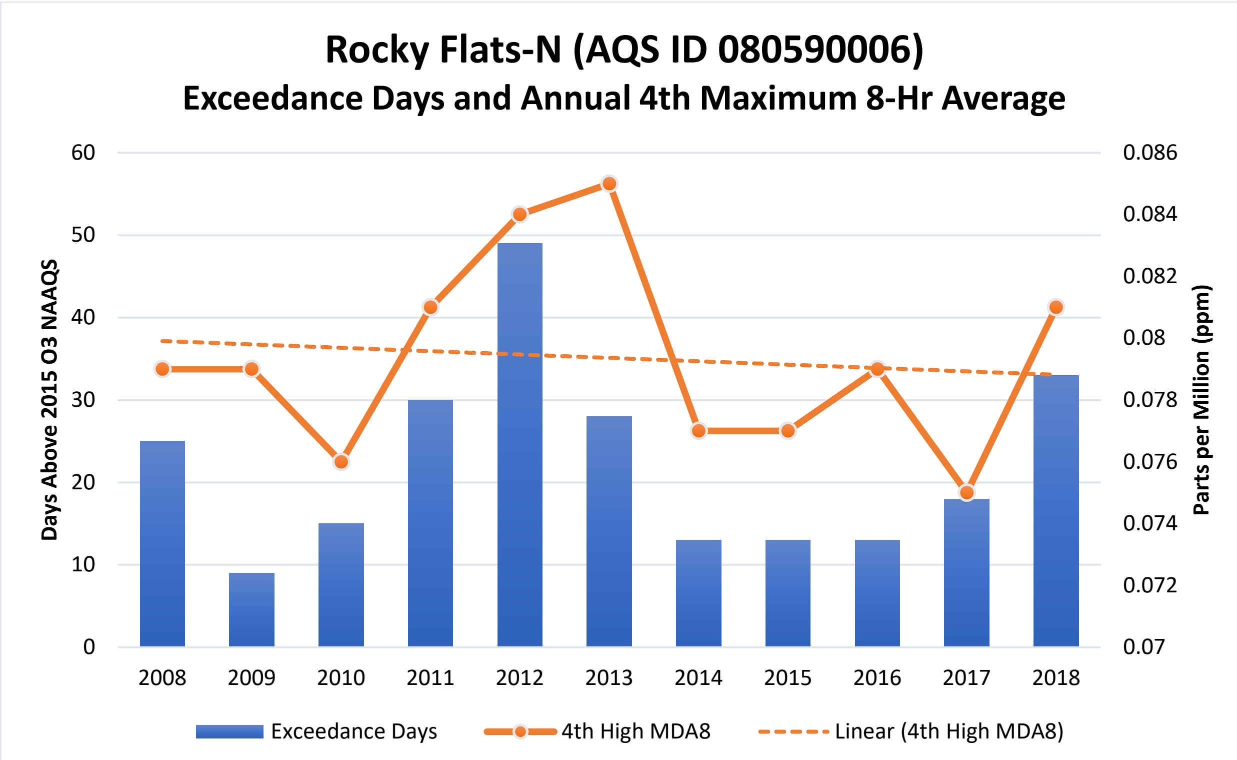
[50] *Id.*

[51] Note that the fourth highest maximum 8-hour ozone average is not the same as the design value. The former reflects data for a single year, the latter for an average of annual values over three years. For details on how the ozone design value is calculated from the fourth highest maximum 8-hour ozone average, see the sources cited in footnotes 4 and 5.

Figure 7. Recorded ozone exceedances and the annual fourth max 8-hour average at the Rocky Flats-N receptor[52]



In Figure 6B the Weld County Tower receptor exhibits a similar ozone concentration pattern to the Rocky Flats-N receptor. Its design values show a downward trend over time, with the receptor meeting the Ozone NAAQS since 2016. In Figure 8, this receptor records fewer exceedance days than the Rocky Flats-N receptor. In 2012, the receptor recorded a peak of seventeen exceedance days and an annual fourth maximum 8-hour average of 80 ppb. By 2018 the number of exceedance days dropped to seven with an annual fourth maximum 8-hour average of 73 ppb. Currently, the Weld County Tower receptor shows attainment of the standard with a design value of 70 ppb using the most recent publicly available data from 2016-2018.

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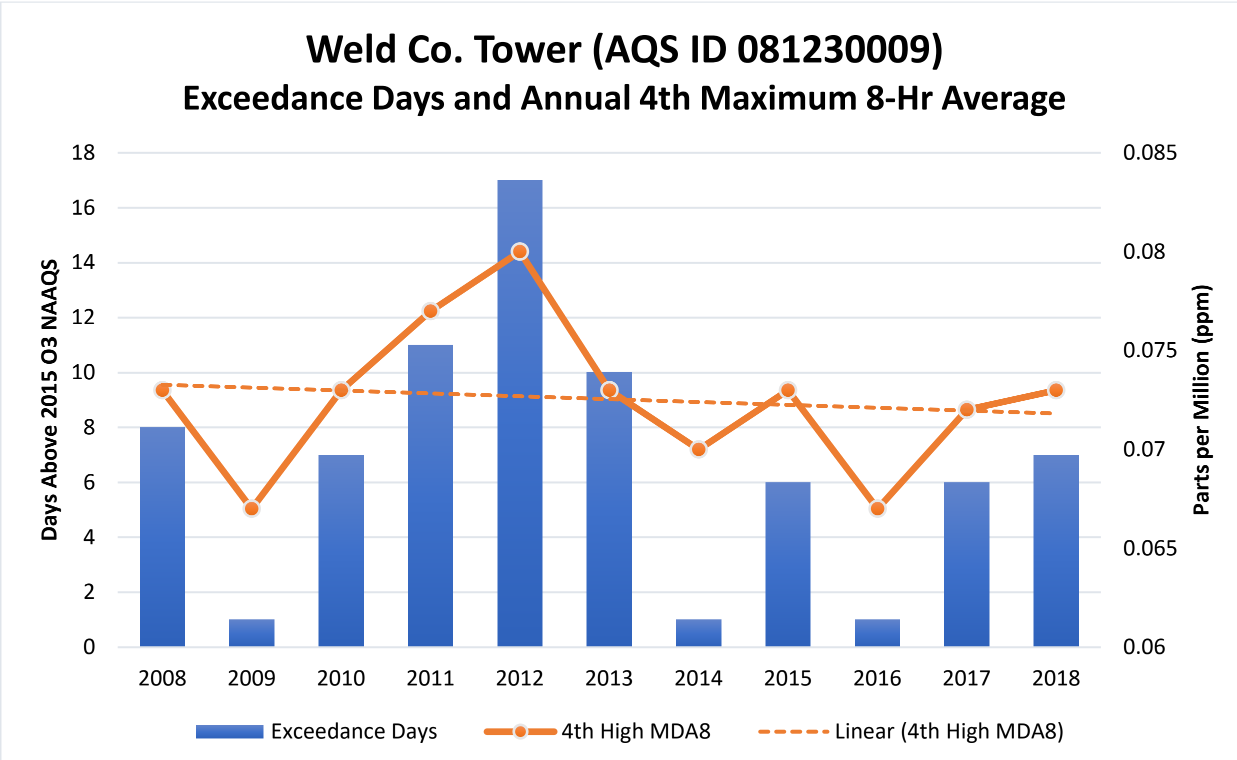
[52] EPA Air Quality System, available online from EPA.

Figure 8. Recorded ozone exceedances and the annual fourth max 8-hour average at the Weld Co. Tower receptor[53]



The above discussed monitor data provide important context for this SIP certification. Not only do local topography and meteorology play a key role in Denver/NFR NAA ozone formation, but the ozone monitor trends are favorable at the two receptors of interest for New Mexico. These favorable trends in monitoring data further support the assessment that New Mexico's small modeled contribution to ozone concentrations in the Denver/NFR NAA does not significantly contribute to nonattainment or interfere with maintenance of the 2015 Ozone NAAQS at the two receptors of concern.

Nitrogen Oxides and Volatile Organic Compounds Emissions Trends

To further understand the potential impact of New Mexico emissions on the two receptors, this certification examines trends in ozone precursor emissions in Colorado and upwind states.

[53] *Id.*

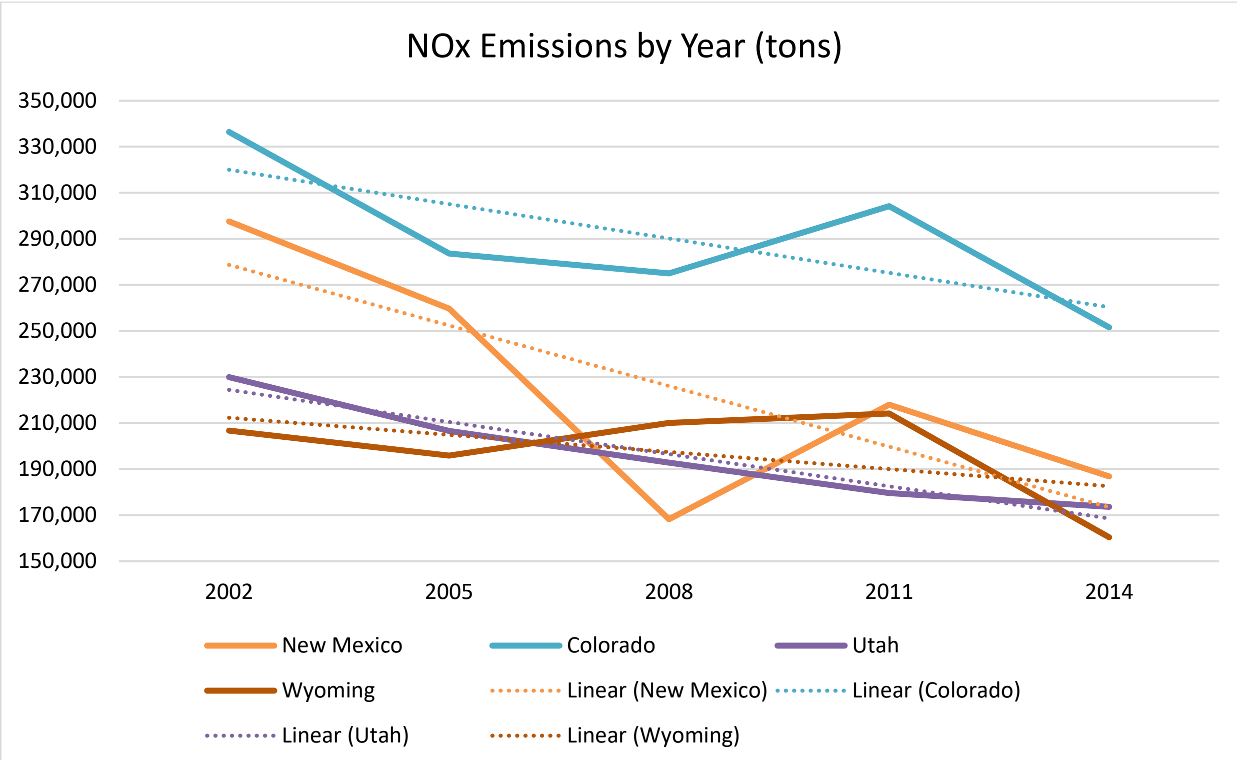
These precursor emission trends will help provide additional context for assessing the ozone modeling performed by EPA and the significance of emissions from New Mexico.

Ozone forms from complex chemical reactions of NO_X and VOCs in the presence of sunlight. Since ozone formation depends on these chemicals, they are collectively referred to as precursor emissions. Control strategies to reduce ozone pollution generally rely on emission reductions of one or both categories of precursor emissions, depending on specific conditions in the jurisdiction.

In addition to New Mexico, the states of Utah, Wyoming, California and Texas have been linked to the Weld County or Rocky Flats-N receptors, as discussed above (i.e. they are modeled to contribute 1% or more of the 2015 Ozone NAAQS to 2023 modeled ozone concentrations). However, a review of emission trends for those states shows no indication of substantial, consistent increases over time in upwind ozone precursor emissions within these states.

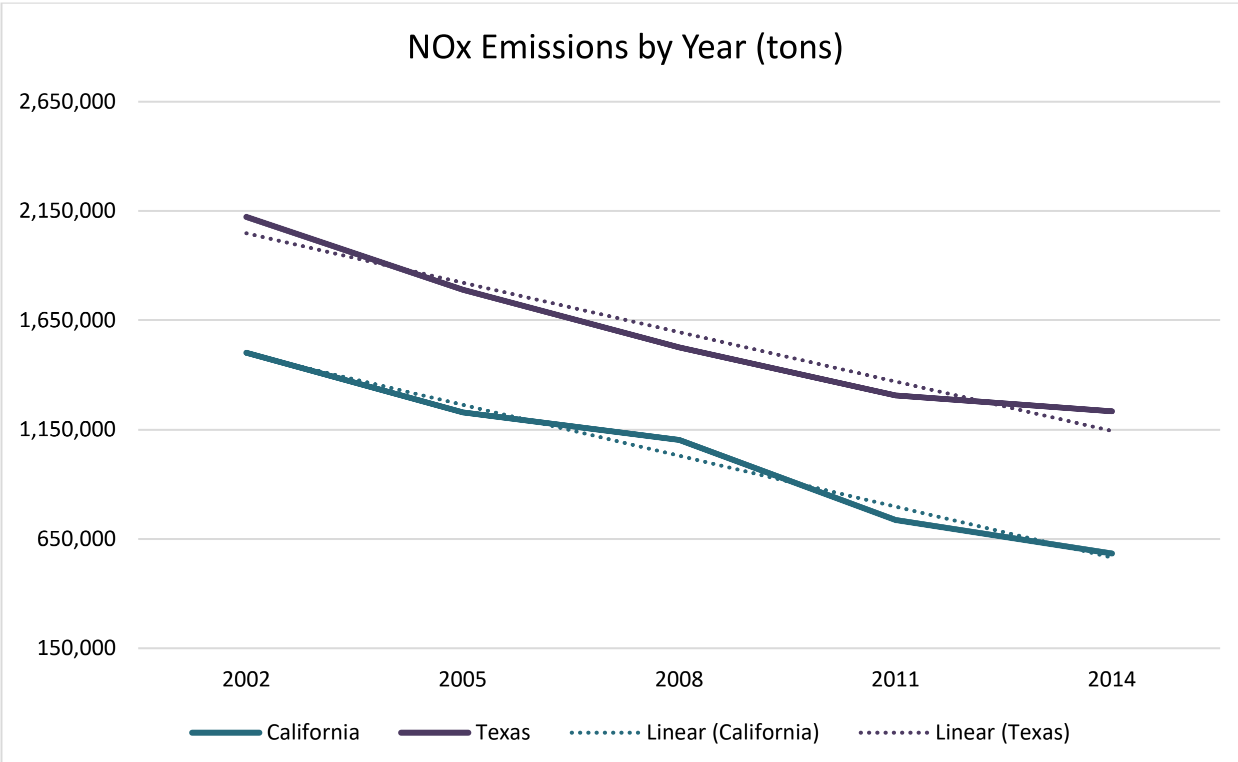
In all of the linked upwind states and Colorado, NOx emissions have declined steadily since 2002, as shown in Figures 9 and 10, below.

Figure 9. Fifteen-year trend of NO_X emissions in New Mexico, Colorado, Utah and Wyoming from all categories (anthropogenic and non-anthropogenic)[54]



[54] EPA, National Emissions Inventory, available online from EPA.

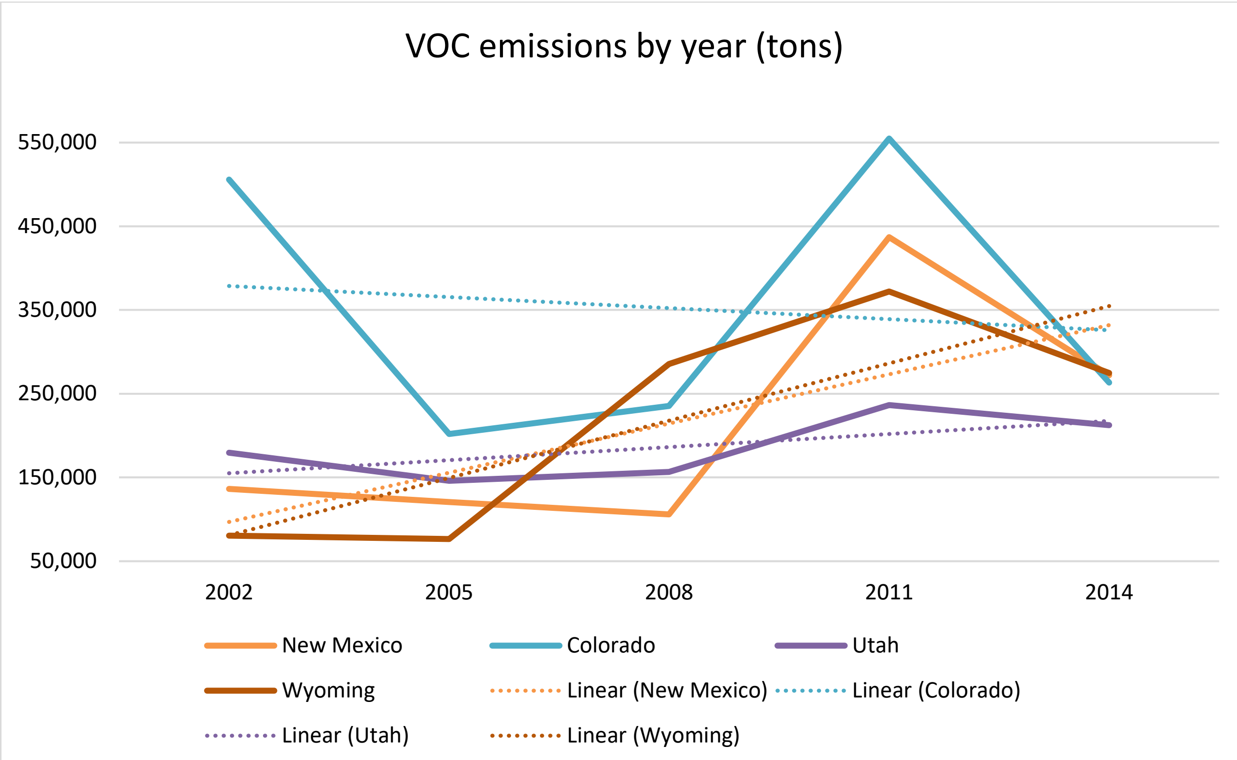
Figure 10. Fifteen-year trend of NOx emissions in California and Texas from all categories (anthropogenic and non-anthropogenic)[55]



VOC emissions in the upwind states and Colorado do not display the same steady downward trend as NOx. VOC emissions since 2002 show variability over time in upwind states and Colorado (Figures 11 and 12). The general trend over time is upward in every state except Colorado but emissions since 2011 declined in every state except California.

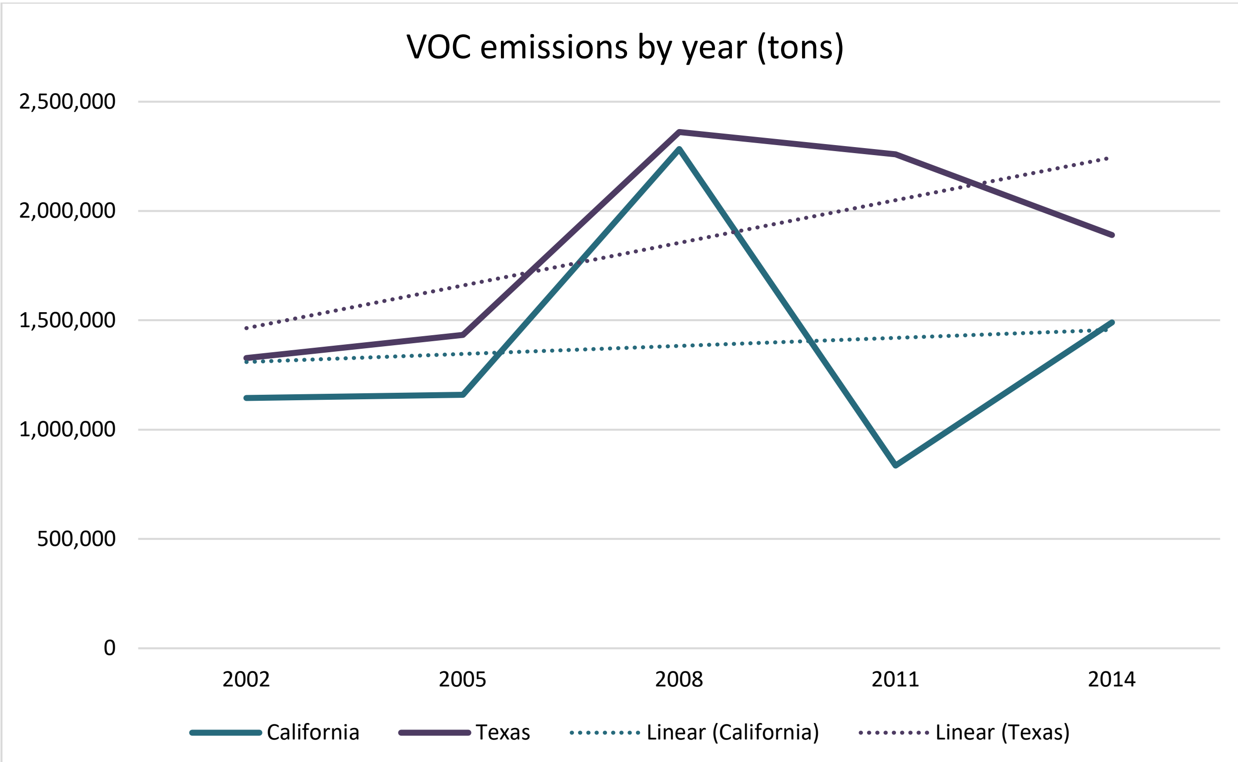
[55] *Id*. For clarity of presentation, emissions from California and Texas are presented separately from those of other states.

Figure 11. Fifteen-year trend of VOC emissions in New Mexico, Colorado, Utah and Wyoming from all categories (anthropogenic and non-anthropogenic)[56]



[56] *Id*.

Figure 12. Fifteen-year trend of VOC emissions in California and Texas from all categories (anthropogenic and non-anthropogenic)[57]



On balance, the downward trend in NOx and the somewhat upward trend in VOCs in linked upwind states and Colorado are not sufficient cause for concern when viewed in light of all the evidence examined in this Good Neighbor SIP certification. A significant upward trend in both NOX and VOCs over time is not in evidence. Thus, on balance, emissions data do not support an assessment that New Mexico contributes significantly to nonattainment or interferes with maintenance at the two downwind receptors in the Denver/NRF NAA.

V: Conclusion

This Good Neighbor SIP demonstrates that New Mexico's emissions do not contribute significantly to nonattainment or interfere with maintenance at the two Colorado receptors examined above. New Mexico's modeled 2023 contribution for these locations is projected to be at or slightly above 1% of the 2015 Ozone NAAQS. However, the contributions of Colorado

57 *Id*.

emissions at these two receptors are projected to substantially outweigh the contributions of all upwind states.

This assessment is based on an approach already used by EPA in similar circumstances. In approving Arizona's previous Good Neighbor SIP submittal under the 2008 Ozone NAAQS, EPA found linked upwind states' contributions did not significantly contribute to nonattainment or interfere with maintenance, despite the contribution being at or above 1% of the NAAQS. In that case, contributions from all upwind states combined were heavily outweighed by emissions contributions from within the receptors' home state. This SIP certification shows that similar circumstances exist regarding New Mexico's potential downwind contribution in Colorado. Additional information supports the finding of an insignificant New Mexico contribution, including topography and meteorology in the vicinity of the two Colorado receptors, as well as trends in monitor data and emissions.

NMED and EHD further note that emissions in New Mexico are anticipated to decrease in the future as the state implements federal rules as well as state initiatives to attain and maintain the 2015 Ozone NAAQS within its jurisdiction.

Thus, the weight of evidence provided in this document demonstrates that emissions from New Mexico do not significantly contribute to nonattainment or interfere with maintenance at the two receptors in Colorado and New Mexico meets its Good Neighbor obligations under the 2015 Ozone NAAQS.