COLORADO
Department of Public
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

September 23, 2016

Shaun McGrath
Regional Administrator
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop St.
Denver, CO 80202-1129

Re: Colorado's Air Quality Control Region Designations of Non-Attainment, Attainment and Attainment/Unclassifiable for the 2015 Revised 8-Hour Ozone NAAQS

Dear Mr. McGrath:

Pursuant to the provisions of section 107(d)(1) of the Clean Air Act, the state of Colorado submits to the Environmental Protection Agency the Colorado designations for the 8-hour Ozone National Ambient Air Quality Standards (NAAQS), as revised in 2015 (effective date December 28 , 2016). Federal law requires that the state of Colorado submit the recommended designations for the 8-hour Ozone NAAQS to the EPA by October 1, 2016, and this letter provides the designations of "non-attainment" and "attainment/unclassifiable" as applicable for all air quality control regions (AQCRs) in Colorado.

The enclosed table describes each AQCR and its designation along with an enclosed technical support document that provides supporting analysis. The non-attainment designation for the 9-county Denver Metro/North Front Range area and attainment/unclassifiable designations for those areas with limited monitoring are based on actual air quality monitoring data for the 2013-2015 periods. The attainment/unclassifiable designations for areas lacking representative monitoring are based on the State's estimation that ozone levels in these AQCRs are not out of compliance with the 8-hour Ozone NAAQS due to low population levels and lack of emission sources.

Colorado recommends that Rio Blanco County should be designated as attainment/unclassifiable notwithstanding a registered a violation of the new 8-Hour Ozone NAAQS in the town of Rangely. The Rangely area only violates the standard because of exceptionally high wintertime ozone values measured in 2013, which will not factor into determining compliance with the standard because 2014-2016 data is used. This recommendation is further supported by stringent emission controls on existing Colorado oil and gas sources, low population density and expected low population growth and traffic volumes for the Rangely area.

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The enclosed AQCR Designations of Non-Attainment, Attainment and Attainment/Unclassifiable for the 2015 Revised 8-Hour Ozone NAAQS was approved by the Colorado Air Quality Control Commission following a public hearing held on September 15, 2016. If you have any questions regarding this submittal, please contact Mike Silverstein, Administrator for the Commission, at (303) 692-3478, or William Allison, Director of the Air Pollution Control Division, at (303) 692-3114.

Sincerely,

Larry Wolk, MD, MSPH
Executive Director

cc. Mike Silverstein, Administrator AQCC
William Allison, Director APCD

Enclosures
- Table of AQCR Designations for 8-Hour Ozone NAAQS
- State of Colorado, Technical Support Document for Recommended 8-Hour Ozone Designations for 2015 Standard
- EPA Ozone Guidance Memorandum (dated February 25, 2016)

AGENDA ITEM CONTROL SHEET

Item Title: 2015 Ozone Standard 8-hour Area Designation Recommendations to EPA

Meeting Date: September 15, 2016

TYPES OF ACTION

NON-HEARING ACTIONS	*REQUEST FOR HEARING*	*HEARING*
☐ Administrative	Rulemaking	☐ Rulemaking
☐ Briefing	☐ Public	☒ Public
☐ Policy	☐ Adjudicatory	☐ Adjudicatory
☐ Other	☐ Informational	☐ Informational

Is this action a Rule Review? ☐ Yes X No

RECOMMENDED ACTION

☐ Adoption X Approval ☐ Denial

MOTION

X Required ☐ Attached ☐ Not Applicable

STATUTORY AUTHORITY

☐ General X Specific

CRS §§ 25-7-105(1)(a), -301

EPA SUBMITTAL

Is this issue considered a SIP revision? No

Which SIP?

EPA submission deadline: October 1, 2016

Is this a delegated program? No

ISSUE STATEMENT:

On October 1, 2015, the EPA promulgated a revised 8-hour National Ambient Air Quality Standard (NAAQS) for ozone. The primary 8-hour ozone standard was lowered from 0.75 parts per million (ppm) established in 2008 to a level of 0.070 ppm. An area is in violation of the ozone NAAQS when the three year average of the annual 4th highest daily maximum 8-hour concentration, at one or more monitoring sites, is greater than or equal to 0.070 ppm.

The standard was lowered based on numerous epidemiological studies conducted during the past number of years in which many of the health effects associated with ozone exposure at and below the level of the 0.075 ppm standard were identified. Prolonged exposure to ozone is associated with increased mortality and a range of serious morbidity health effects, including aggravation of a variety of respiratory symptoms and lung impairment, asthma attacks, respiratory related hospital admissions and emergency department visits as well as potential cardiovascular problems.

Under Section 107(d) of the Clean Air Act, states are required to submit attainment or non-attainment designation status recommendations to EPA no later than one year after the promulgation of a new or revised standard - in this case, October 1, 2016. The Division is recommending to the Air Quality Control Commission, and the Governor or his designee, a "non-attainment" designation for the nine county Denver-Boulder-Greeley-Fort Collins-Loveland region, and designations of "attainment" or "attainment/unclassifiable" for the thirteen remaining Air Quality Control Regions (AQCR) in Colorado. The tribal lands of the Southern Ute (located in Archuleta, La Plata and Montezuma Counties) and Ute Mountain Ute (located in La Plata and Montezuma Counties) are excluded from the recommended designations because those tribes or the EPA are responsible for making such recommendations and determinations.

At the public hearing, the Division will discuss the basis for recommending to the EPA a designation of the Denver Metro/North Front Range (DM/NFR) nine-county area as non-attainment with an area boundary identical to the previous 8-hour area, and the balance of the State as attainment and/or unclassifiable. The Division will also discuss the basis for recommending Rio Blanco County should be designated as attainment/unclassifiable notwithstanding a registered a violation of the new 8-Hour Ozone NAAQS in the town of Rangely. Rangely is located near the western Colorado border over 70 miles north of Grand Junction.

The EPA recommends five criteria, or "factors", to help with attainment/nonattainment determinations and, if necessary, to help determine the appropriate size of a nonattainment area. States must submit an analysis of these five factors, along with a proposed nonattainment boundary, for any areas that are not meeting the federal standard. The five factors to be addressed are: (1) Air quality data, (2) Emissions and emissions-related data, (3) Meteorological data, (4) Geography and topography, (5) Jurisdictional boundaries. Based on an analysis in the enclosed *"Draft Technical Support Document for Recommended 8-Hour Ozone Designations for 2015 Standard,"* the Division has considered these factors in the designation recommendations for DM/NFR non-attainment area as well as all other attainment/unclassifiable areas subject to APCD jurisdiction.

Upon conclusion of the Public Hearing and action by the Commission, the Division will send Colorado's ozone air quality recommendations package to the EPA.

ATTACHMENTS:

(1) Sample Executive Director's (Governor's designee) Letter Submitting to EPA the AQCR Designations of Non-Attainment, Attainment and Attainment/Unclassifiable for the 2015 Revised 8-Hour Ozone NAAQS
(2) Proposed Table of AQCR Designations for 8-Hour Ozone NAAQS
(3) Proposed Draft Technical Support Document for Recommended 8-Hour Ozone Designations for 2015 Standard
(4) EPA Ozone Guidance Memorandum (dated February 25, 2016)

CONTACT:

Please contact the Air Pollution Control Division staff: Janessa Salgado, at 303-692-3212 (email: janessa.salgado@state.co.us), or Curtis Taipale at 303-692-3265 (email: curtis.taipale@state.co.us) with any questions.

SIGNATURES:

Janessa Salgado — 9-1-16

Preparer: Janessa Salgado — Date

Chris Colclasure — 9/1/16

Program Manager: Chris Colclasure — Date

1 Sept 2016

Division Director: William Allison — Date

2016 Colorado Designations for 8-Hour Ozone NAAQS (based on 2013–2015 monitoring data)	
Air Quality Control Regions (AQCR)	8-Hour Ozone NAAQS Designation
Denver-Boulder-Greeley-Fort Collins-Loveland Adams County Arapahoe County Boulder County (including the portion of Rocky Mountain National Park therein) Broomfield County Denver County Douglas County Jefferson County Larimer County (part) including the portion of Rocky Mountain National Park therein and that portion of the county that lies south of a line described as follows: Beginning at a point on Larimer County's eastern boundary and Weld County's western boundary intersected by 40 degrees, 42 minutes, and 47.1 seconds north latitude, proceed west to a point defined by the intersection of 40 degrees, 42 minutes, 47.1 seconds north latitude and 105 degrees, 29 minutes, and 40.0 seconds west longitude, thence proceed south on 105 degrees, 29 minutes, 40.0 seconds west longitude to the inter-section with 40 degrees, 33 minutes and 17.4 seconds north latitude, thence proceed west on 40 degrees, 33 minutes, 17.4 seconds north latitude until this line intersects Larimer County's western boundary and Grand County's eastern boundary. Weld County (part): That portion of the county that lies south of a line described as follows: Beginning at a point on Weld County's eastern boundary and Logan County's western boundary intersected by 40 degrees, 42 minutes, 47.1 seconds north latitude, proceed west on 40 degrees, 42 minutes, 47.1 seconds north latitude until this line intersects Weld County's western boundary and Larimer County's eastern boundary.	Non-Attainment
State AQCR 01 Logan County Morgan County Phillips County Sedgwick County Washington County Yuma County	Attainment/Unclassifiable
State AQCR 02 Larimer County (part): That portion of the county that lies north of a line described as follows: Beginning at a point on Larimer County's eastern boundary and Weld County's western boundary intersected by 40 degrees, 42 minutes, and 47.1 seconds north latitude, proceed west to a point defined by the intersection of 40 degrees, 42 minutes, 47.1 seconds north latitude and 105 degrees, 29 minutes, and 40.0 seconds west longitude, thence proceed south on 105 degrees, 29 minutes, 40.0 seconds west longitude to the inter-section with 40 degrees, 33 minutes and 17.4 seconds north latitude, thence proceed west on 40 degrees, 33 minutes, 17.4 seconds north latitude until this line intersects Larimer County's western boundary and Grand County's eastern boundary. Weld County (part): That portion of the county that lies north of a line described as follows: Beginning at a point on Weld County's eastern boundary and Logan County's western boundary intersected by 40 degrees, 42 minutes, 47.1 seconds north latitude, proceed west on 40 degrees, 42 minutes, 47.1 seconds north latitude until this line inter-sects Weld County's western boundary and Larimer County's eastern boundary.	Attainment/Unclassifiable

2016 Colorado Designations for 8-Hour Ozone NAAQS (based on 2013–2015 monitoring data)	
Air Quality Control Regions (AQCR)	8-Hour Ozone NAAQS Designation
State AQCR 03 Clear Creek County Gilpin County	Attainment/Unclassifiable
State AQCR 04 El Paso County Park County Teller County	Attainment/Unclassifiable
State AQCR 05 Cheyenne County Elbert County Kit Carson County Lincoln County	Attainment/Unclassifiable
State AQCR 06 Baca County Bent County Crowley County Kiowa County Otero County Prowers County	Attainment/Unclassifiable
State AQCR 07 Huerfano County Las Animas County Pueblo County	Attainment/Unclassifiable
State AQCR 08 Alamosa County Conejos County Costilla County Mineral County Rio Grande County Saguache County	Attainment/Unclassifiable
State AQCR 09 Archuleta County (part) excluding Southern Ute Indian Tribe (SUIT) lands Dolores County La Plata County (part) excluding SUIT and Ute Mountain Ute Tribe lands Montezuma County (part) excluding SUIT and Ute Mountain Ute Tribe lands San Juan County	Attainment/Unclassifiable
State AQCR 10 Delta County Gunnison County Hinsdale County Montrose County Ouray County San Miguel County	Attainment/Unclassifiable
State AQCR 11 Garfield County Mesa County Moffat County Rio Blanco County	Attainment/Unclassifiable

2016 Colorado Designations for 8-Hour Ozone NAAQS (based on 2013–2015 monitoring data)	
Air Quality Control Regions (AQCR)	8-Hour Ozone NAAQS Designation
State AQCR 12 Eagle County Grand County Jackson County Pitkin County Routt County Summit County	Attainment/Unclassifiable
State AQCR 13 Chaffee County Custer County Fremont County Lake County	Attainment/Unclassifiable

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 25 2016

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Area Designations for the 2015 Ozone National Ambient Air Quality Standards

FROM: Janet G. McCabe JGM
Acting Assistant Administrator

TO: Regional Administrators
Regions 1-10

The purpose of this guidance is to provide information on the schedule and process for initially designating areas for the purpose of implementing the 2015 primary and secondary ozone national ambient air quality standards (NAAQS). In addition, this memorandum identifies important factors that the Environmental Protection Agency intends to evaluate in making final nonattainment area boundary decisions for these standards. The EPA recommends that states and tribes also consider these factors in making their recommendations for area designations and nonattainment area boundaries. As for designations for prior ozone NAAQS, the EPA will also consider any other relevant information in making designation determinations. Please share this memorandum with state and tribal air agencies in your region.

On October 1, 2015, the EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292, October 26, 2015). In that action, the EPA strengthened both standards to a level of 0.070 parts per million, while retaining their indicators, averaging times, and forms. The EPA revised the ozone standards based on an integrated assessment of an extensive body of new scientific evidence, which substantially strengthens our knowledge regarding ozone-related health and welfare effects, the results of exposure and risk analyses, the advice of the Clean Air Scientific Advisory Committee, and consideration of public comments.

The revised primary standard provides increased protection for children, older adults, and people with asthma or other lung diseases, and other at-risk populations against an array of adverse health effects including reduced lung function, increased respiratory symptoms and pulmonary inflammation and asthma exacerbations; effects that contribute to emergency department visits or hospital admissions; and mortality. The revised secondary standard provides protection of natural forests from adverse growth-related effects and is expected to provide increased protection from other effects of potential public welfare significance, including crop yield loss and visible foliar injury.

Clean Air Act Designation Requirements

Section 107(d) of the Clean Air Act (CAA) governs the process for initial area designations after the EPA establishes a new or revised NAAQS. Under section 107(d) of the CAA, states are required to submit area designation recommendations to the EPA. This submission must happen by a date specified by the EPA, which cannot be sooner than 120 days, or later than 1 year, after promulgation of the new or revised NAAQS. If, after careful consideration of these recommendations, the EPA intends to promulgate a designation different from a state's recommendation, then the EPA must notify the state at least 120 days prior to promulgating the final designation and must provide the state an opportunity to comment on the intended modification. The EPA may choose to modify a state's recommended designation as it relates to the status of an area or as it relates to the boundaries of an area. The CAA requires the EPA to complete the initial designation process within 2 years of promulgation of a new or revised NAAQS, unless the Administrator has insufficient information to make initial designation decisions in the 2-year time frame. In such circumstances, the EPA may take up to 1 additional year to make initial area designation decisions (i.e., no later than 3 years after promulgation of the standard). While section 107(d) of the CAA specifically addresses the designations process between the EPA and states, the EPA intends to follow the same process to the extent practicable for tribes that choose to make initial designation recommendations pursuant to section 301(d) of the CAA regarding tribal authority and the Tribal Authority Rule (TAR) (63 FR 7254, February 12, 1998). To provide clarity and consistency in doing so, in December 2011, the EPA issued a guidance memorandum concerning the involvement of tribes in the designations process.[1] In accordance with the TAR and the December 2011 tribal designations guidance, and in consultation with the tribes, the EPA intends to designate tribal areas on the same schedule as designations for states. If a state or tribe does not submit designation recommendations, then the EPA will promulgate the initial designations that the agency deems appropriate.

Schedule for Initial Ozone Area Designations

State governors should submit, and tribes can choose to submit, their initial designation recommendations for the 2015 ozone NAAQS to the EPA no later than 1 year following promulgation of the revised NAAQS, i.e., by October 1, 2016. Because the form of the 2015 ozone NAAQS relies on a 3-year average, we recommend that states and tribes base their recommendations on air quality data from the 3 most recent years of quality assured monitoring data available at that time, i.e., 2013 to 2015. However, states and tribes may also have preliminary information about 2016 monitoring data that could help inform their recommendations. Based upon these monitoring data and any other available information, states and tribes should identify areas as attainment, nonattainment, or unclassifiable.[2] If

[1] Guidance to Regions for Working with Tribes during the National Ambient Air Quality Standards (NAAQS) Designations Process. Memorandum from Stephen D. Page, Director, EPA OAQPS to Regional Administrators, Regions I-X. December 20, 2011. Available at *http://www.epa.gov/ttn/oarpg/t1/memoranda/20120117naaqsguidance.pdf.*

[2] For the initial area designations for the 1997 ozone NAAQS and the 2008 ozone NAAQS, the EPA used a designation category of "unclassifiable/attainment" for areas that were monitoring attainment and for areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to nearby violations. The EPA reserved the category "unclassifiable" for areas where the EPA could not determine based on available information whether the area was meeting or not meeting the NAAQS and the EPA had not determined that the area contributed to a nearby violation. While states can submit recommendations identifying areas as "attainment," the EPA expects to continue to use the "unclassifiable/attainment" category for designations for the 2015 ozone NAAQS.

the EPA believes it is necessary to make any modifications to a state's or tribe's initial recommendations, including area boundaries, then the EPA will notify the state or tribe by letter of the intended modification no later than 120 days prior to finalizing the designation. These notifications are commonly known as the "120-day letters." Consistent with the statutory requirement that the EPA designate areas no later than 2 years following promulgation of a revised NAAQS, the EPA expects to complete the initial area designations by October 1, 2017. Thus, the EPA intends to issue the 120-letters no later than June 2, 2017. If a state or tribe has additional information that it wants the EPA to consider with respect to a designation recommendation that the EPA plans to modify, then the EPA requests that such information be submitted no later than 60 days from the date of the 120-day letter. This schedule will ensure that the EPA can fully consider any such additional information prior to issuing final designations. Also, although section 107(d) of the CAA explicitly exempts the designation process from the public notice and comment rulemaking process, the EPA intends to consider public input in the designation process. Accordingly, we plan to provide a 30-day public comment period immediately following issuance of the 120-day letters responding to the designation recommendations from states and tribes.[3] Attachment 1 summarizes this anticipated schedule.

Identifying Nonattainment Areas

Section 107(d)(1) of the CAA directs the EPA to designate an area "nonattainment" if it is violating the NAAQS or if it is contributing to a violation of the NAAQS in a nearby area. Thus, the first step in the designation process is to identify air quality monitoring sites with data that show a violation of the 2015 ozone NAAQS. Violations are identified using data from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors that are sited and operated in accordance with 40 CFR part 58. Procedures for using the air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix U, as revised in conjunction with the final rule for the 2015 ozone NAAQS (80 FR 65292, October 26, 2015). For designations for the 2015 ozone NAAQS, the EPA intends to evaluate areas using the most recent complete three consecutive calendar years of quality-assured, certified air quality data in the EPA Air Quality System (AQS).[4] In accordance with 40 CFR 58.15, states are required to certify their air monitoring data for the previous year by May 1 of each year. Although generally the EPA will use such data only if they have been certified by the reporting organization, data not certified by the reporting organization can nevertheless be used if the deadline for certification has passed and the EPA judges the data to be complete and accurate. We expect that in providing designation recommendations to the EPA by October 1, 2016, states and tribes will review and rely on air quality data from 2013 to 2015. States and tribes may also review and consider preliminary 2016 data, although those data cannot be relied on until they are either certified in accordance with 40 CFR 58.15 or the date for certification has passed. Air quality monitoring data from 2016 are required to be certified and quality assured by May 1, 2017. Because the certification date will have passed and the data will be available, the EPA expects to base final designation decisions by October 1, 2017, on data

[3] Section 107(d)(2) explicitly provides that designations are exempt from the notice and comment provisions of the Administrative Procedure Act (APA). Likewise, designations under section 107(d) of the CAA are not among the list of actions that are subject to the notice and comment procedures of CAA section 307(d). Thus, neither the CAA nor the APA require notice and comment rulemaking for promulgation of the designations for these or any other NAAQS. However, the EPA intends to solicit direct public comment on its preliminary responses to the initial area designation recommendations of the states and tribes because we believe this process will be useful to gather additional information and to assure that the agency is more directly aware of issues raised by initial area designations.

[4] This information is available on the EPA's website at *http://www2.epa.gov/aqs*.

from 2014 to 2016.[5] For this reason, the EPA encourages states and tribes to review and consider preliminary 2016 air quality data in their designation recommendations. States and tribes may also update their designation recommendations based on 2016 data once the data have met the certification requirements.

The EPA notes that in past designations, some states have chosen to certify air quality data prior to the certification deadline (i.e., "early certify") so that the EPA could rely on the newer data for designations. For multistate nonattainment areas, there have been situations where some, but not all, of the states with portions in the area have chosen to early certify their data. In such cases, the "most recent air quality data" for the area is a mix of two different 3-year periods – an earlier time period for those states that did not early certify data and a later time period for those states that chose to early certify. The most common situation is where one state that is part of the multistate area early certifies data that show attainment of the NAAQS. The other is where one state early certifies data that show a violation. The EPA's position is that the agency cannot review mixed years of data to conclude that an area is attaining the standard; the decision must be based on the same 3-year period for all portions of the area. In contrast, if the early certified data for one state's portion of a multistate area indicate a violation of the NAAQS, the EPA's position is that the agency must consider the violating monitor and assess what nearby areas contribute to the violation.[6]

The process for evaluating the appropriate designation for areas that are not violating the NAAQS, but may be contributing to the violations of the NAAQS in a violating area, is discussed below in connection with the process for determining appropriate nonattainment area boundaries.

Exceptional Events and Designations

When certain criteria are met, the CAA and the EPA's implementing regulations specified in the Final Rule on the Treatment of Data Influenced by Exceptional Events (72 FR 13560, March 22, 2007)[7] allow for the exclusion of air quality monitoring data from design value calculations when there are exceedances caused by exceptional events. A design value describes the air quality status of a given location relative to the level of the NAAQS. A design value calculated using a data set from which exceptional event-influenced data have been excluded has the potential to affect initial area designations and nonattainment area classifications for the 2015 ozone NAAQS.

In the 2015 ozone NAAQS final rule, the EPA established schedules for air agencies to flag data influenced by exceptional events and submit related documentation for data that will be used in the initial designations process for the 2015 ozone NAAQS (*see* Attachment 2). Although some of these deadlines are accelerated compared to the general schedule timelines in the 2007 Exceptional Events

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[5] In the final rule for the 2015 ozone NAAQS, the EPA also finalized changes to the ambient air monitoring requirements applicable to the ozone NAAQS. In 32 states and the District of Columbia, the final rule extends the ozone season. The new ozone season requirements do not take effect until January 1, 2017.

[6] The Court of Appeals for the D.C. Circuit upheld this approach as reasonable. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

[7] On November 10, 2015, the EPA proposed revisions to the 2007 Exceptional Events Rule and announced the availability for public comment of a draft guidance document, which applies the proposed rule revisions to wildfire events that could influence monitored ozone concentrations. *See* 80 FR 72840, November 20, 2015. The EPA intends to finalize these rule revisions and the wildfire guidance by the October 1, 2016, date by which states, and any tribes that wish to do so, are required to submit their initial designation recommendations for the 2015 ozone NAAQS.

Rule, they were promulgated to align closely with the timing of the initial designations recommendations from states and tribes in October 2016 and/or the EPA's expected issuance of 120-day letters pertaining to designations by June 2017. These schedules reflect the EPA's interest in ensuring that we can fully consider exceptional events claims that could influence the final designations decisions.

The EPA regional offices are encouraged to work with states and tribes with exceptional events claims to prioritize and expedite the demonstration development and review process for those claims that have the potential to influence regulatory decisions, such as the initial designations process. Similarly, the EPA encourages states and tribes to contact and collaborate with the appropriate EPA regional office after identifying any exceptional events that influence ambient air quality concentrations in a way that could potentially affect designations for the 2015 ozone NAAQS. The EPA has developed interim exceptional events implementation guidance documents that air agencies can use when reviewing potential exceptional events and developing appropriate exceptional event demonstrations. Additional information and examples of exceptional event submissions and best practice components can be found at the EPA's exceptional events website located at *http://www2.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events.*

Nonattainment Area Analyses and Boundary Determination

The EPA believes that the boundaries for each nonattainment area should be evaluated and determined on a case-by-case basis considering the specific facts and circumstances unique to the area. Section 107(d) explicitly requires that the EPA designate as nonattainment not only the area that is violating the pertinent standard, but also those nearby areas that contribute to the violation in the violating area. After identifying each monitor that indicates a violation of the 2015 ozone NAAQS in an area, the EPA will determine which nearby areas contribute to the violation(s).

Ground-level ozone is not emitted directly into the air, but is formed by chemical reactions primarily between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) that are attributable to a variety of emission sources commonly found throughout urbanized areas. Because ozone and its precursor emissions are pervasive and readily transported, the EPA believes it is important to examine ozone-contributing emissions across a relatively broad geographic area associated with a monitored violation. Thus, for analyzing whether nearby areas contribute to a violating area, the EPA intends to consider information relevant to designations associated with the counties in the Combined Statistical Area (CSA) or, where appropriate, the Core Based Statistical Area (CBSA) in which the violating monitor(s) are located. The CSAs and CBSAs are delineated by the Office of Management and Budget (OMB) as part of their Metropolitan and Micropolitan Statistical Area program.[8] The CBSA is a collective term that refers to both Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (Micropolitan Areas), which are distinguished by size. An MSA has at least one urban area with a population of at least 50,000. A Micropolitan Area has at least one urban area with a population of at

[8] OMB adopted revised standards for defining Metropolitan and Micropolitan Statistical Areas on December 27, 2000 (65 FR 82229). These standards established the terms CSA and CBSA. In 2010, OMB further revised the standards for delineating Metropolitan and Micropolitan Statistical Areas (75 FR 37246, June 28, 2010). The statistical areas are delineated based on U.S. Census Bureau information. The EPA intends to use the 2010 standards and the associated lists of CSAs and CBSAs issued in February 2013. These lists and their geographic components are provided at *http://www.census.gov/population/metro/.*

least 10,000, but less than 50,000. Each CBSA consists of a county or counties associated with at least one urban core, plus adjacent counties having a high degree of social and economic integration with the core as measured through commuting ties with the counties containing the core.[9] A CSA includes two or more adjacent CBSAs.

The EPA previously reviewed relevant information associated with OMB statistical area boundaries when analyzing nonattainment areas for the 1997 and 2008 ozone standards. We believe this is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated.[10] The EPA emphasizes it does not intend the statistical area boundary to be a presumed nonattainment area boundary. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CSA or CBSA.[11] Where a violating monitor is not located in a CSA or CBSA, the EPA intends to review relevant information associated with the county containing the monitor and, if appropriate, other adjacent nearby counties. The EPA will determine the nonattainment area boundaries through a weight-of-evidence analysis for the area based on synthesizing the assessments of the five factors identified below. In relatively urbanized areas, the nonattainment area boundary may include an entire metropolitan area. In rural locations, the nonattainment area boundary may include one or more small population centers, each with sources that contribute to a violating monitor. In some cases, the boundary for a nonattainment area may include portions of two or more states, thus resulting in a multistate area. This approach to designations has been upheld by numerous courts under a variety of challenges.

Consistent with past designations for ozone NAAQS, for area-specific analyses through which the EPA intends to determine area boundaries, the EPA will evaluate information relevant to five factors: air quality data, emissions and emissions-related data, meteorology, geography/topography, and jurisdictional boundaries. The EPA also recommends that states and tribes base their boundary recommendations on an evaluation of information relevant to these five factors. Attachment 3 describes these factors in general and provides guidance regarding analyses relevant to each of these factors.[12] Additionally, the EPA, states and tribes may identify and evaluate other relevant information or circumstances specific to a particular area to support nonattainment area boundary recommendations.

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[9] The geographic components of CBSAs are counties and equivalent entities (boroughs and census areas in Alaska, parishes in Louisiana, independent cities in Maryland, Missouri, Nevada, and Virginia, and municipios in Puerto Rico).

[10] The EPA notes that for the purpose of the designations for the 1-hour ozone standards at the time the CAA was amended in 1990, CAA section 107(d)(4)(A)(iv) and (v) specified the use of the OMB statistical areas as the boundaries that applied by operation of law for the then-existing nonattainment areas classified as Serious, Severe, and Extreme, unless a governor made a demonstration to the satisfaction of the EPA Administrator that a portion did not contribute.

[11] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. Miss. Comm'n on Envtl. Quality v. EPA, 790 F.3d 138, 160 (D.C. Cir. 2015).

[12] In the designation guidance for the 2012 $PM_{2.5}$ NAAQS, the EPA used these same five factors. In prior designation guidance for the ozone and $PM_{2.5}$ standards, the EPA identified nine factors to consider in making designation recommendations: emissions data, air quality data, population density and degree of urbanization, traffic and commuting patterns, growth rates and patterns, meteorology, geography/topography, jurisdictional boundaries, and level of control of emission source. In the area analyses to support the designations for the 2008 ozone standards, the EPA grouped the emissions-related factors together in the emissions and emissions-related data factor, resulting in five overall factors. The Court has upheld the EPA's use of a multi-factor test for designations multiple times. See Mississippi Commission on Env. Quality v. EPA 709 F.3d 138 (D.C. Cir. 2015); *ATK Launch Sys., Inc. v. EPA*, 669 F.3d 330 (D.C. Cir. 2012); *Catawba Cnty., v. EPA*, 571 F.3d 20 (D.C. Cir. 2009).

While the EPA generally believes it is appropriate to include the entire violating or contributing county in an ozone nonattainment area, we recognize that, in some cases, an assessment of relevant information may support inclusion of only part of a county. For example, as has been the case in past designations, there may be low elevation areas (e.g., valleys) with poor air quality in violation of the NAAQS due to restricted atmospheric dispersion where higher elevations (e.g., mountainous areas) in the same county can be shown not to have sources of emissions that contribute to the violation. Alternatively, partial county boundaries may be appropriate in situations where the sources located in a contributing county are located only in a portion of a large county that is otherwise not contributing to the nearby violations. Particularly in the western United States where counties are large, including only partial counties in a designated nonattainment area may be appropriate. For defining partial county boundaries, the EPA recommends the use of well-defined legal jurisdictional boundaries such as townships, census blocks, immovable landmarks (e.g., major roadways), or other permanent and readily identifiable boundaries.

In addition, as provided for in the December 20, 2011, guidance titled, "Policy for Establishing Separate Air Quality Designations for Areas of Indian Country," tribes may recommend that the EPA designate areas of Indian country separately from the adjacent state areas.[13] This guidance provides for a nationally consistent approach for evaluating such designation recommendations from tribes. The policy was designed to recognize tribal sovereignty in air quality management matters affecting Indian country.

Nonattainment Area Classifications

As provided in CAA section 181(a)(1), at the time of initial designations, the EPA will classify all nonattainment areas according to the severity of the ozone air quality problem. The classification categories are Marginal, Moderate, Serious, Severe-15, Severe-17 and Extreme. The EPA previously interpreted the air quality thresholds associated with each classification through rulemaking for both the 1997 and 2008 ozone NAAQS. We intend to take a similar approach for the 2015 ozone NAAQS and will finalize the rulemaking no later than the promulgation of the final designations.

Under CAA section 181(a)(4), the EPA has the discretion to reclassify a nonattainment area to a higher or lower classification (also known as a bump up or a bump down) within 90 days of the effective date of the initial designation and classification if the area would have been classified in another category had the area's design value been 5 percent greater or 5 percent less than the level on which the initial classification was based. The EPA does not intend to exercise its authority independently to initiate a reclassification of an area to a higher or lower classification. Rather, the EPA intends to rely on a state or tribe to submit a request for such a reclassification. As part of the action to designate and classify areas in 1991 for the 1-hour NAAQS, the EPA developed criteria for evaluating a state's request to reclassify a particular area to a lower classification. *See* 56 FR 56698, November 6, 1991. The EPA intends to continue to use the same approach for purposes of evaluating a request to reclassify an area to a lower classification for the 2015 ozone NAAQS. In the *Federal Register* action to designate areas for the 2015 ozone NAAQS, the EPA will provide the schedule for submitting a reclassification request under section 181(a)(4) that would allow sufficient time for the EPA to make a determination within the 90-day period allowed under the CAA.

[13] Memorandum from Stephen D. Page, Director, EPA OAQPS to Regional Administrators, Regions I-X. December 20, 2011. Available at *http://www.epa.gov/ozone-designations*.

Section 181(b)(3) of the CAA allows a state to voluntarily request that the EPA reclassify a nonattainment area in that state to a higher classification. The EPA must grant the request. Multistate nonattainment areas present a special case because the area is not wholly in one state and classifications apply areawide. For multistate nonattainment areas, the EPA strongly encourages all of the states with a portion included in the nonattainment area to consult and agree prior to submission of a reclassification request. Section 181(b)(3) does not place a time limit on the opportunity for a state to request a voluntary reclassification of a nonattainment area to a higher classification. These voluntary reclassifications can be done at any time.

Rural Transport Areas

The EPA recognizes that violations of the ozone standards in some rural areas may be almost entirely attributable to emissions from upwind areas and/or sources of background ozone. Section 182(h) provides the EPA with the discretion to treat an ozone nonattainment area as a "rural transport area" (RTA), provided the area meets certain criteria. Regardless of the area's classification under section 181(a), an RTA is deemed to have fulfilled all ozone-related planning and control requirements if it meets the CAA's planning requirements for areas classified as Marginal.[14] To qualify as an RTA, the EPA must determine that the nonattainment area boundary does not include and is not adjacent to any part of an MSA[15], and that the area does not contain VOC and NO_x emissions sources that make a significant contribution to monitored ozone concentrations in the area or in other areas. A nonattainment area that includes, or is adjacent to, any part of a Micropolitan Statistical Area or that is too sparsely populated to be included in a statistical area, may be able to qualify as an RTA.

States and tribes that believe a potential nonattainment area qualifies for treatment as an RTA are encouraged to request, as part of their recommendations, that the EPA use the section 182(h) authority and to work with the EPA to develop and review information that would satisfy the CAA's RTA criteria. In general, the EPA expects a rural nonattainment area that has few or insignificant sources of ozone precursors to encompass a relatively small geographic area due to the lack of emission sources. Therefore, partial county boundaries may be appropriate. The EPA expects this to be especially relevant in the western United States, where many of the counties are large. A partial county nonattainment area located in a county that is adjacent to an MSA may still be able to qualify as an RTA provided that the nonattainment area boundary is not adjacent to the MSA boundary. The EPA intends to respond to any RTA request submitted during the designation process at the time the EPA promulgates the initial area designations. However, the EPA notes that a state or tribe may also request RTA treatment for a nonattainment area after the initial designations are completed. Attachment 3 provides information on conducting an analysis to support an RTA request.

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[14] The requirements applicable to ozone transport regions supersede the Marginal requirements for RTAs.

[15] The rural transport area criteria in section 182(h) restrict rural transport areas to those nonattainment areas that do not include and are not adjacent to any part of a "MSA" or "CMSA" as defined at the time of the 1990 CAA amendments. The OMB issued revised statistical area standards in 2000 that replaced the pre-existing MSA and CMSA definitions and established the terms "CBSAs" and "CSA." In 2010, OMB further revised the standards. The CBSA is a collective term that includes MSAs and Micropolitan Statistical Areas. The EPA interprets the references to both MSA and CMSA in CAA section 182(h) to refer to OMB's current definition of MSA. *See* 80 FR 12264, March 6, 2015. The EPA believes this interpretation of CAA section 182(h) is consistent with the original scope of CAA section 182(h) as promulgated in 1990.

Unclassifiable Areas

In certain cases, there may be insufficient information to support a designation of nonattainment or attainment for an area. For example, there may be monitors that indicate an exceedance of the NAAQS, but the monitoring data may be incomplete or the monitors may not be sited and operated in accordance with the regulatory requirements of 40 CFR part 58. In recommending boundaries for an unclassifiable area, states should consider which nearby areas contribute to ambient air quality within the impacted area. The EPA notes that if sufficient information later becomes available indicating a monitor in the unclassifiable area is violating the NAAQS and the EPA redesignates the area to nonattainment, the EPA likely would conduct a weight-of-evidence analysis as described in Attachment 3 of this guidance to determine the appropriate area boundaries.

Attainment Areas

Once the EPA has determined the boundaries for nonattainment areas (areas that are violating the NAAQS or contributing to a nearby violation) and any unclassifiable areas, the EPA intends to designate the remainder of the state as unclassifiable/attainment.[16] The EPA requests that states and tribes recommend how they would like the boundaries drawn for their unclassifiable/attainment areas. For designations for the 1-hour and two previous 8-hour ozone NAAQS, states have elected to draw boundaries for the unclassifiable/attainment areas in a variety of ways, including as "rest of state" or "entire state," by Air Quality Control Regions, by county, by previous nonattainment area boundaries, or by a combination of methods. The EPA recommends that the boundaries of unclassifiable/attainment areas generally not be smaller than a county.

Summary

This memorandum provides the EPA's preliminary views on the process for determining initial area designations and boundaries for the 2015 ozone NAAQS. Any guidance contained herein is not binding on states, tribes, the public or the EPA. The EPA will make the designations determinations and nonattainment area boundary decisions in the final action that designates all areas for the 2015 ozone standards. When the EPA promulgates the initial area designations, those decisions will be binding on states, tribes, the public and the EPA as a matter of law.

Three attachments provide additional information relevant to the initial ozone area designations process. Attachment 1 is an anticipated timeline of important milestones in the initial area designations process for the 2015 ozone NAAQS. Attachment 2 identifies the promulgated exceptional event schedule for initial data flagging and submission of exceptional event demonstrations. Attachment 3 provides information on the five factors that the EPA intends to consider in evaluating and making decisions on nonattainment area boundaries and provides guidance regarding analyses relevant to support each of the factors. Attachment 3 also provides information on conducting an analysis to support an RTA request.

[16] As indicated in footnote 2, in the initial designations for previous ozone NAAQS, the EPA used a designation category of "unclassifiable/attainment" for areas that were monitoring attainment and for areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to nearby violations. The EPA expects to continue this approach for designations for the 2015 ozone NAAQS.

Staff in the EPA's Office of Air Quality Planning and Standards are available for assistance and consultation throughout the initial area designation process. Questions on this guidance may be directed to Carla Oldham at (919) 541-3347 or Denise Scott at (919) 541-4280.

Attachments (3)

1. Anticipated Timeline For 2015 Ozone NAAQS Designation Process
2. Revised Schedule For Exceptional Event Flagging And Documentation Submission For Data To Be Used In Initial Area Designations For The 2015 Ozone NAAQS
3. Factors the EPA Plans to Consider in Determining Nonattainment Area Boundaries in Designations for the 2015 Ozone NAAQS, and Guidance on Analyses to Support these Factors

ATTACHMENT 1

ANTICIPATED TIMELINE FOR 2015 OZONE NAAQS DESIGNATION PROCESS	
Milestone	**Date**
The EPA promulgates 2015 Ozone NAAQS rule	October 1, 2015
States and tribes submit recommendations for ozone designations to the EPA	No later than October 1, 2016
The EPA notifies states and tribes concerning any intended modifications to their recommendations (120-day letters)	No later than June 2, 2017 (120 days prior to final ozone area designations)
The EPA publishes public notice of state and tribal recommendations and the EPA's intended modifications, if any, and initiates 30-day public comment period	On or about June 9, 2017
End of 30-day public comment period	On or about July 10, 2017
States and tribes submit additional information, if any, to respond to the EPA's modification of a recommended designation	No later than August 7, 2017
The EPA promulgates final ozone area designations	No later than October 1, 2017

ATTACHMENT 2

Revised Schedule for Exceptional Event Flagging and Documentation Submission for Data to be Used in Initial Area Designations for the 2015 Ozone NAAQS

NAAQS Pollutant/ Standard/(Level)/ Promulgation Date	Air Quality Data Collected for Calendar Year	Event Flagging & Initial Description Deadline	Detailed Documentation Submission Deadline
Ozone/ Primary and Secondary 8-hour Standards (0.070 parts per million) Promulgated October 1, 2015	2013, 2014, 2015	July 1, 2016	October 1, 2016
	2016	May 31, 2017	May 31, 2017

ATTACHMENT 3

Factors the EPA Plans to Consider in Determining Nonattainment Area Boundaries in Designations for the 2015 Ozone NAAQS, and Guidance on Analyses to Support these Factors

For initial area designations for the 2015 ozone national ambient air quality standards (NAAQS), the Environmental Protection Agency will rely on monitoring data to identify areas to be designated nonattainment due to monitored violations of the standard. Consistent with the directives of the Clean Air Act (CAA) and with previous area designation processes, the EPA will then determine the appropriate nearby[1] areas to include within the nonattainment area boundary for the violating area, based on emissions that contribute to these violations. For each monitor or group of monitors indicating a violation of the NAAQS, the EPA intends to assess information related to five factors for the purpose of establishing the appropriate geographic boundaries for designated ozone nonattainment areas. The EPA will evaluate relevant information from the entire area (i.e., Combined Statistical Area / Core Based Statistical Area) containing the violating monitor(s) and any adjacent counties or nearby areas that have the potential to contribute. For those portions of the area where an evaluation of the available information clearly establishes that emissions sources do not contribute to exceedances at the violating monitor(s), the EPA believes it would be appropriate to exclude that portion of the area from the nonattainment area. This weight-of-evidence approach to determining area boundaries could result in nonattainment areas consisting of an entire metropolitan area, single counties, or, in cases supported by relevant evidence, partial counties, including partial counties within larger urban areas or in relatively isolated locations. While technical assessments can help to define the magnitude or relative magnitude of contribution from nearby areas, the EPA is not setting a threshold contribution level or "bright line" test for determining whether a contributing area should be included within the boundaries of a given nonattainment area. Section 107(d) of the CAA does not require the EPA to set a threshold contribution. As was done in prior NAAQS designations, the EPA believes that the contribution determination should be made through a case-by-case evaluation of the relevant facts and circumstances in each nonattainment area.

As a framework for area-specific analyses to support nonattainment area boundary recommendations and final boundary determinations, the EPA believes it is appropriate to evaluate the following five factors:

1. air quality data,
2. emissions and emissions-related data,
3. meteorological data,
4. geography/topography, and
5. jurisdictional boundaries.

The EPA notes that these five factors are comparable to the factors that states and tribes and the EPA have used successfully for analytical purposes in prior designations. The recommendation of these factors is not intended to indicate that other relevant information should not be considered in the initial area designations process, as appropriate. Where a state or tribe includes additional information or analysis as part of its recommendation, the EPA will evaluate that information as part of its review in determining the appropriate nonattainment area designation.

[1] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

This attachment is intended to provide guidance regarding available data that states and tribes may wish to assess when evaluating these five factors. This guidance also provides insight into the EPA's subsequent review and evaluation of the state and tribal nonattainment area boundary recommendations. The guidance offers suggestions about techniques and approaches; it does not contain requirements to be strictly followed and should not be read as prescriptive with respect to the specific techniques recommended.

The EPA recognizes that some of the recommended assessments can be resource intensive. To help mitigate this potential concern, the EPA intends to provide an Ozone Designations Mapping Tool to assist air agencies in developing their area designation and nonattainment boundary recommendations and to provide the relevant data to facilitate the analyses. The EPA will make the Ozone Designations Mapping Tool available on the ozone designations website.[2] The table below outlines the datasets that the EPA expects to make available to the public on the ozone designations website and the expected date of availability. Design values for the 3-year period 2012 – 2014 are currently available[3] and will also be posted on the ozone designations website. The EPA will update this website during the initial area designations process as other relevant datasets are identified.

Datasets the EPA will Provide via the EPA Ozone Designations Website

Dataset	Expected Availability Date
2013 – 2015 Ozone Design Values	Summer 2016
2014 – 2016 Ozone Design Values	Summer 2017
Nitrogen Oxide (NO_x)/VOC Point sources and county level emissions and Vehicle Miles Traveled (VMT) from 2011 National Emissions Inventory (NEI)[4] version 2	March 2016
County and Census Tract Population	March 2016
HYSPLIT Trajectory data *	March 2016
Geography/Topography *	March 2016
Jurisdictional Boundaries *	March 2016

* Separate datasets will not be provided. The information will be part of the web-based Ozone Designations Mapping Tool.

This guidance also offers recommendations concerning how states and tribes may wish to describe the basis for their initial designations recommendations. The EPA recommends that states and tribes articulate those recommendations in a narrative format. Thus, this guidance provides some direction regarding the content and structure of a narrative that describes the problem in a potential nonattainment area with monitors violating the NAAQS. A comprehensive narrative would articulate a conceptual model of the area that explains the nature and causes of the ozone air quality problem in the specific area, identifies the scope and scale of the air quality problem in that area, and describes all nearby emission sources that contribute to the problem.[5] For multistate or multi-jurisdictional areas, the EPA

[2] *http://www.epa.gov/ozone-designations/*

[3] *http://www3.epa.gov/airtrends/values.html*

[4] The 2014 NEI may not be available for initial designation recommendations. If it becomes available, then it will be considered in lieu of the 2011 NEI.

[5] Chapter 2.1 of the EPA's Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze has a detailed description of how to develop a sound conceptual description of an air quality problem. The document is located at: *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

encourages states and tribes to work collaboratively to develop a single narrative. However, states or tribes with areas contributing to potential multistate or multi-jurisdictional nonattainment areas could also develop a conceptual model that describes only the contribution from the areas within their jurisdiction to the larger nonattainment area, rather than attempting to describe the scope and scale of the air quality problem throughout the entire area. Where a single area-wide narrative on the causes of the ozone air quality problem is not developed, the EPA will collectively use the information in all relevant submittals, along with other relevant data, to make its decision on the extent and designation of the multi-state area.

The underlying analytical framework of the recommended narrative can be summarized as follows:

- Determine violating monitors with design values greater than the NAAQS and gather data that enables an assessment of potential nearby contributing areas and the emissions sources (NO_x and VOC) in those areas.

- Assess and characterize the spatial and temporal differences in ozone concentrations within the area using data from Federal Reference Method (FRM)/Federal Equivalent Method (FEM) ozone monitors, as well as data from other FRM/FEM ozone monitors in nearby areas, if available.

- Areas may find it useful to assess and characterize the area-specific sensitivity of ozone formation to NO_x and VOC emissions. The amount of ozone formed in any given area depends on the amount of NO_x, VOC, and sunlight available to interact in a set of complex chemical reactions to form ozone. Depending on the local situation, peak ozone concentrations may be NO_x-sensitive, VOC-sensitive, or a mix of the two depending upon other conditions. Understanding the relative role of local NO_x and VOC emissions sources to ozone formation in the area violating the NAAQS helps identify which nearby emissions sources may be contributing to the monitored violations. Ambient data analyses and/or photochemical modeling simulations can be used to assess and characterize local ozone sensitivities.

- The information identified in the previous bullets can be evaluated in conjunction with emissions data and emissions-related data (e.g., vehicle miles traveled and population) to determine which source categories and source regions are contributing to the monitored violations.

- Once the emissions and air quality assessments have been evaluated, it is valuable to then assess the meteorology during the ozone season in the violating area. Weather patterns will have a large impact on the determination of contributing source regions. This analysis may further help to identify the relative magnitude of contributions from emission sources in nearby areas.

- Additionally, it may be useful to assess any geographic/topographic information, which could have consequences for transport, meteorology, and ozone formation in the area.

- Finally, all of the above assessments would be aggregated or synthesized into a consistent narrative that describes the relationship between sources in the analysis area and the measured exceedances. It will also be useful to assess jurisdictional considerations that could be relevant in identifying a nonattainment area boundary. This synthesis should represent a collective "weight-of-evidence" regarding the most appropriate boundaries for the nonattainment area.

While the general 5-factor framework is expected to be comprehensive and provide the foundation for each assessment of area boundaries, the extent of the analyses may vary on an area-by-area basis based on the nature, cause, and extent of the ozone air quality problem. This guidance suggests analyses of certain data sets that can be useful to assess which nearby areas contribute to nonattainment in a given area. In cases where more highly-resolved or newer data sets are available that are not explicitly mentioned in this guidance, states and tribes should consider their use. If these data are used, the EPA recommends that the states or tribes fully describe the data and their derivation in their supporting documentation for the designation recommendation.

The following sections provide more detail on the five factors and the weight-of-evidence approach that the EPA plans to consider when evaluating state and tribal recommendations and determining nonattainment area boundaries for the 2015 ozone NAAQS.

1. Air Quality Data

Ozone in the troposphere is a secondary pollutant formed by photochemical reactions of precursor gases and is not directly emitted from specific sources. Ozone is formed by atmospheric reactions involving two main classes of precursor pollutants: VOCs and NO_x. The formation of ozone is a complex, nonlinear function of many factors, including the intensity of sunlight, atmospheric mixing, the concentration of ozone precursors in the air, and the rates of chemical reactions of these precursors. Ozone is largely regional in nature with some higher values occurring in locations with ozone-conducive emissions, meteorological conditions, or transport patterns.

The first step in identifying an area to be designated nonattainment and to determine an appropriate nonattainment area boundary is to identify all monitored violations of the NAAQS using the most recently available design values. The EPA determines NAAQS compliance by considering the design value for each air quality monitoring site. The design value for the 2015 ozone NAAQS is the 3-year average of the annual 4th highest daily maximum 8-hour average concentrations.[6] Only ozone measurement data collected in accordance with the quality assurance (QA) requirements[7] using approved FRM/FEM monitors can be used for NAAQS compliance determinations. The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) to calculate the ozone design values. Individual measurements that the EPA determines to be "exceptional" in accordance with the Exceptional Events Rule[8] (such as days with poor air quality caused by wildland fire) are not included in these calculations. State and tribal monitoring agencies are required to annually certify data submitted to AQS by May 1st of the subsequent year.[9] A tribal monitoring agency must certify its data if the tribe is monitoring for regulatory purposes. A tribe may also be specifically required to certify its data under terms of a grant from EPA. Tribes should consult with the appropriate Regional office on questions regarding regulatory monitoring and the certification process. The EPA typically extracts ambient data from AQS and calculates official design values for regulatory purposes shortly after the

[6] The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50, Appendix U.

[7] The QA requirements for ozone monitoring data are specified in 40 CFR part 58, Appendix A.

[8] Final Rule on the Treatment of Data Influenced by Exceptional Events (72 FR 13560, March 22, 2007). Note, on November 10, 2015, the EPA proposed revisions to the 2007 Exceptional Events Rule and issued a draft guidance document for wildfire ozone events. The EPA intends to finalize the rule revisions and guidance before the October 1, 2016, deadline for state and tribal designations recommendations.

[9] Data certification requirements can be found in 40 CFR, part 58.15. The EPA has developed guidance related to the data certification process that can be found at: *http://www3.epa.gov/ttn/amtic/qacert.html.*

certification due date. The design values calculated using this data undergo review by the EPA regional offices, and the final design values are then posted on a public website.[10] Initial state and tribal designation recommendations due October 1, 2016, should focus on design values based on air quality data from 2013 to 2015; however, the EPA intends to make final designation decisions using design values based on the 2014 to 2016 certified air quality data.

In addition to identifying monitors where the most recent design values violate the NAAQS, examining historical ozone air quality measurement data (including previous design values) can improve our understanding of the nature of the ozone ambient air quality problem in an area and thereby, inform decisions regarding the nonattainment area boundary. Since ozone concentrations are substantially impacted by meteorological conditions, including local wind patterns and synoptic weather patterns, the frequency and spatial distribution of exceedances of the standards can vary from year-to-year. This can be revealed by examining how frequently exceedances of the standard have occurred at the monitor with the highest design value for the area and at other monitor locations in the area under consideration, and how the spatial pattern in ozone concentrations across the area varies over time. This information can help to identify spatial and temporal patterns in the air quality of a given area and, when combined with other information from the 5-factor review, can help identify nearby areas with emissions sources contributing to an area with a monitored violation.

2. Emissions and Emissions-Related Data

The sources and levels of emissions of ozone-precursor pollutants are important factors in the initial area designations process. As noted above, ambient ozone is formed through complex atmospheric processes. Air quality in a nonattainment area is also typically the result of a combination of regional and local emissions. In the designations process, for each area with a violating monitor, the EPA evaluates the current emissions data from nearby counties to assess each county's potential contribution to ozone concentrations at the violating monitor(s) in the area under evaluation. It should be noted that while ozone can be transported many hundreds of miles and sources of emissions that are very distant from the potential nonattainment area may also contribute to monitored ozone levels, these far upwind emissions are not considered in the designation determination to be "nearby" sources.[11] Therefore, the evaluation of the area is also a means to differentiate between the impact of emissions from more distant sources and from sources in nearby areas that should be included as part of the designated nonattainment area. For initial area designations, we intend to examine current emissions of identified sources of NO_X and VOC, as guided by the local conceptual description of NO_X- and VOC-limited areas. The EPA expects that some local NO_X and VOC emissions contributions from mobile and stationary sources and transport from nearby areas can contribute to higher ozone levels at the violating monitors. Analyses should include reviewing data from the latest NEI and other relevant sources, as available. The analysis should also include examining the magnitude of county-level emissions and the geographic locations of NO_X and VOC sources.

Analyzing the magnitude and spatial extent of emissions provides information about potential spatial gradients in ozone precursor emissions. Combining these analyses (e.g., magnitude of emissions and point of release) with meteorological information can inform the evaluation of the degree of contribution from nearby areas In addition, if the most recent emission inventories do not reflect conditions for the

[10] Design values for ozone can be found at: *http://www3.epa.gov/airtrends/values.html*.

[11] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

same time period as the air quality data being used to determine the nonattainment designation, then information provided on changes in emissions will be considered. These changes may include emissions reductions due to permanent and enforceable emissions controls and may include emissions increases from new sources or at existing sources.

The EPA believes that it will be appropriate to use 2011 NEI version 2 data because that will be the most recent national emissions inventory information available at the beginning of the designations process.[12] The NEI includes data, generally on an annual basis at the county level. Emissions from large stationary sources at a specific location are also available. More detailed inventories (higher resolution than county estimates) may also be available for some areas, although not in the NEI.[13] To supplement the NEI county-level data, the EPA will provide information that could be used to understand spatial allocation within a county including the location and magnitude of large point sources. Additionally, states and tribes may wish to review gridded emissions data, which are generally available at 12 km grid resolution. These data, which can be provided by the EPA, have been created to cover emissions levels in the contiguous 48 states for 2011. These gridded emissions data can be provided by the EPA on an annual basis or for shorter time periods such as the ozone season.

Additionally, states or their regional organizations may submit their own emissions information or versions of gridded emissions for more recent years.

Population and degree of urbanization

The EPA has consolidated population and degree of urbanization within the emissions and emissions-related data factor as these elements supplement and help to inform the analysis of emissions data. The EPA intends to provide data such as population by county and census tract. An analysis of population and degree of urbanization may provide indicators of the location of emissions-related activities within the county.

The EPA expects that states and tribes may have independently developed datasets to better inform these elements. The EPA believes that population information such as the location and recent trends in population growth and the patterns of residential and commercial development can serve as potential indicators of the probable location and magnitude of emissions sources that may contribute to ozone concentrations in a given nonattainment area.

Traffic and commuting patterns

The EPA recommends examining the location of major transportation arteries and information on traffic volume and commuting patterns in and around the area containing a violating monitor. This may include examining the number of commuters in each nearby county who drive to a county within the area that has a violating monitor, the percent of total commuters in each county who commute to other counties

[12] The 2014 NEI may not be available for initial designation recommendations. If it becomes available, then it will be considered in lieu of the 2011 NEI.

[13] The EPA develops gridded emissions by applying temporal (e.g., seasonal variations in emissions as reported to the NEI) and spatial (e.g., incorporates latitude and longitude location information as reported to the NEI) adjustments to the county-based NEI estimates to produce the more finely resolved gridded emissions. These emissions are generally available at a 12 km resolution, but may be available at finer resolutions for certain localities that have been the focus of special modeling studies.

with violating monitors within the metropolitan area, and the total VMT for each county. Areas with higher VMT and commuting activity can be an indicator of the location of mobile source emissions that may contribute to ozone concentrations at the violating monitor.

The NEI is one source of the county-wide VMT data and facilitates relative comparisons of traffic and commuting patterns between counties in a larger area.[14] However, more detailed assessments provided by states or tribes could help to highlight the magnitude and location of emissions activity. The EPA will provide gridded VMT data; however, these estimates may not correspond directly with VMT data developed by state or local agencies.

3. Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may support determination of nonattainment area boundaries.

One basic type of meteorological analysis involves assessing potential source-receptor relationships in the area on days with high ozone concentrations using wind speed and wind direction data. A more sophisticated and accurate assessment involves modeling air parcel trajectories to help understand complex transport situations. The HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) modeling system may be useful for some areas to produce trajectories that illustrate the 3-dimensional paths traveled by air parcels to a violating monitor. The EPA will provide back trajectories for violating monitors, for each day of high ozone concentration (i.e., daily maximum 8 hour values that exceed the NAAQS) at those monitors. States or tribes can choose to do additional HYSPLIT modeling and guidance is provided below. If a trajectory model other than HYSPLIT is used, states or tribes should provide detailed information about the technique, how it is used, and why it is preferred over HYSPLIT.

Preparing and running a HYSPLIT modeling analysis

Atmospheric trajectory models use meteorological data and mathematical equations to simulate 3-dimensional transport in the atmosphere. Generally, the position of particles or parcels of air with time are calculated based on meteorological data such as wind speed and direction, temperature, humidity, and pressure. Model results depend on the spatial and temporal resolution of the atmospheric data used, and also on the complexity of the model itself. The HYSPLIT model[15] is frequently used to produce trajectories for assessments associated with determining nonattainment area boundaries. HYSPLIT contains models for trajectory, dispersion, and deposition; however, analyses recommended here only use the trajectory component. The trajectory model, which uses existing meteorological forecast fields from regional or global models to compute advection (i.e., the rate of change of an atmospheric property caused by the horizontal movement of air) and stability, is designed to support a wide range of simulations related to the atmospheric transport of pollutants.

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[14] NEI county-level VMT estimates are developed in a top-down approach from Federal Highway Administration estimates of statewide VMT by road class that are allocated to counties based on surrogates. Accordingly, the NEI estimates do not always compare well to detailed area-specific studies that are developed in a more robust way (e.g., travel demand model data).

[15] *http://ready.arl.noaa.gov/HYSPLIT.php*

HYSPLIT trajectories may be produced for various combinations of time and locations. When HYSPLIT trajectories are produced for specific monitor locations for days of high ozone concentrations (e.g., daily maximum 8-hour values that exceed the NAAQS), the results illustrate the potential source region for the air parcel that affected the monitor on the day of the high concentration.

While HYSPLIT is a useful tool for identifying meteorological patterns associated with exceedance events, HYSPLIT trajectories alone do not conclusively indicate contribution to measured high concentrations of ozone. Therefore, they cannot be used in isolation to determine inclusion or exclusion of an area within a nonattainment boundary. While a HYSPLIT trajectory analysis alone cannot yield a conclusion that a particular region contributes to ozone concentrations, a set of HYSPLIT trajectories that show no wind flow from a particular region on any day with high ozone concentration measurements might provide support for discounting that region as contributing to ozone concentrations. HYSPLIT trajectories are very useful in combination with information on the location and magnitude of ozone precursor emissions sources.

A HYSPLIT backward trajectory, the most common trajectory used in assessments associated with determining nonattainment area boundaries, is usually depicted on a standard map as a single line extending in two dimensional (x,y) space from a starting point, regressing backward in time as the line extends from the starting point. An individual trajectory can have only one starting height; HYSPLIT can plot trajectories of different starting heights at the same latitude/longitude starting point on the same map, automatically using different colors for the different starting heights. HYSPLIT will also include a vertical plot of the trajectories in time, with colors corresponding to the same trajectory in the (x,y) plot. This display can be easily misinterpreted as having finer accuracy than the underlying model and data.

It is important to observe the overall size of the plot, its width and length in kilometers, and consider the size of an individual grid cell in the input meteorological data set. These input grid cells are usually 40 km in width and length, so the total area of a trajectory plot may be limited. It is also important to understand the trajectory line itself. The line thickness is predetermined as a user option, so its thickness does not imply coverage other than to represent the centerline of an air parcel's motion calculated to arrive at the starting location at the starting time. Uncertainties are clearly present in these results, and these uncertainties change with trajectory time and distance traveled. One should avoid concluding a region is not along a trajectory's path if the center line of that trajectory missed the region by a relatively small distance.

Detailed information for downloading, installing, and operating HYSPLIT can be found at these websites:
http://ready.arl.noaa.gov/HYSPLIT.php
http://www.arl.noaa.gov/documents/reports/hysplit_user_guide.pdf
http://www.arl.noaa.gov/documents/reports/arl-224.pdf

HYSPLIT's many setup options allow great flexibility and versatility. However, careful selection and recording of these options is necessary to provide reviewers the ability to reproduce the model results. The following paragraphs describe the options that should be recorded, at a minimum, to enable another party to reproduce a HYSPLIT model run.

Model Version. If the HYSPLIT trajectory is produced via the NOAA Air Resources Laboratory (ARL) website (*http://ready.arl.noaa.gov/HYSPLIT_traj.php*), note the "*Modified:*" *date* in the lower-left corner of the webpage, as well as the date the trajectory was produced. If the trajectory is produced using a stand-alone version of HYSPLIT, note *the release date*, which will be displayed after exiting the main graphical user interface (GUI) screen.

Basic Trajectory Information. Note the *starting time* (YY MM DD HR), the *duration of the trajectory* in hours, and whether the trajectory is *backward or forward.* Note the *latitude and longitude*, as well as the *starting height*, for each *starting location*. Starting height is given by default in meters above ground level (AGL) unless another option is selected. Starting heights are typically no less than 100 meters AGL to avoid direct interference of terrain, and are typically no greater than 1500 meters AGL to confine the air parcel within the mixed layer. Some trajectories can escape the mixed layer, and this result would be considered in the interpretation.

Starting height and starting location will identify the 3-dimensional location of the trajectory's latest endpoint in time if a backward trajectory is selected (i.e., the start of a trajectory going backward in time). Backward trajectories used in analyses associated with designations typically have a trajectory duration of 24 hours. Considering the geographic proximity of areas under consideration in ozone designations, air parcel locations within this proximity are almost always within the last 24 hours of travel to the trajectory endpoint. Air parcel locations more than 24 hours prior to trajectory end time are rarely found within this proximity.

Input Meteorological Data Set. Note the *input meteorological data set* used in the HYSPLIT model run. The *original file name* provides sufficient information to identify the data set.

Meteorological data fields to run the model are already available for access through the HYSPLIT menu system, or by direct FTP from ARL. The ARL web server contains several meteorological model data sets already converted into a HYSPLIT compatible format in the public directories. Direct access via FTP to these data files is built into HYSPLIT's graphical user interface. The data files are automatically updated on the server with each new forecast cycle. Only an email address is required for the password to access the server. The ARL analysis data archive consists of output from the Global Data Analysis System (GDAS) and the NAM Data Analysis System (NDAS - previously called EDAS) covering much of North America. Both data archives are available from 1997 in semi-monthly files (SM). The EDAS was saved at 80 km resolution every 3-hours through 2003, and then at 40 km resolution starting in 2004. Detailed information on all meteorological data available for use in HYSPLIT can be found in the HYSPLIT4 Users Guide.[16]

It is possible to run the stand-alone HYSPLIT program on user-supplied meteorological data. This could be advantageous when the horizontal resolution or model physics used by ARL is inferior to other existing datasets. If a state or tribe chooses to use meteorological data not already on the ARL web server, the state or tribe should document the reason for this choice and should provide detailed information about the substituted meteorological dataset.

[16] *http://www.arl.noaa.gov/documents/reports/hysplit_user_guide.pdf*

Vertical Motion Options. HYSPLIT can employ one of five different *methods for computing vertical motion*. A sixth method is to accept the vertical motion values contained within the input meteorological data set, effectively using the vertical motion method used by the meteorological model that created the data set. In a typical HYSPLIT application, EPA selects the option to accept the vertical motion values contained within the input meteorological data set. The user should note which method was selected as well as the value chosen for *the top of the model*, in meters AGL.

Trajectory Display Options. The HYSPLIT trajectory model generates a text output file of end-point positions. The end-point position file is processed by another HYSPLIT module to produce a Postscript display file or output files in other display formats. Some parameters, such as map projection and size, can be automatically computed based on the location and length of the trajectory, or they can be manually set by the user. While these display options do not directly affect the trajectory information itself, noting these options will eliminate possible misinterpretation of identical trajectories because of differing display options. An important display option is the choice of *vertical coordinate*, usually set to meters AGL for these assessments.

4. Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. For example, valley-type topographical features can cause local stagnation episodes where vertical temperature inversions effectively "trap" air pollution. Under these conditions, emissions can accumulate leading to periods of elevated ozone concentrations. These inversions may be limited in extent and, therefore, the areas with inversions may need to be separated from areas at altitudes above the top of the inversion layer in locations where exceedances are associated with this type of event. Conversely, higher altitude mountaintop sites might experience a greater influence from long range transport and associated transport episodes in comparison to nearby areas at a lower altitude. Similarly, the absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given violating area.

5. Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, existing jurisdictional boundaries may be considered for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates should be used.

Weight-of-Evidence Analysis Based on the Five Factors

In making designations recommendations for violating areas or contributing areas, and the nonattainment area boundaries for such areas, the EPA recommends that states and tribes consider the five recommended factors together and use a weight-of-evidence approach for this analysis. As explained above, the starting point for evaluating the factors is the air quality analysis. Of particular importance are the location(s) of the violating monitor(s) based on 2013-2015 data[17] and the characteristics of those violations. Once the characteristics of the violations are established, one can begin to assess which nearby emissions sources and source regions may have contributed to those violations. This contribution evaluation should generally consider the location and magnitude of emissions, and the potential for these emissions to contribute to the ambient conditions at the violating monitors as informed by the meteorological and geographical/topographical analysis factors. The guiding principle for this evaluation should be to include, within the boundaries of the nonattainment area, nearby areas with emissions of ozone precursors (NO_x and VOC) that contribute to the violating monitor on days that exceed the NAAQS. The final factor, jurisdictional boundaries, should be considered to refine the nonattainment area boundary to ensure meaningful air quality planning and regulation during the NAAQS implementation phase. As in prior designations for ozone NAAQS, the EPA believes that it is appropriate to use already-established air planning boundaries where possible, to assure continued effective planning and implementation.

The EPA believes that the 5-factor analysis described here is generally comprehensive and intends to use the weight-of-evidence approach based on these five factors in establishing the nonattainment boundaries for the 2015 ozone NAAQS. As noted earlier, the EPA intends to provide an Ozone Designations Mapping Tool to assist air agencies in developing their area designation and nonattainment boundary recommendations and to provide the relevant data to facilitate the analyses. The EPA will make the Ozone Designations Mapping Tool available on the ozone designations website.

The EPA also recognizes the potential value of additional data or methodologies not already specified in this guidance that states or tribes may elect to submit to qualitatively describe or quantify the relative contributions from contributing areas to violating monitors. In some cases, these supplemental methodologies (e.g., source apportionment modeling) may be used to synthesize the various factors, such as air quality, emissions, and meteorological data into quantitative estimates of the contributions from specific areas.

Source Apportionment Modeling

Source apportionment modeling refers to an augmented instrumentation of traditional regional photochemical Eulerian models which allows the model to track the impacts of NO_x and VOC emissions from user-defined source regions on predicted ozone concentrations in a particular grid cell. Emissions are tracked with source apportionment through ozone formation, transport, and deposition processes in the host photochemical model.[18,19] Source apportionment modeling combines into a single analysis

[17] The EPA intends to consider 2014-2016 data as soon as these data are available.

[18] Dunker, A. M., Yarwood, G., Ortmann, J. P., and Wilson, G. M. Comparison of source apportionment and source sensitivity of ozone in a three-dimensional air quality model, Environ. Sci. Technol., 36, 2953–2964, 2002.

[19] Kwok, R.H.F, Baker, K.R., Napelenok S.L., Tonnesen, G.S. Photochemical grid model implementation and application of VOC, NO_x, and O_3 source apportionment, Geoscientific Model Development, 8(1), 99-114, 2015.

several of the factors that the EPA believes are important for determining nonattainment area boundaries: air quality data, emissions, meteorology, and geography/topography. Consequently, this modeling may help identify possible areas for inclusion in the nonattainment area because of their contribution to violations in nearby areas with violating monitors.

The EPA does not require states or tribes to conduct source apportionment modeling as part of the initial area designations process for the 2015 ozone NAAQS. However, some states used source apportionment modeling in their boundary determinations for the 2008 ozone NAAQS. The EPA is not producing source apportionment modeling assessments for any areas as part of the initial area designations process for the 2015 NAAQS. Like other aspects of the factor analyses, source apportionment modeling produces information that can help to determine potential boundaries for the area that should be designated nonattainment. Where provided by states or tribes, source apportionment results will be considered as just one part of an overall assessment of the potential nonattainment area boundaries. The EPA recognizes that while there are uncertainties associated with interpreting source apportionment outputs, it can be a useful technique for comparing the relative contribution of individual county emissions of ozone precursor emissions in a more sophisticated manner.

If a state chooses to conduct source apportionment modeling, the EPA recommends that model episodes are of sufficient duration to capture the entire range of meteorological and emissions conditions that can lead to ozone violations in a particular area. Further, we recommend that states and tribes follow the relevant EPA guidance for photochemical modeling attainment demonstrations[20] when establishing their source apportionment modeling platform. In establishing the parameters of a source apportionment modeling exercise, the violating monitor(s) would typically comprise the receptor(s) in the analysis. When summarizing the outputs from the source apportionment modeling, it is suggested that the relative contributions from nearby source regions be compared against one another. It is expected that the focus of the source apportionment modeling would be identifying each source region's contribution to ozone levels near or exceeding the level of the ozone NAAQS. While the EPA does not believe it is appropriate to establish an *a priori* threshold contribution level, a relative comparison of the modeled contribution of each source region should reveal where there are potential contributing sources that should be included within the nonattainment area.

Rural Transport Areas

Section 182(h) of the CAA identifies a category of ozone nonattainment areas referred to as rural transport areas (RTAs). An RTA is treated as a Marginal area for purposes of ozone-related planning and control requirements, regardless of the area's classification. In order for an area to qualify as an RTA, the nonattainment area must meet two criteria. First, the nonattainment area cannot be adjacent to, or include any part of a metropolitan statistical area, as defined by the Office of Management and Budget. Second, the NO_x and VOC emissions from sources within the area cannot make a significant contribution to ozone concentrations in the area itself, or in other areas. The first criterion was discussed earlier in this guidance memo. This portion of the document provides guidance to states and tribes regarding the information that should be submitted to the EPA as part of a demonstration for the second criterion. The EPA believes that a multi-factor, weight-of-evidence approach is needed to demonstrate

[20] Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze. December 2014. Located at: *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

that emissions within a potential RTA do not contribute significantly to the local ozone nonattainment problem or to ozone nonattainment downwind. The factors are similar in nature to the ones described above to guide development of nonattainment designation boundaries: air quality data, emissions estimates, meteorological transport patterns, and geography/topography.

In most instances, the first step in demonstrating that the NO_x and VOC emissions in a potential RTA do not significantly contribute to ozone in the area itself is the development of a conceptual description of the nature of ozone exceedances in the area.[21] This conceptual description should summarize the spatial and temporal patterns of ozone exceedances in the area and begin to identify hypotheses as to which processes and sources are likely most responsible for those high ozone values. To the extent that the conceptual description suggests that transport from upwind areas is largely responsible for the local ozone problem, the RTA demonstration should then further analyze existing ambient monitoring data, meteorological transport patterns, and local and regional emissions estimates to construct a weight-of-evidence argument that concludes the upwind contributions dominate any local contributions.

When compiling a weight-of-evidence based RTA demonstration, it may be valuable to consider an analysis of regional surface ozone monitoring data to see if there is a clear signal of an ozone plume being generated over an upwind area and being transported downwind as the day proceeds, reaching the potential RTA area after the time in which local photochemical production of ozone would have ceased. It also may be useful to look at any available ozone precursor data in or near the local area as a way to assess the chemical nature of a particular air mass. One indication of a photochemically-aged ozone plume that was likely formed from upwind emissions and transported away from its source origin, would be situations in which high ambient ozone and total reactive nitrogen (NO_y) values were observed in locations with relatively low ambient concentrations of NO_x. In other cases, there may be data available about the 3-dimensional chemical state of the atmosphere (e.g., from aircraft, satellites, or other relevant instrumentation) that can help characterize the role of transported ozone from upwind areas.

In terms of the meteorological factor, using HYSPLIT to estimate the back trajectories of air parcels on high ozone days can provide valuable information about the transport path and potential origin of the ozone pollution. We expect that for most areas that would qualify for treatment as an RTA, most, if not all, back trajectories on high ozone days would suggest long-path trajectories with source origins well away from the local area and with little potential for recirculation of the local emissions.

Finally, for the emissions factor, the relative magnitude of local emissions in any potential RTA is also a key consideration in determining if local sources contribute significantly to the ozone problem in the area. If the NO_x and VOC inventories for a particular area are appreciably less than those for other areas for which there is evidence demonstrating contribution to the ozone nonattainment problem (i.e., from the ambient and meteorological analyses), this provides support for concluding that the transport component is overwhelming any local ozone production. A simple approach to assessing the potential importance of local emissions is to compile county-level emissions inventory estimates for each county potentially along the trajectories that are expected to contribute to ozone in the potential RTA. If the emissions from upwind contributing counties are substantially larger than what is being emitted locally, then this suggests that the impact of the local emissions may not be significant. The EPA recommends that any comparative assessments of emissions be based on the most current available inventories.

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[21] Chapter 2.1 of EPA's Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze has a detailed description of how to develop a sound conceptual description of an air quality problem. *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

It is also possible to assess the contribution of local NO_x and VOC emissions to the ozone in the area using photochemical air quality modeling. "Zero-out" modeling can provide an estimate of the total local impact by calculating the difference between the model estimates from a base case run and the estimates from a simulation in which the man-made emissions of NO_x and VOC are removed from the potential RTA. If the response of the model is small (i.e., even with zero local emissions, there is still a local ozone problem due to transport), it would support a determination that local emissions sources make a small contribution to ozone concentrations in the area. Additionally, source apportionment modeling can be used to estimate the contributions of user-defined source regions (or source categories) to total modeled ozone in an area. These types of modeling analyses can be resource-intensive and the EPA does not expect areas to rely on these models unless they have already been completed for other purposes. In some cases, there may be existing regional or national modeling simulations that can be leveraged to support an RTA demonstration. States and tribes are encouraged to consult with their EPA regional office on potentially available information.

The analyses described above focus on showing that local emissions do not significantly impact high ozone in the local area. Similar analyses would be appropriate to demonstrate that local emissions do not significantly impact ozone concentrations in other areas. It is unrealistic to expect that a state or tribe could analyze impacts on every possible downwind area Instead, we recommend that the state or tribe consider the effects of local emissions on the nearest potential nonattainment areas, in a qualitative sense using some of the data analyses described above.

In general, the EPA believes the geographical restrictions of section 182(h)(1) will limit the number of areas eligible for treatment as an RTA. States or tribes requesting that the EPA treat an ozone nonattainment area as an RTA are encouraged to conduct the technical analyses discussed above as part of a multi-factor, weight-of-evidence demonstration. Documentation that describes each analysis performed and the aggregate determination that emissions in the candidate area do not make a significant contribution to ozone concentrations in that area or in other downwind (current or potential) nonattainment areas should be submitted to the appropriate EPA regional office. Any state or tribe seeking an RTA determination for an area is encouraged to work closely with the appropriate EPA regional office to coordinate the analytical plan for such a demonstration.

State of Colorado

Technical Support Document

For Recommended 8-Hour Ozone Designations

Colorado Air Quality Control Commission
Adopted September 15, 2016

Colorado Department of Public Health and Environment
Air Pollution Control Division
4300 Cherry Creek Drive South
Denver, Colorado 80246

Table of Contents

SECTION 1

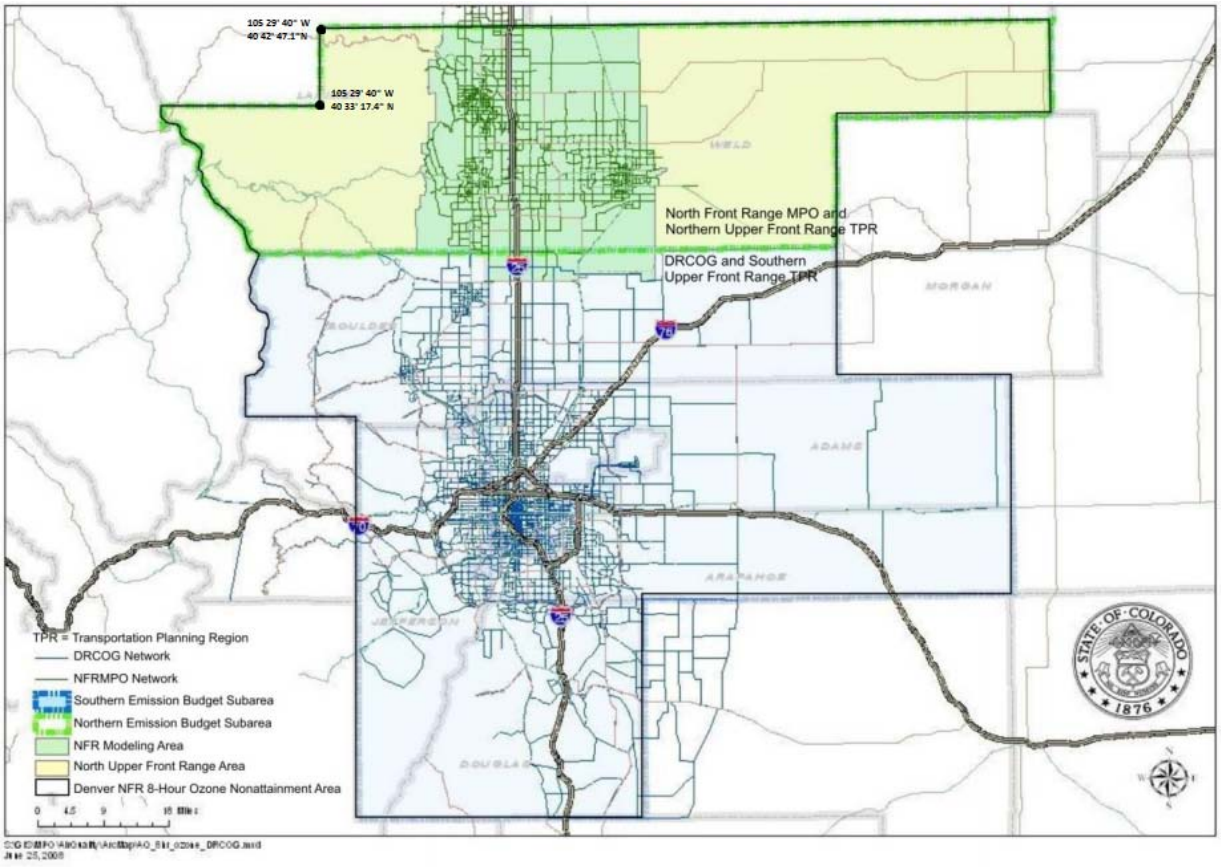
Denver Metro / North Front Range Region

SECTION 1: DM/NFR Area – Five Factor Analysis for Ozone Nonattainment

Designation Recommendation

The State recommends designating the current Denver Metro/North Front Range (DM/NFR) 8-hour nonattainment area (see Figure 1-1) as nonattainment for the 2015 revised 8-hour ozone standard (0.070 ppm). This recommendation is based on monitoring information that indicates the region is not in compliance with the 2015 8-hour ozone standard and the following five factor analysis that indicates the nonattainment boundary should remain unchanged:

Figure 1-1: DM/NFR Existing 8-hour Ozone Nonattainment Area



Nonattainment Boundary Recommendation

The State recommends that the proposed nonattainment area boundary for the revised 8-hour ozone standard should be identical to the current EPA-approved ozone nonattainment boundary for the 9-county area. This large area encompasses the region's 1) urbanized area, 2) traffic and commuting patterns, and 3) industrial and commercial activities. With the Rocky Mountains to the west, the Palmer Divide to the south, the Cheyenne Ridge to the north, and following the South Platte River valley to the northeast, the area is commonly referred to as the Denver Basin and serves as the topographic and climatological airshed for the region. The recommended boundary is as follows:

Adams County
Arapahoe County
Boulder County (including the portion of Rocky Mountain National Park therein)
Broomfield County
Denver County
Douglas County
Jefferson County
Larimer County (part) including the portion of Rocky Mountain National Park therein and that portion of the county that lies south of a line described as follows: Beginning at a point on Larimer County's eastern boundary and Weld County's western boundary intersected by 40 degrees, 42 minutes, and 47.1 seconds north latitude, proceed west to a point defined by the intersection of 40 degrees, 42 minutes, 47.1 seconds north latitude and 105 degrees, 29 minutes, and 40.0 seconds west longitude, thence proceed south on 105 degrees, 29 minutes, 40.0 seconds west longitude to the inter-section with 40 degrees, 33 minutes and 17.4 seconds north latitude, thence proceed west on 40 degrees, 33 minutes, 17.4 seconds north latitude until this line intersects Larimer County's western boundary and Grand County's eastern boundary.
Weld County (part): That portion of the county that lies south of a line described as follows: Beginning at a point on Weld County's eastern boundary and Logan County's western boundary intersected by 40 degrees, 42 minutes, 47.1 seconds north latitude, proceed west on 40 degrees, 42 minutes, 47.1 seconds north latitude until this line intersects Weld County's western boundary and Larimer County's eastern boundary.

DM/NFR Overview

The EPA recommends five criteria or "factors" to help with attainment/nonattainment determinations and, if necessary, to help determine the appropriate size of a nonattainment area. States must submit an analysis of these five factors, along with a proposed nonattainment boundary, for any areas that are not meeting the federal standard. The five factors to be addressed are:

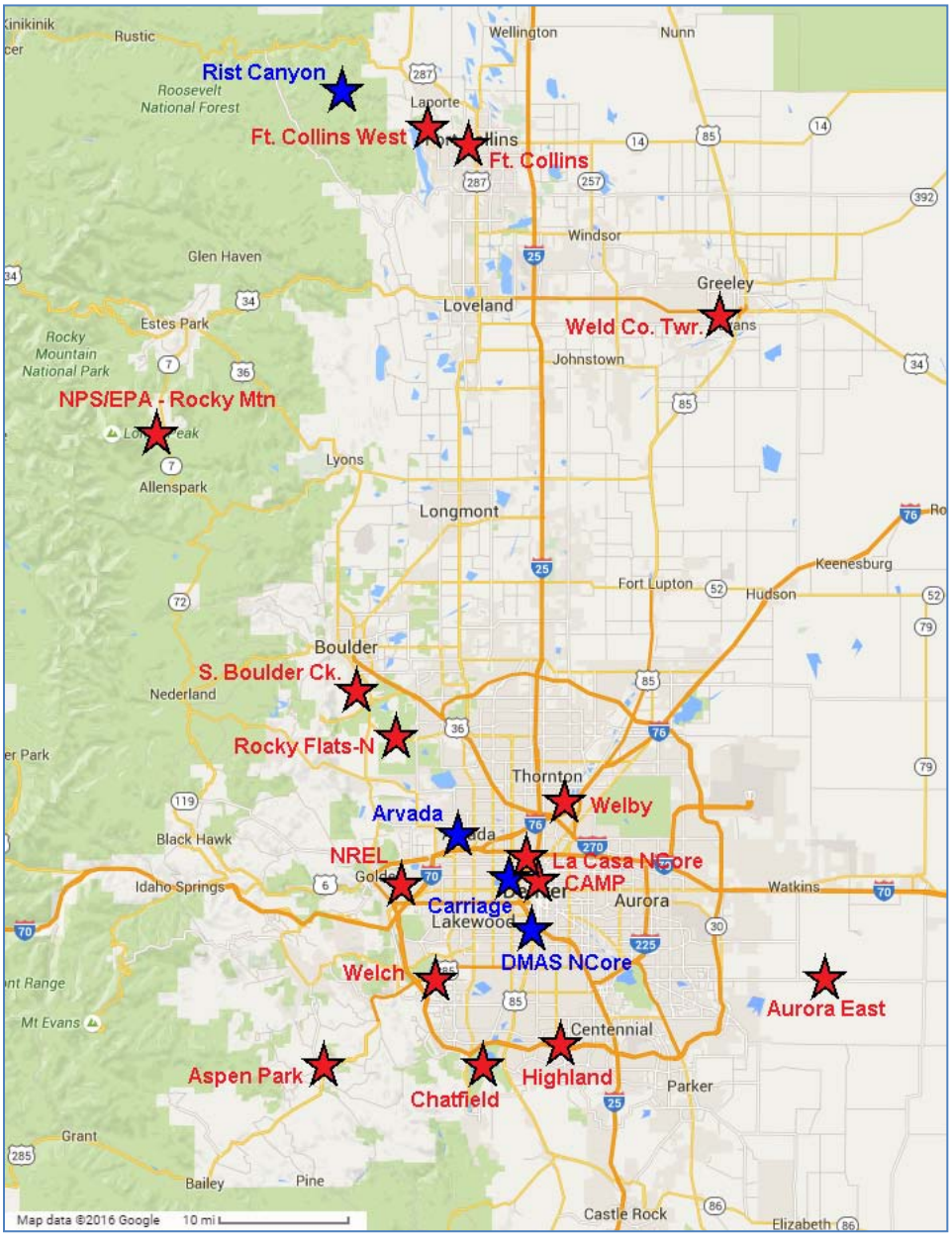
1. Air quality data
2. Emissions and emissions-related data
3. Meteorological data
4. Geography/topography
5. Jurisdictional boundaries

Since ozone monitoring data in the 9-county area indicates nonattainment of the 2015 National Ambient Air Quality Standard (NAAQS), the following five factor analysis is necessary to support the conclusion that the existing nonattainment boundary is appropriate for the revised ozone standard.

Factor # 1: Air Quality Data

There are 16 ozone monitors (see Figure 1-2 and Table 1-1) currently operating in the DM/NFR region (including monitors operated by other agencies). The Highland monitor was not operational from October 1, 2014 to September 1, 2015 due to a renovation of an underground water storage tank on the site, but is now currently operational. The Rist Canyon monitoring site was discontinued in June of 2013 after meeting its monitoring objectives.

Figure 1-2: Ozone Monitoring Sites for the DM/NFR Region



Red= Current sites in operation
Blue= Sites from past 10 years that are no longer in operation

The monitoring data from 2013 to 2015 at the monitoring locations is shown in the table below. The monitors currently in violation of the revised 2015 standard are highlighted in red.

Table 1-1: Ozone Monitoring Data for the DM/NFR Region

Denver Metro /North Front Range Region 4th Maximum 8-Hour Ozone Values and 3-Year Averages					
Site Name	AQS#	Year			3-Year Average
		2013	2014	2015	2013-2015 (ppm)
CDPHE-APCD Sites					
Welby	08-001-3001	0.077	0.067	0.069	0.071
Highland Reservoir	08-005-0002	0.079	-	-	-
Aurora - East	08-005-0006	0.073	0.067	0.068	0.069
South Boulder Creek	08-013-0011	0.079	0.070	0.074	0.074
CAMP	08-031-0002	0.067	0.061	0.067	0.065
La Casa	08-031-0027	0.071	0.066	0.071	0.069
Chatfield State Park	08-035-0004	0.083	0.074	0.081	0.079
Welch	05-059-0005	0.080	0.066	0.075	0.073
Rocky Flats - N	08-059-0006	0.085	0.077	0.077	0.079
NREL	08-059-0011	0.084	0.076	0.081	0.080
Aspen Park	08-059-0013	0.077	0.065	0.070	0.070
Ft. Collins - West	08-069-0011	0.082	0.074	0.075	0.077
Rist Canyon	08-069-0012	0.066	-	-	-
Ft. Collins - CSU	08-069-1004	0.074	0.072	0.069	0.071
Weld County Tower	08-123-0009	0.073	0.070	0.073	0.072
Other Agency Sites					
NPS- Rock Mtn. NP	08-069-0007	0.074	0.069	0.069	0.070
EPA Rocky Mountain NP	08-069-9991	0.075	0.073	0.070	0.072
Other Sites Near DM/NFR					
U.S. Air Force Academy, CO	08-041-0013	0.074	0.064	0.067	0.068
Manitou Springs, CO	08-041-0016	0.072	0.062	0.065	0.066
Cheyenne NCore, WY	56-021-0100	0.069	0.065	0.063	0.065
Centennial, WY	56-001-9991	0.069	0.066	0.065	0.066

The following figures provide historical trend data of the 8-hour ozone 4th maximum for the DM/NFR region monitors.

Figure 1-3: Western Denver Metro Area - 8-hour (4th Max) Ozone Values

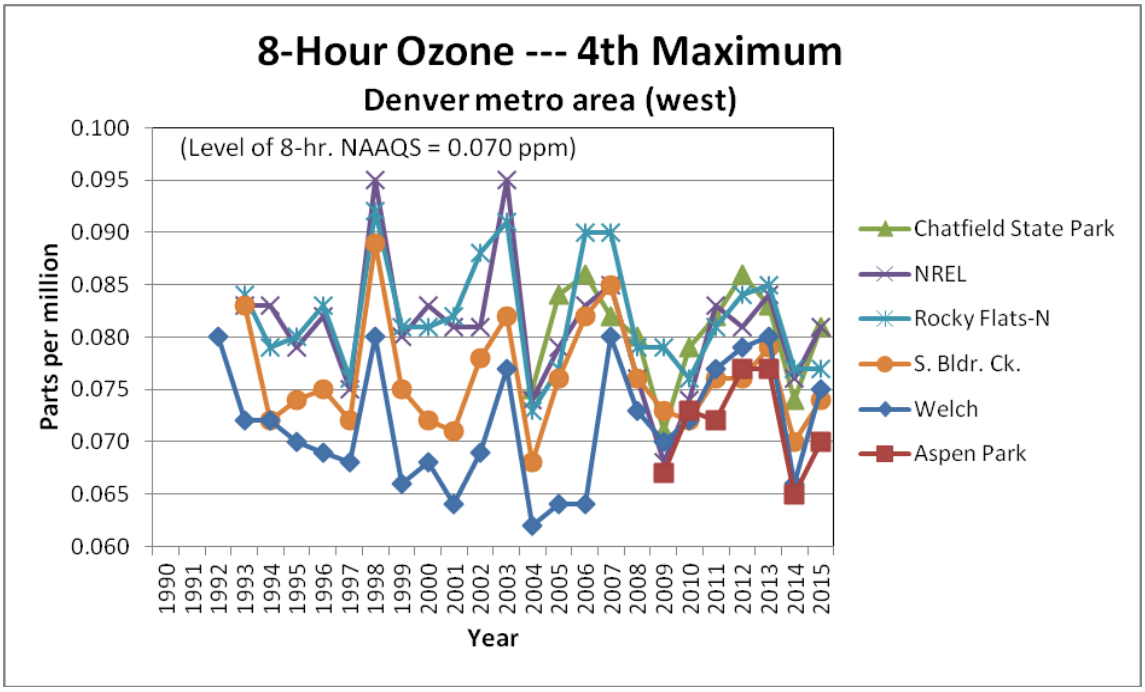


Figure 1-4: North, South and East Denver Metro Area - 8-hour (4th Max) Ozone Values

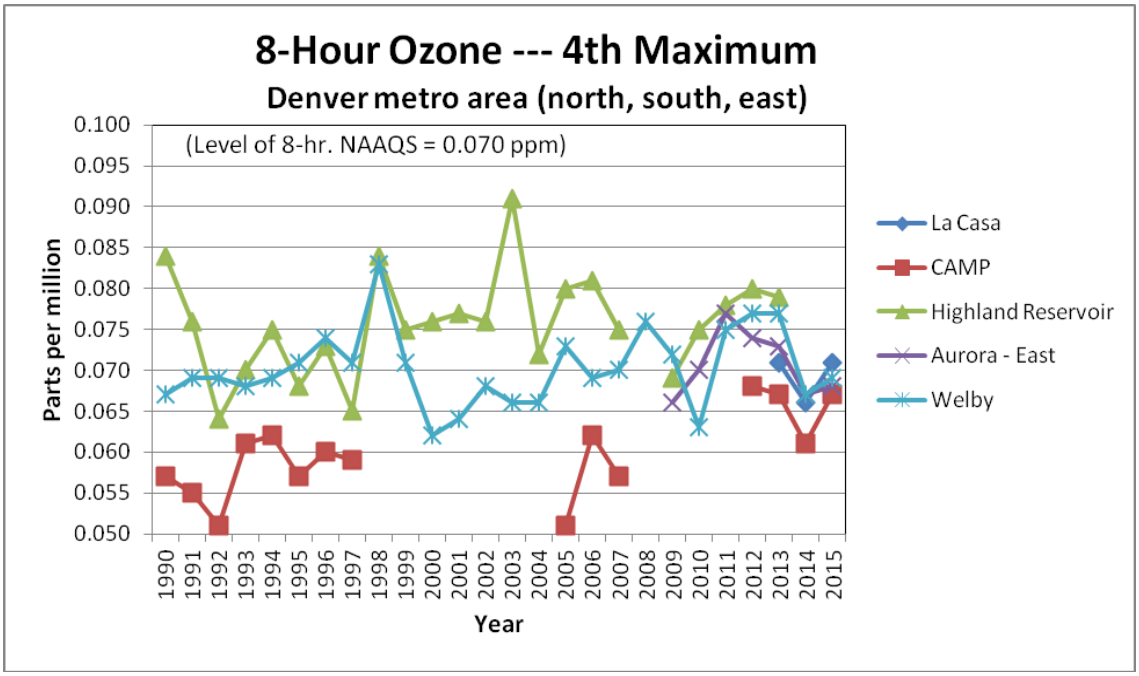
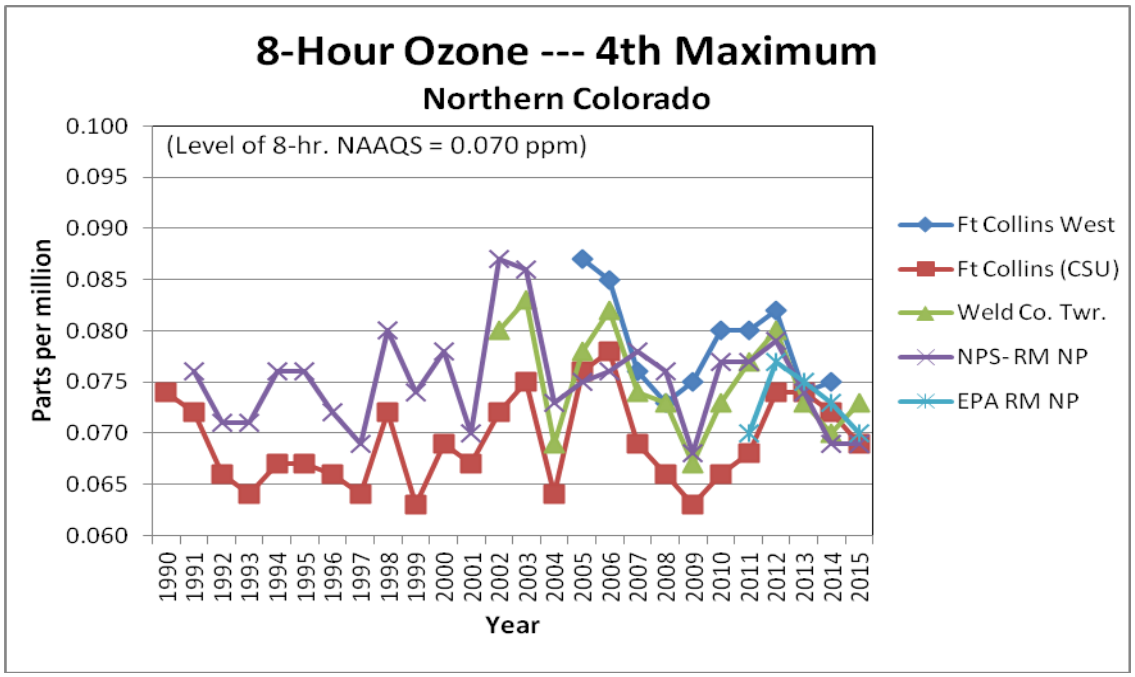


Figure 1-5: North Front Range Area - 8-hour (4th Max) Ozone Values



Air Quality Data Conclusions

The monitoring data supports the recommended nonattainment designation for the current 8-hour ozone nonattainment area. If future monitoring locations indicate that additional counties or regions are in violation of the revised ozone standard, the existing nonattainment boundary will be revaluated and expanded as necessary.

Factor # 2: Emissions and Emissions-Related Data

Table 1-2 contains the 2011 emissions data for NO_x and VOC emissions for 16 source categories for the 9-county DM/NFR region from version 2 of the 2011 National Emissions Inventory (NEI). The emission sources are categorized into controllable and uncontrollable emissions. Biogenic, agricultural livestock waste and wildfire emissions comprise the uncontrolled emission sources. The emissions data for Larimer and Weld Counties includes the whole county and does not apportion emissions originating from the proposed nonattainment area portion of these counties. Consequently, the Division analyzed the ozone nonattainment area NOx and VOC emissions with the total county emissions to determine the percentage of NOx and VOC emissions that are attributed to the northern portions of Larimer and Weld Counties. Based on this analysis, the northern portions of Larimer and Weld Counties (excluding nonattainment area) comprise about 26.4% and 13.9% of the 2011 NO_x and VOC emissions respectively. Accordingly, the controllable emissions from portions of Larimer and Weld Counties that are excluded from the proposed nonattainment area are estimated as follows:

Larimer County (northern portion excluding NAA): NOx = 2,879 tpy; VOC = 3,076 tpy
Weld County (northern portion excluding NAA): NOx = 8,042 tpy; VOC = 18,610 tpy

Table 1-2: 2011 Ozone Precursor Emissions Data for DM/NFR Nonattainment Area Counties

	Adams		Arapahoe		Boulder		Broomfield		Denver		Douglas		Jefferson		Larimer		Weld	
Category	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)
Agriculture Burning	14	24	2	4	3	5	0	0	0	1	0	0	0	0	18	28	199	307
Aircraft	2	4	23	40	4	9	0	0	2,824	540	0	0	5	10	8	9	6	14
Commercial Cooking	0	16	0	27	0	20	0	3	0	43	0	13	0	33	0	17	0	8
Electricity Generating Units	9,105	62	129	10	2,106	17	99	6	2,133	21	2	0	13	5	1,896	40	789	100
Prescribed Fire	16	171	0	0	31	660	0	0	0	0	0	0	10	203	571	12,130	37	601
Fuel Combustion	2,599	856	1,592	900	918	758	12	76	1,814	1,007	458	388	2,303	904	857	792	6,773	2,589
Highway Vehicles	8,763	4,522	8,397	5,643	3,972	2,671	1,111	579	9,618	5,543	5,082	2,478	8,825	5,607	5,914	3,375	6,668	3,239
Non-Road	1,974	1,512	2,016	2,336	1,375	1,337	201	134	2,723	2,009	1,506	1,246	2,226	2,160	1,326	1,756	1,632	1,235
Oil and Gas Production	448	2,480	63	387	161	1,145	68	667	20	106	0	0	0	4	79	691	12,478	104,473
Other Point Sources	762	4,200	52	2,416	780	1,216	1	230	55	2,297	62	1,073	641	2,886	87	1,418	730	18,620
Railroads	837	45	263	13	183	9	0	0	732	44	699	35	255	13	150	7	1,131	56
Solvent Utilization	0	2,567	0	3,149	0	1,623	0	302	0	3,387	0	1,579	0	2,990	0	1,678	0	1,901
Surface Coating	1	736	0	391	0	204	0	126	0	597	0	122	0	472	0	201	19	828
Total- Controllable	**24,521**	**17,195**	**12,538**	**15,317**	**9,533**	**9,674**	**1,492**	**2,125**	**19,920**	**15,593**	**7,809**	**6,933**	**14,279**	**15,287**	**10,905**	**22,142**	**30,463**	**133,972**
Biogenics	724	5,044	484	4,064	201	9,155	60	658	122	1,551	212	10,212	78	11,342	582	30,323	2,233	17,006
Agriculture- Livestock Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wildfires	0	3	0	0	30	667	0	0	0	0	27	239	49	759	90	1,333	1	4
Total- Uncontrollable	**724**	**5,048**	**484**	**4,064**	**231**	**9,823**	**60**	**658**	**122**	**1,551**	**239**	**10,451**	**127**	**12,100**	**672**	**31,656**	**2,233**	**17,010**
Total- Controllable + Uncontrollable	**25,245**	**22,243**	**13,022**	**19,381**	**9,764**	**19,497**	**1,552**	**2,783**	**20,042**	**17,144**	**8,048**	**17,384**	**14,406**	**27,388**	**11,577**	**53,798**	**32,696**	**150,982**

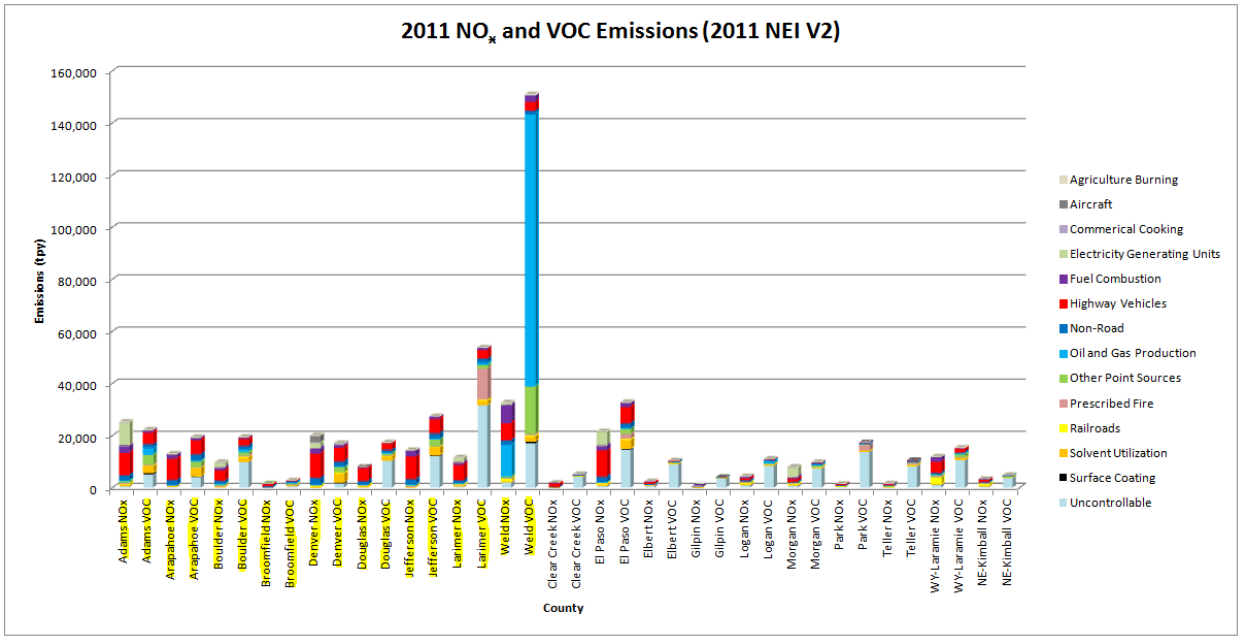
Table 1-3 includes the 2011 emissions data for NOx and VOC emissions for 16 source categories for the counties representing micropolitan and metropolitan statistical areas bordering the current DM/NFR region, including bordering Wyoming and Nebraska counties.

Table 1-3: 2011 Ozone Precursor Emissions Data for Counties nearby the DM/NFR region

	Clear Creek		El Paso		Elbert		Gilpin		Logan		Morgan		Park		Teller		WY-Laramie		NE-Kimball	
Category	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)
Agriculture Burning	0	0	1	1	5	8	0	0	69	109	86	129	0	0	0	0	18	29	0	0
Aircraft	0	0	102	49	0	0	0	0	0	1	0	1	0	0	0	0	5	20	0	0
Commercial Cooking	0	1	0	27	0	0	0	0	0	1	0	1	0	1	0	2	0	4	0	0
Electricity Generating Units	5	0	5,435	107	0	0	0	0	8	1	3,799	62	0	0	0	0	1	0	0	0
Prescribed Fire	4	95	52	1,991	2	21	2	45	2	22	8	188	116	2,560	55	1,052	2	23	0	1
Fuel Combustion	51	19	1,573	1,515	103	37	21	11	711	172	768	127	41	30	85	65	1,916	215	15	6
Highway Vehicles	1,655	388	10,339	6,488	1,088	402	156	106	965	332	1,215	462	700	352	617	393	4,435	1,509	1,247	187
Non-Road	35	93	2,221	1,923	124	106	100	47	413	159	356	152	99	397	83	321	456	319	224	35
Oil and Gas Production	0	0	3	1	33	227	0	0	85	1,194	44	649	0	0	0	0	295	405	42	369
Other Point Sources	16	81	100	2,202	0	151	0	11	6	193	16	198	0	51	639	91	709	1,313	67	120
Railroads	1	0	926	46	135	7	178	9	1,009	52	784	39	0	0	0	0	2,834	151	1,086	56
Solvent Utilization	0	50	1	3,414	0	202	0	29	0	245	0	250	0	89	0	127	0	600	0	103
Surface Coating	0	3	0	472	0	7	0	2	0	14	0	54	0	5	0	7	0	75	0	9
Total- Controllable	**1,767**	**729**	**20,752**	**18,236**	**1,490**	**1,169**	**457**	**260**	**3,268**	**2,494**	**7,078**	**2,311**	**955**	**3,485**	**1,479**	**2,057**	**10,671**	**4,665**	**2,681**	**886**
Biogenics	62	4,409	852	14,582	921	9,194	33	3,664	1,105	8,559	920	7,475	462	13,574	120	8,381	1,250	10,638	596	3,922
Agriculture- Livestock Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wildfires	0	0	2	15	0	0	0	0	1	13	0	0	21	339	1	16	0	2	0	2
Total- Uncontrollable	**62**	**4,409**	**853**	**14,597**	**921**	**9,194**	**33**	**3,664**	**1,106**	**8,572**	**920**	**7,475**	**483**	**13,913**	**121**	**8,397**	**1,250**	**10,640**	**596**	**3,924**
Total- Controllable + Uncontrollable	**1,829**	**5,139**	**21,605**	**32,833**	**2,411**	**10,363**	**490**	**3,924**	**4,374**	**11,066**	**7,997**	**9,786**	**1,438**	**17,398**	**1,600**	**10,454**	**11,922**	**15,305**	**3,277**	**4,810**

A summary of the above tabular data is provided in the following graph. The county names highlighted in yellow are the 9 counties in the existing nonattainment area.

Figure 1-6: 2011 Emissions In and Nearby the 9-County Nonattainment Area



The NO_x and VOC emissions and the locations of small and large point stationary sources by county are shown in the two maps below (Figures 1-7 and 1-8). The current nonattainment boundary is shown with the thick, black line.

Figure 1-7: 2011 DM/NFR NO_x Emissions and Point Sources

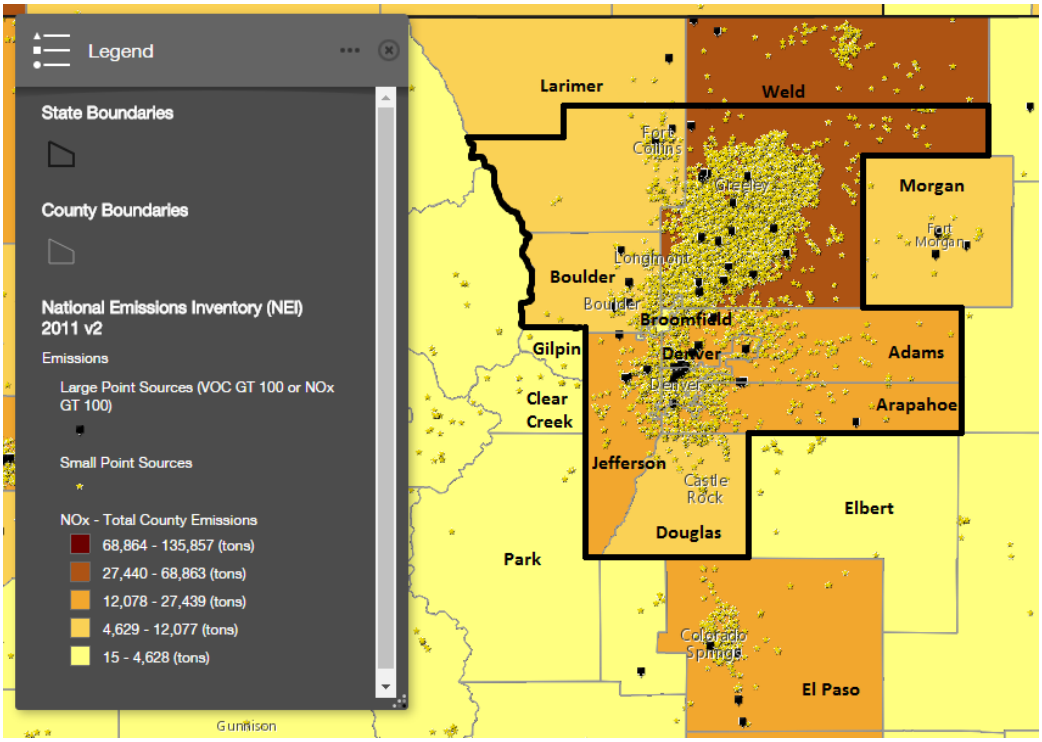
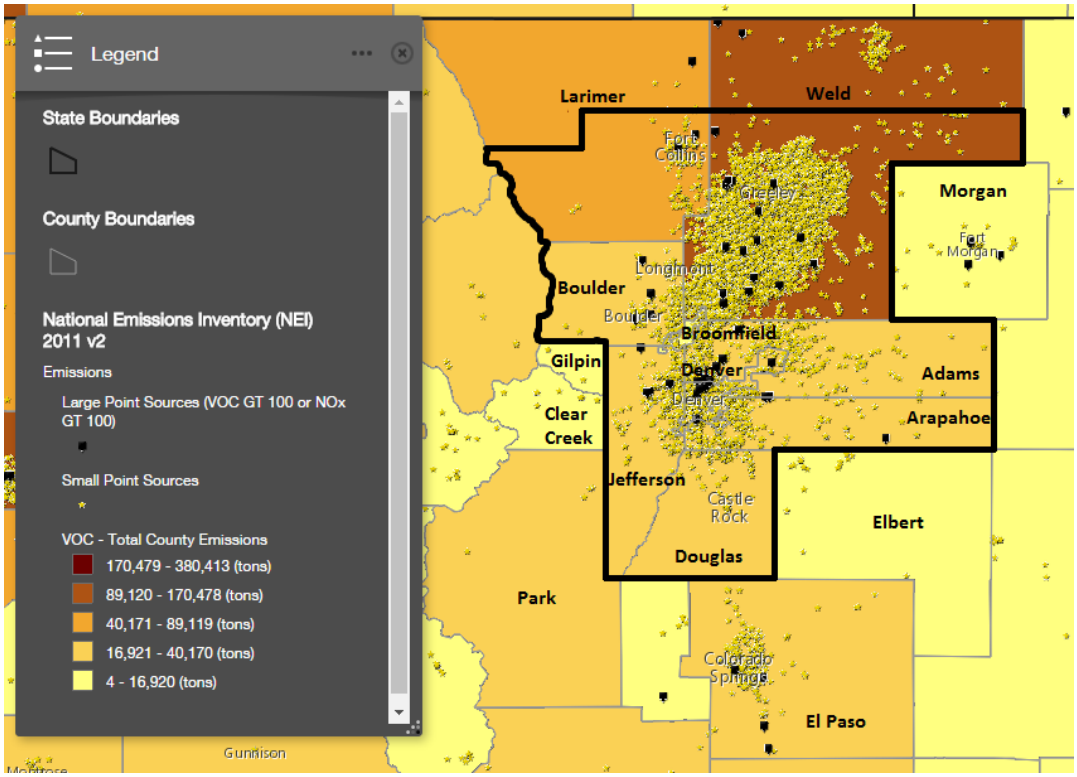


Figure 1-8: 2011 DM/NFR VOC Emissions and Point Sources



Emissions Data Conclusions

Precursor emissions outside of the current 8-hour ozone nonattainment area are substantially less than the emissions within the current nonattainment boundary. With the exception of El Paso County, controllable precursor emissions in nearby counties are either very small by comparison or at substantial distances from high concentration monitors. For El Paso County, the State determined that this region is in a separate airshed and emissions do not significantly contribute to ozone concentrations in the recommended nonattainment area. Also, ozone monitoring in El Paso County indicates attainment of the revised 8-hour ozone standard (see U.S. Air Force Academy, CO and Manitou Springs, CO air monitoring data in Table 1-1). Therefore, the emissions information supports the recommended nonattainment designation and boundary for the current 8-hour ozone nonattainment area. If future emissions growth indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

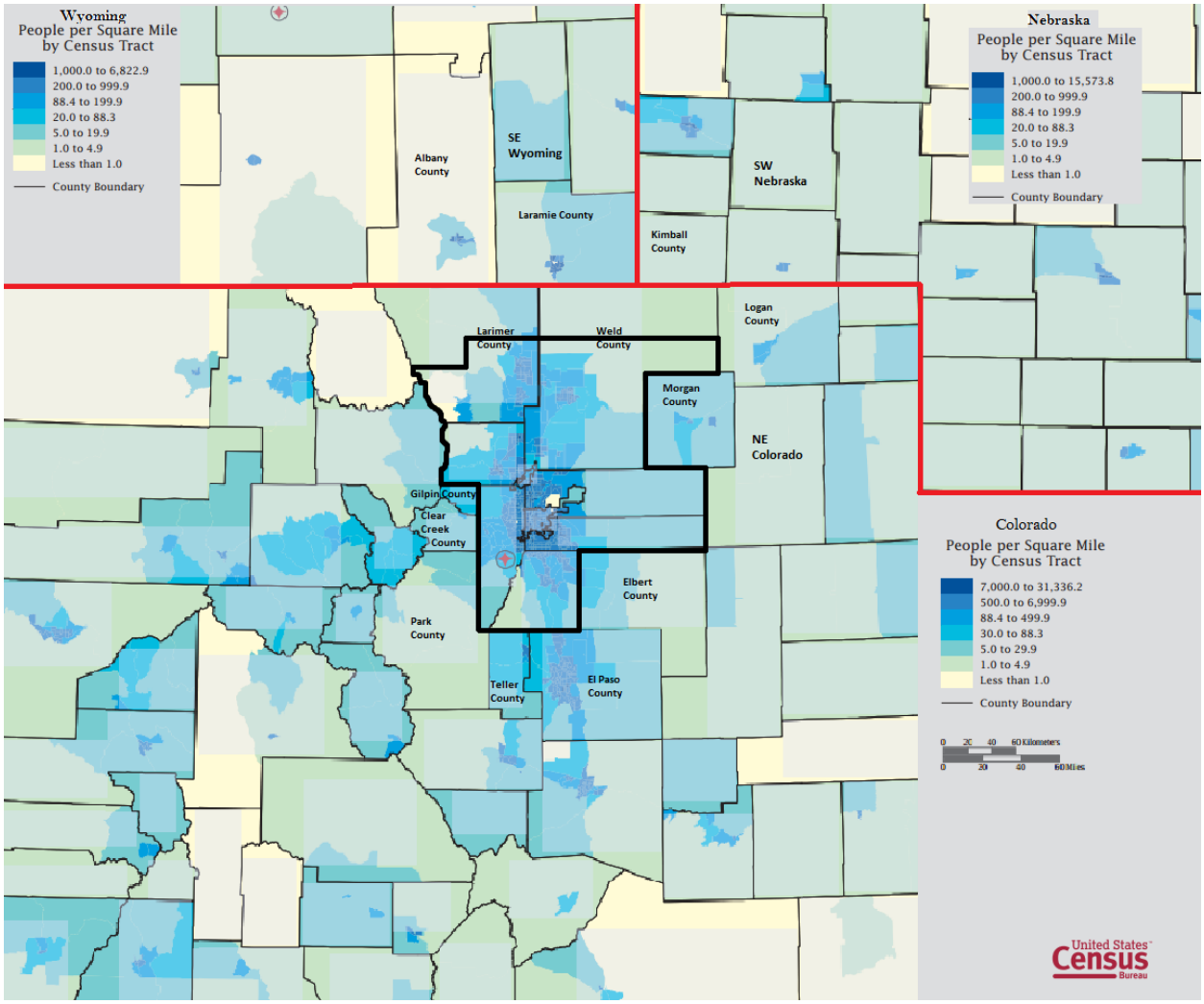
Population Density and Degree of Urbanization

Population Density

In Figure 1-9 below, the population density and the degree of urbanization for NE Colorado, SE Wyoming and SW Nebraska is depicted based on the 2010 US Census. The nonattainment area

is highlighted in black and some peripheral counties are labeled that were also evaluated in the above emissions data section.

Figure 1-9: Population Density & Degree of Urbanization of the NE Colorado Region (2010 Census)



In Figure 1-10 and Figure 1-11, below, the regional population density for the Denver Metro Area and North Front Range Region are shown.

Figure 1-10: 2010-2014 Regional Population Density for Denver Metro Area

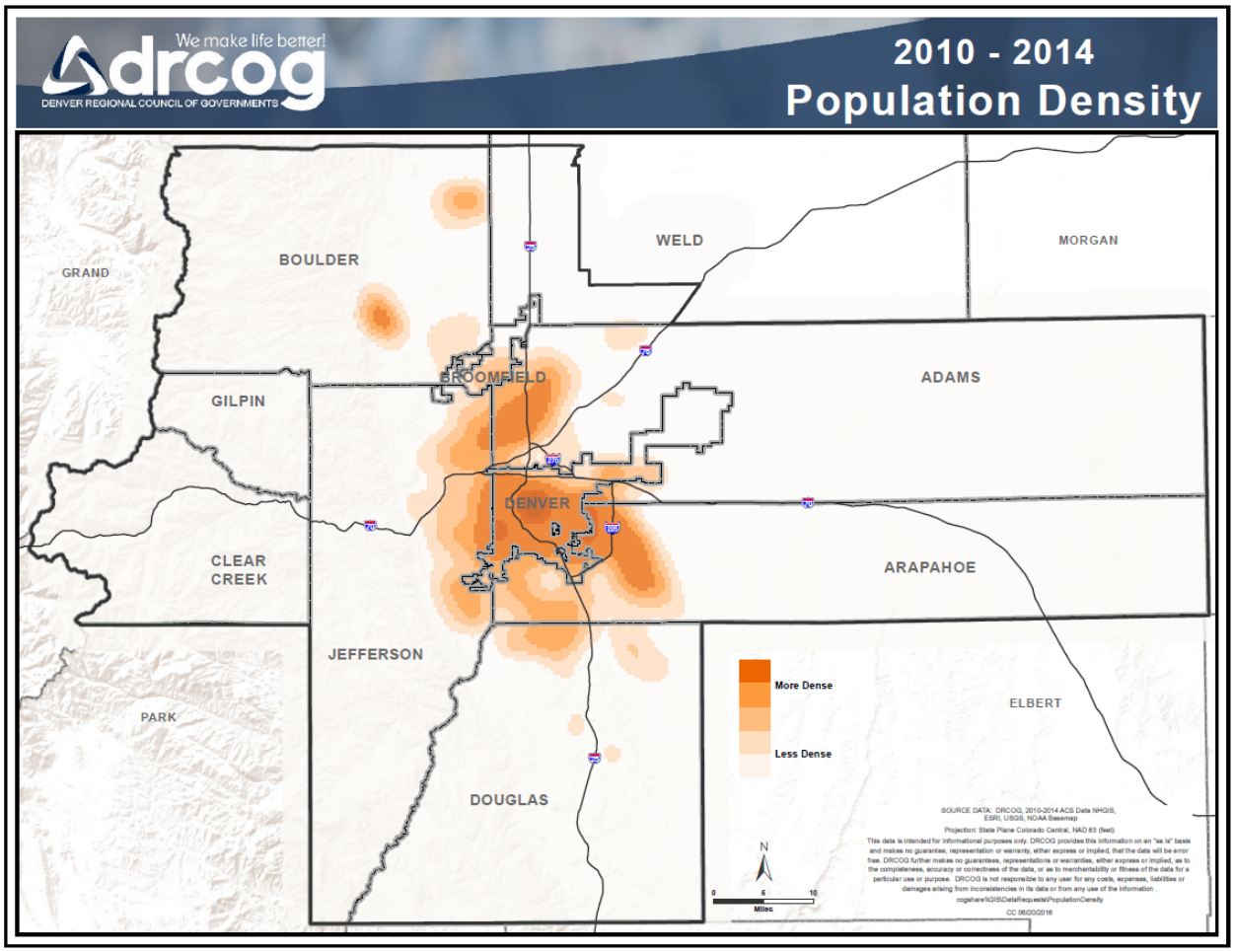
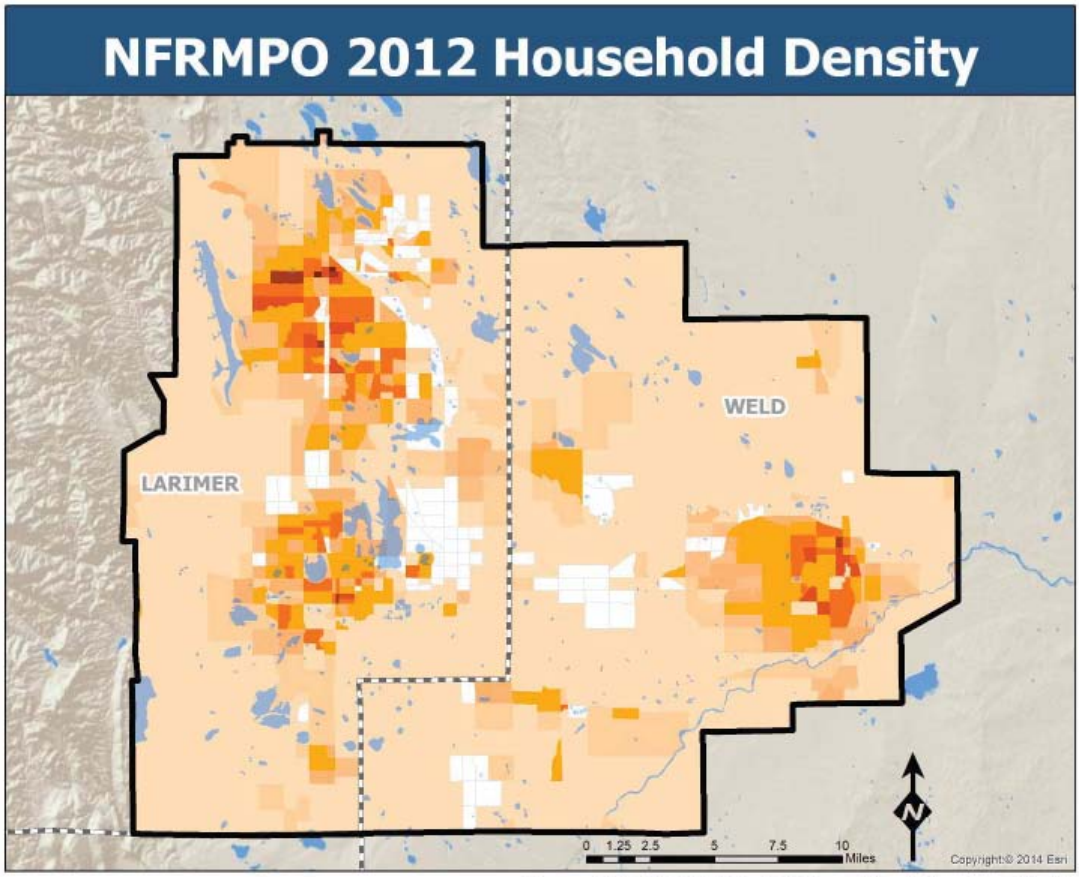


Figure 1-11: 2012 Household Density for North Front Range Area



Source: NFRMPO 2012 - 2040 Land Use Allocation Model
May, 2015

Table 1-4, below, shows the county level population, land area and calculated population density for the current nonattainment area, bordering counties and nearby micropolitan statistical areas.

Table1-4: County-Level Population and Calculated Population Density

County	Land Area (square mile)	Population July 2010 (Estimate)	Calculated Population Density (people/sqaure mile)	Population July 2015 (Estimate)	Caluclated Population Density (people/sqaure mile)	Population Density Rank
Adams	1,192	443,680	372.2	491,337	412.2	6
Araphoe	803	574,727	715.7	631,096	785.9	3
Boulder	746	295,986	396.8	319,372	428.1	5
Broomfield	28	56,271	2009.7	65,065	2323.8	2
Clear Creek	395	9,083	23.0	9,303	23.6	14
Denver	153	603,300	3943.1	682,545	4461.1	1
Douglas	840	286,964	341.6	322,387	383.8	7
Elbert	1,851	23,095	12.5	24,735	13.4	16
El Paso	2,126	626,916	294.9	674,471	317.2	8
Gilpin	150	5,461	36.4	5,828	38.9	13
Grand	1,847	14,783	8.0	14,615	7.9	18
Jackson	1,613	1,385	0.9	1,356	0.8	22
Jefferson	772	535,625	693.8	565,524	732.5	4
Larimer	2,601	300,524	115.5	333,577	128.2	9
Lincoln	2,586	5,469	2.1	5,557	2.1	20
Logan	1,839	22,130	12.0	22,036	12.0	17
Morgan	1,285	28,172	21.9	28,360	22.1	15
Park	2,201	16,262	7.4	16,510	7.5	19
Summit	608	28,065	46.2	30,257	49.8	11
Teller	557	23,450	42.1	23,385	42.0	12
Washington	2,521	4,801	1.9	4,864	1.9	21
Weld	3,992	254,166	63.7	285,174	71.4	10

Total for NAA	3,351,243	3,696,077
Sum for Other	809,072	861,277

Note: NAA total includes the total populations for Weld and Larimer counties

Counties in the current 8-hour ozone nonattainment area

Top 10- Population Density

CBSA and CSA Analysis

EPA suggests that because ground-level ozone and ozone precursor emissions are pervasive and readily transported, it is important to examine ozone-contributing emissions across a relatively broad geographic area. Accordingly, EPA states they will consider information associated with counties in Statistical Area (CBSA) or Combined Statistical Area (CSA) associated with a violating monitor(s).

The following tables (Table 1-5 and Table 1-6) contain the CBSAs and CSAs for Colorado. The CBSAs and CSAs with violating monitors are highlighted in blue.

Table 1-5: 2010 Colorado Metropolitan/Micropolitan Statistical Areas (CBSA)

Colorado Metropolitan/Metropolitan Statistical Areas-Core Based Statistical Areas (CBSA)			
Code	**Metropolitan/Micropolitan Statistical Areas**	**Principal Cities**	**Counties**
14500	Boulder, CO Metropolitan Statistical Area	Boulder	*Boulder*
14720	Breckenridge, CO Micropolitan Statistical Area	Breckenridge	*Summit*
15860	Cañon City, CO Micropolitan Statistical Area	Cañon City	*Fremont*
17820	Colorado Springs, CO Metropolitan Statistical Area	Colorado Springs	*El Paso* , Teller
18780	Craig, CO Micropolitan Statistical Area	Craig	Moffat
19740	Denver-Aurora-Lakewood, CO Metropolitan Statistical Area	Denver, Aurora, Lakewood	*Adams* , *Arapahoe* , *Broomfield* , Clear Creek, *Denver* , *Douglas* , Elbert, Gilpin, *Jefferson* , Park
20420	Durango, CO Micropolitan Statistical Area	Durango	*La Plata*
20780	Edwards, CO Micropolitan Statistical Area	Edwards	*Eagle*
22660	Fort Collins, CO Metropolitan Statistical Area	Fort Collins	*Larimer*
22820	Fort Morgan, CO Micropolitan Statistical Area	Fort Morgan	*Morgan*
24060	Glenwood Springs, CO Micropolitan Statistical Area	Glenwood Springs	*Garfield, Pitkin*
24300	Grand Junction, CO Metropolitan Statistical Area	Grand Junction	*Mesa*
24540	Greeley, CO Metropolitan Statistical Area	Greeley	*Weld*
33940	Montrose, CO Micropolitan Statistical Area	Montrose	*Montrose*
39380	Pueblo, CO Metropolitan Statistical Area	Pueblo	*Pueblo*
44460	Steamboat Springs, CO Micropolitan Statistical Area	Steamboat Springs	*Routt*
44540	Sterling, CO Micropolitan Statistical Area	Sterling	*Logan*

Italics= Central Counties

Areas with violating monitors

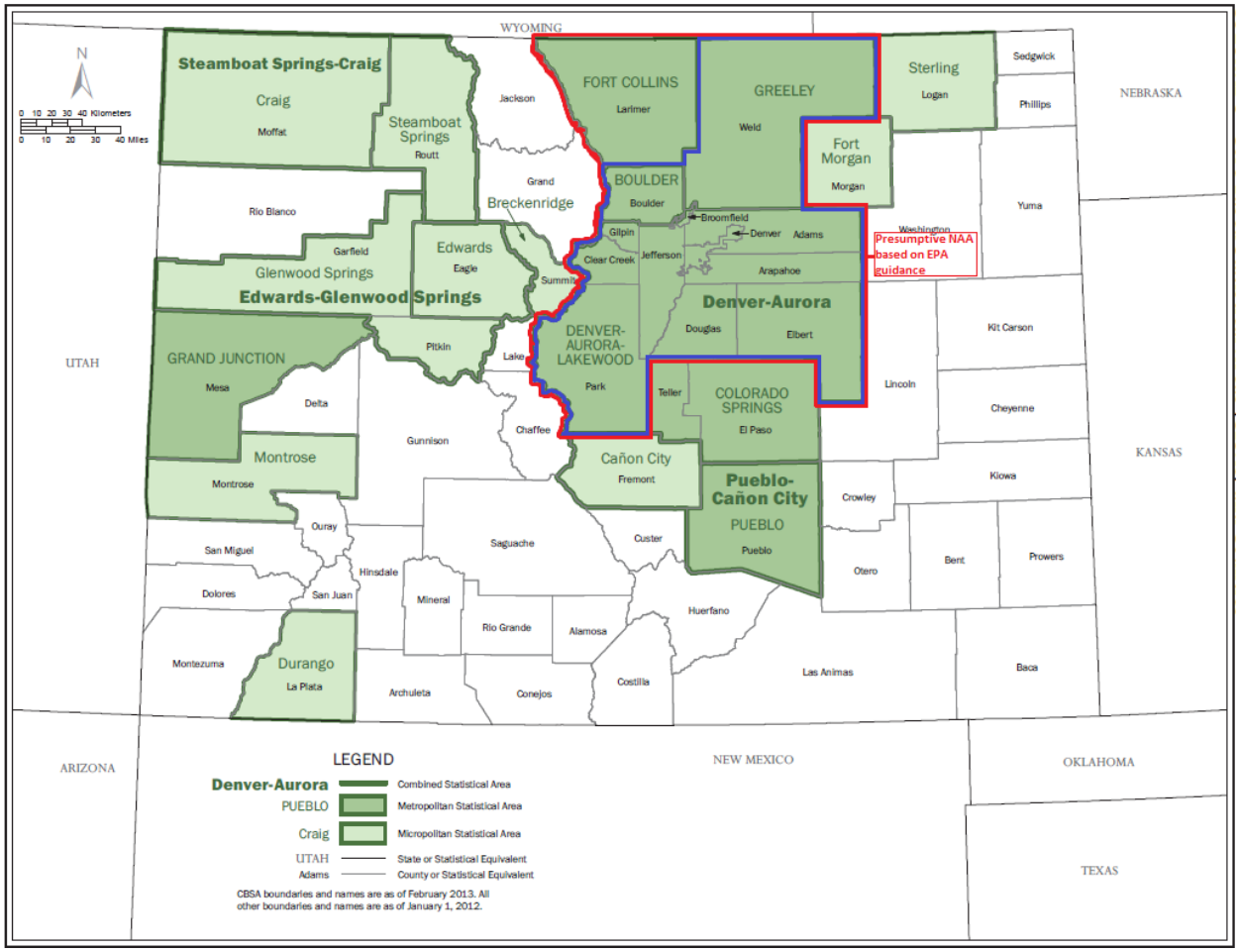
Table 1-6: 2010 Colorado Combined Statistical Areas

Colorado Combined Statistical Areas (CSA)			
Code	**Combined Statistical Area**	**CBSA's Included in CSA**	**Counties**
216	Denver-Aurora, CO	Boulder, CO Metropolitan Statistical Area, Denver-Aurora-Lakewood, CO Metropolitan Statistical Area, Greeley, CO Metropolitan Statistical Area	Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, Park, Weld
233	Edwards-Glenwood Springs, CO	Edwards, CO Micropolitan Statistical Area, Glenwood Springs, CO Micropolitan Statistical Area	Eagle, Garfield, Pitkin
444	Pueblo-Cañon City, CO	Cañon City, CO Micropolitan Statistical Area, Pueblo, CO Metropolitan Statistical Area	Fremont, Pueblo
525	Steamboat Springs-Craig, CO	Craig, CO Micropolitan Statistical Area, Steamboat Springs, CO Micropolitan Statistical Area	Moffat, Routt

Areas with violating monitors

As shown in the two tables above, CSAs and CBSAs with violating monitors (highlighted in red in Figure 1-12 below) includes one CSA (Denver-Aurora CSA, highlighted in blue in Figure 1-12) and one CBSA (Fort Collins, CO Metropolitan Statistical Area). The Denver-Aurora CSA includes Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, Park and Weld counties. The Fort Collins, CO Metropolitan Statistical Area CBSA comprises Larimer County.

Figure 1-12: 2013 CSAs and CBSAs and Counties in Colorado



Although, EPA recommends that any CSA or CBSA with a violating monitor should be examined, they also state that area-specific analyses should be used to support designations recommendations. The State recommends that although Clear Creek, Elbert, Gilpin, Park and the northern portions of Larimer and Weld counties are part of the violating CSA, they should not be included in the ozone nonattainment area. Additionally, in the past, EPA has requested further explanation from the State regarding the inclusion of Morgan County in the nonattainment area boundary, and the State recommends it not be included in the nonattainment area. The basis of recommendation for the exclusion of Clear Creek, Elbert, Gilpin, Park, northern portions of Larimer and Weld, and Morgan County is detailed below.

<u>Clear Creek and Gilpin Counties</u>

The counties of Clear Creek and Gilpin are lightly populated areas located in high elevation mountainous terrain outside of the existing ozone nonattainment area. Based on the information in Table 1-4, the estimated 2015 population density for Clear Creek and Gilpin Counties are 23.6 and 38.9 people per square mile respectively. The total estimated 2015 population residing in Clear Creek and Gilpin Counties is 9,303 and 5,828 people respectively. Compared to the 3.7

million (2015) people residing in the existing DM/NFR nonattainment area, these two counties represent less than 0.5 percent of the total population for the area.

The combined ozone precursor emissions (NO_x and VOC) for both counties are about 11,400 tons/year from all source categories with only 3,200 tons/year being attributed to controllable sources (excludes uncontrollable emissions: biogenic, agricultural livestock waste and wildfire emissions). There are no stationary point sources in Clear Creek or Gilpin Counties with ozone precursor emissions over 100 tons/year (see Figures 1-7 and 1-8).

The back trajectory analyses below (Figures 1-23 – 1-29) indicate that Clear Creek and Gilpin Counties are infrequent contributors to air quality in the DM/NFR nonattainment area. This is indicated by the low number of trajectory points in the grid cells over Clear Creek and Gilpin Counties.

In summary, the inclusion of Clear Creek and Gilpin Counties into the ozone nonattainment area is not warranted because of low population, low degree of urbanization, very low precursor emissions, and infrequent contributions to air quality in the DM/NFR.

Elbert and Park Counties

The counties of Elbert and Park are lightly populated areas outside of the existing ozone nonattainment area. Based on the information in Table 1-4, the estimated 2015 population density for Elbert and Park Counties are 13.4 and 7.5 people per square mile respectively. The total estimated 2015 population residing in Elbert and Park Counties is 24,735 and 16,510 people respectively. Compared to the 3.7 million (2015) people residing in the existing DM/NFR nonattainment area, these two counties represent less than 1.1 percent of the total population for the area.

Information from the State Demography Office indicates that the 2014 population estimates for the towns of Elizabeth and Kiowa are 1,395 and 739 persons respectively. Bailey is an unincorporated town that is not tracked as a municipality by the State Demography Office, although a Google search yielded population data for 2009 indicating that 8,859 people reside in the Bailey ZIP code (80421).

The combined ozone precursor emissions (NO_x and VOC) for Elbert and Park Counties are about 12,800 tons/year and 18,800 tons/year from all source categories respectively. Of the total emissions only 2,700 tons/year and 4,400 tons/year are due to controllable emission sources (excludes uncontrollable emissions: biogenic, agricultural livestock waste and wildfire emissions) for Elbert and Park Counties respectively. There are no stationary point sources in Elbert or Park Counties with ozone precursor emissions over 100 tons/year.

The back trajectory analyses below (Figures 1-23 – 1-29) indicate that Elbert and Park Counties are infrequent contributors to air quality in the DM/NFR nonattainment area. This is indicated by the very low number of trajectory points in the grid cells over Elbert and Park Counties, particularly over the urbanized areas of concern.

In summary, the inclusion of the urbanized areas of Elbert and Park Counties into the ozone nonattainment area is not warranted because of low population, low degree of urbanization, very low precursor emissions, and infrequent contributions to air quality in the DM/NFR.

Northern Portions of Larimer and Weld Counties

The northern portions of Larimer and Weld Counties are rural and sparsely populated with most areas having a population density fewer than five people per square mile, as indicated in the Figure 1-9. There are only three stationary point sources with ozone precursor air pollutant emissions above 100 tons/year located north of the existing nonattainment area boundary (see Figures 1-7 and 1-8). Expanding the nonattainment area to include these three point sources would not enhance the States regulatory authority, although any future major modifications to these facilities would be affected.

The estimated 2011 emissions (all source categories) for the northern portion of Larimer County are approximately 2,879 tons/year of NO_x and 3,076 tons/year of VOC (approximately 26.4% and 13.9% of total county emissions for NOx and VOC respectively). The estimated 2011 emissions (all source categories) for the northern portion of Weld County are approximately 8,042 tons/year of NO_x and 18,610 tons/year of VOC (approximately 26.4% and 13.9% of total county emissions for NOx and VOC respectively).

Depending on the future ozone nonattainment area classification, requirements associated with the existing ozone nonattainment area may increase in stringency, such as the need to expand the vehicle Inspection/Maintenance Program (I&M program). Accordingly, the potential expansion of the existing nonattainment area to include these rural areas could result in requiring residents with vehicles to be subject to mandatory vehicle inspections. The emission reduction benefit associated with a mandatory I/M program targeting rural residents often located far from an inspection station is negligible.

The back trajectory analyses below (Figures 1-23 – 1-29) indicate that the northern portions of Larimer and Weld Counties are infrequent contributors to air quality in the DM/NFR nonattainment area. This is indicated by the very low number of trajectory points in the grid cells over the northern portions of Larimer and Weld Counties.

In summary, the inclusion of the northern portions of Larimer and Weld Counties into the ozone nonattainment area is not warranted because of sparse population, low degree of urbanization, low precursor emissions, and infrequent contributions to air quality in the DM/NFR.

Morgan County

Morgan County is a rural area outside of the existing ozone nonattainment area. Based on the information in Table 1-4, the estimated 2015 population density for Morgan County is 22.1 people per square mile. The total estimated 2015 population residing in Morgan County is 28,360. Compared to the 3.7 million (2015) people residing in the existing DM/NFR nonattainment area, Morgan County represents less than 0.8 percent of the total population for the area.

The NO_x emissions for Morgan County are approximately 8,000 tons/year and the VOC emissions are approximately 9,800 tons/year from all source categories. The NO_x emissions from one electric generating unit (EGU) represent approximately half of the total NO_x emissions in the county. The NOx emissions from the EGU were reduced substantially when the operation of a selective catalytic reduction (SCR) system began in 2014. Also, of the 9,800 tons/year of VOC emissions, approximately 7,500 tons/year are from uncontrollable sources. There are three stationary point sources in Morgan County with ozone precursor emissions over 100 tons/year, see Figures 1-7 and 1-8.

The back trajectory analyses below (Figures 1-23 – 1-29) indicate that Morgan County is an infrequent contributor to air quality in the DM/NFR nonattainment area. This is indicated by the very low number of trajectory points in the grid cells over Morgan County.

In summary, the inclusion of Morgan County into the ozone nonattainment area is not warranted because of low population, low degree of urbanization, low precursor emissions, and infrequent contributions to air quality in the DM/NFR.

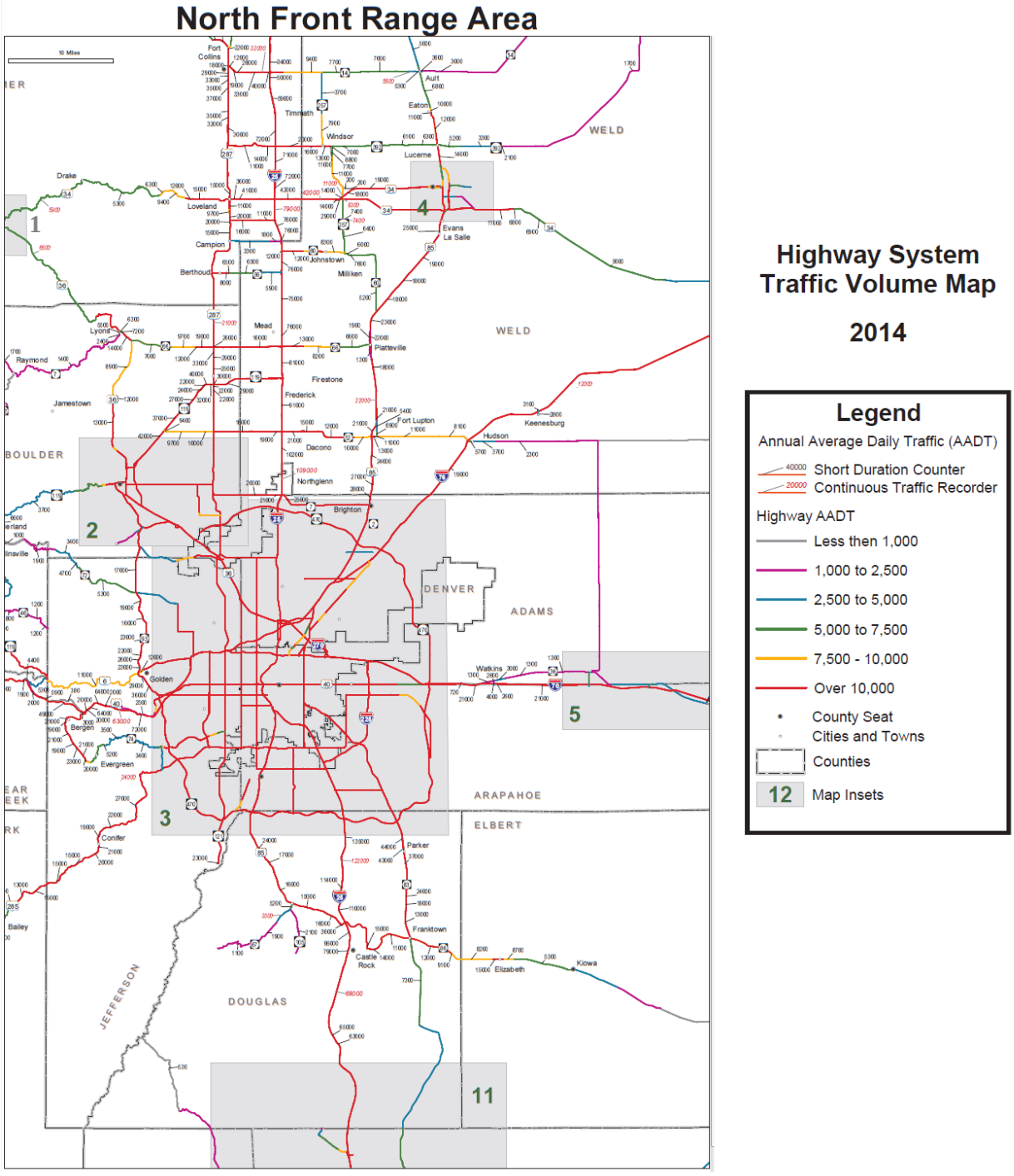
Population Density and Degree of Urbanization Conclusions

The region's population density/degree of urbanization information illustrates that the urbanization (and the associated activities that can result in emissions of ozone precursors) is concentrated within the current 8-hour ozone nonattainment area boundaries. As shown in Table 1-4, the current 8-hour ozone nonattainment area boundary contains 9 of the 10 most densely populated counties in the state. Urbanization rapidly diminishes beyond the central portion of the current nonattainment area. Because population in the surrounding counties is low by comparison, and the human landscape is rural with small pockets of development, the population/urbanization information supports the recommended nonattainment designation for the current 8-hour ozone nonattainment area. If future urbanization indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

Traffic and Commuting Patterns

The following figures (Figure 1-13 – Figure 1-18) show the traffic volume in various areas within and around the DM/NFR area based on information from the Colorado Department of Transportation (CDOT).

Figure 1-13: CDOT Traffic Volume in North Front Range Area



The above shaded areas in Figure 1-13 denoted by numbers (1-5) are expanded below to provide more detail on localized annual average daily traffic volumes.

Figure 1-14: CDOT Traffic Volume in Estes Park Area

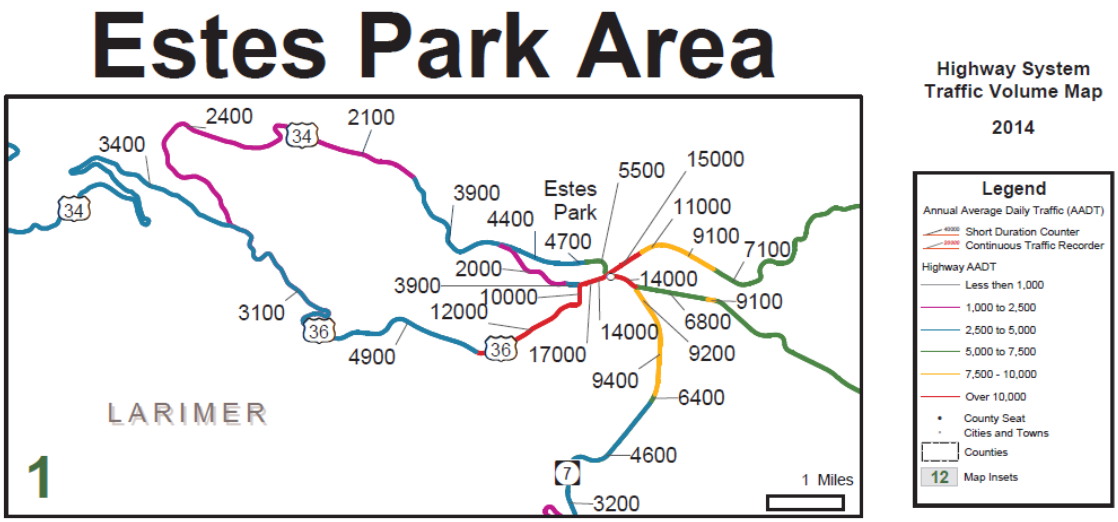


Figure 1-15: CDOT Traffic Volume in Boulder Area

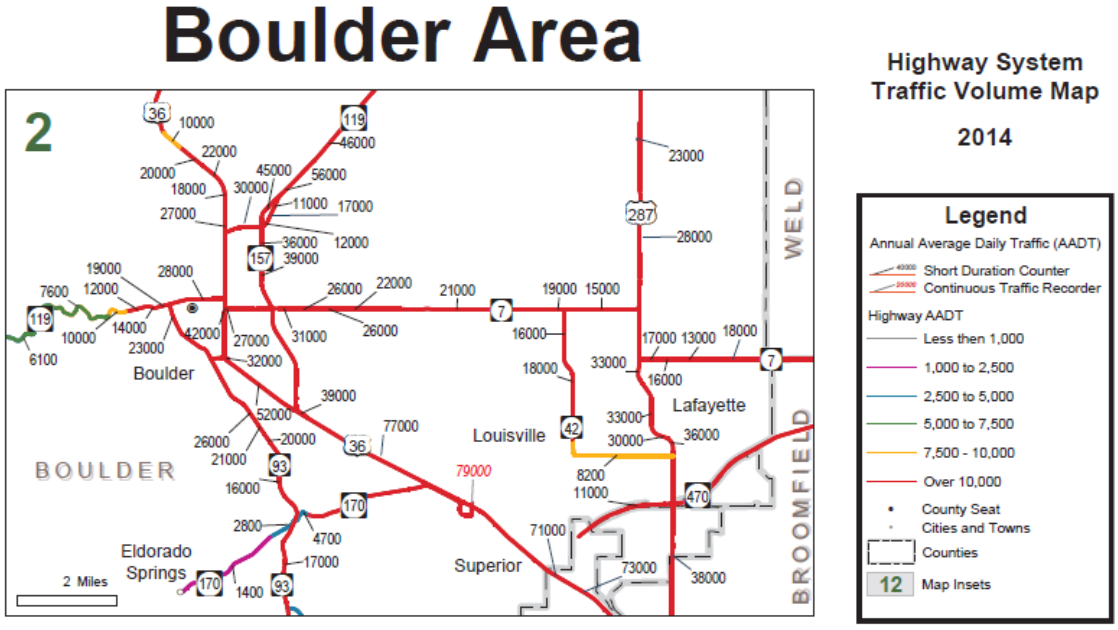


Figure 1-16: CDOT Traffic Volume in Denver Metro Area

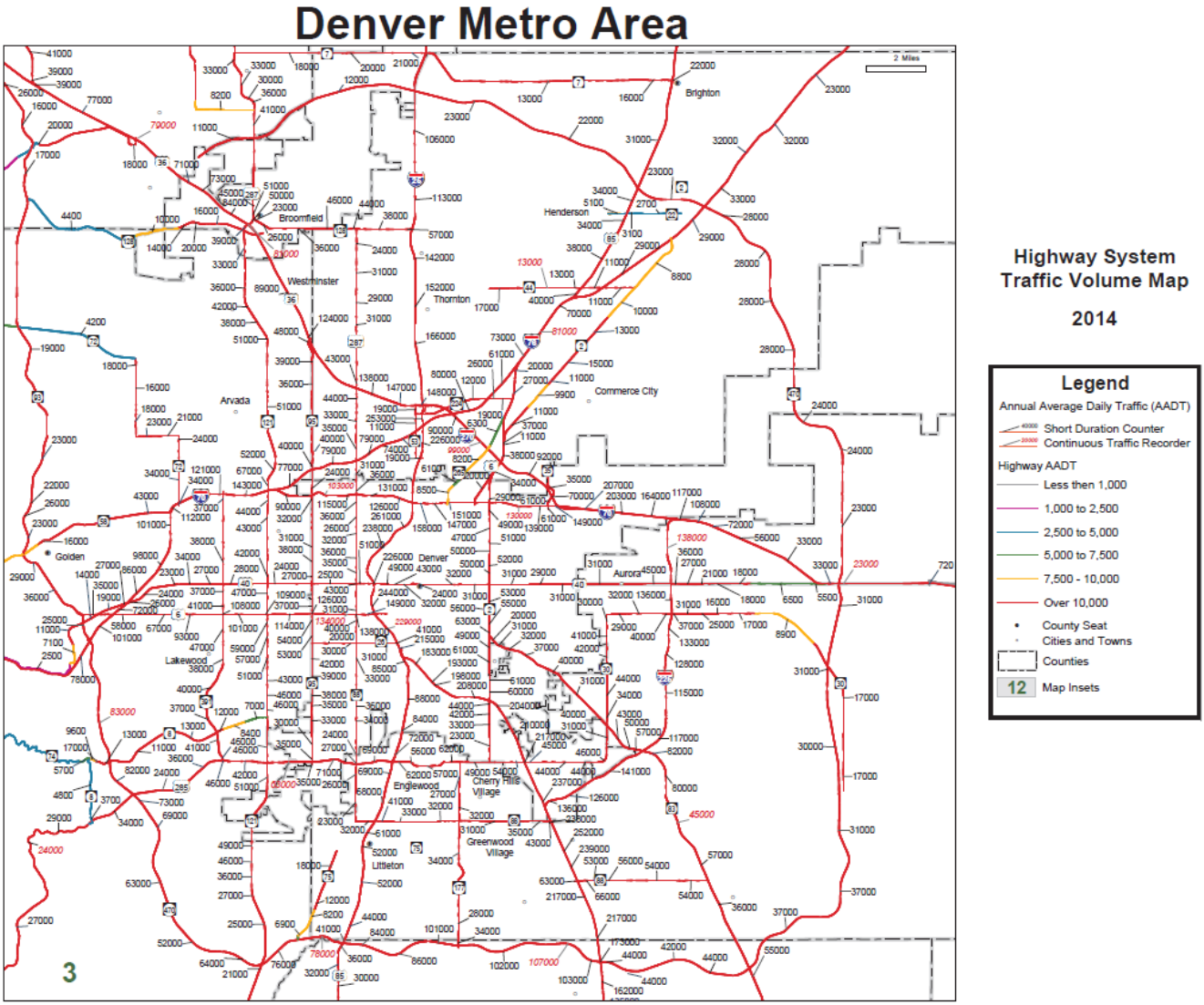


Figure 1-17: CDOT Traffic Volume in Greeley Area

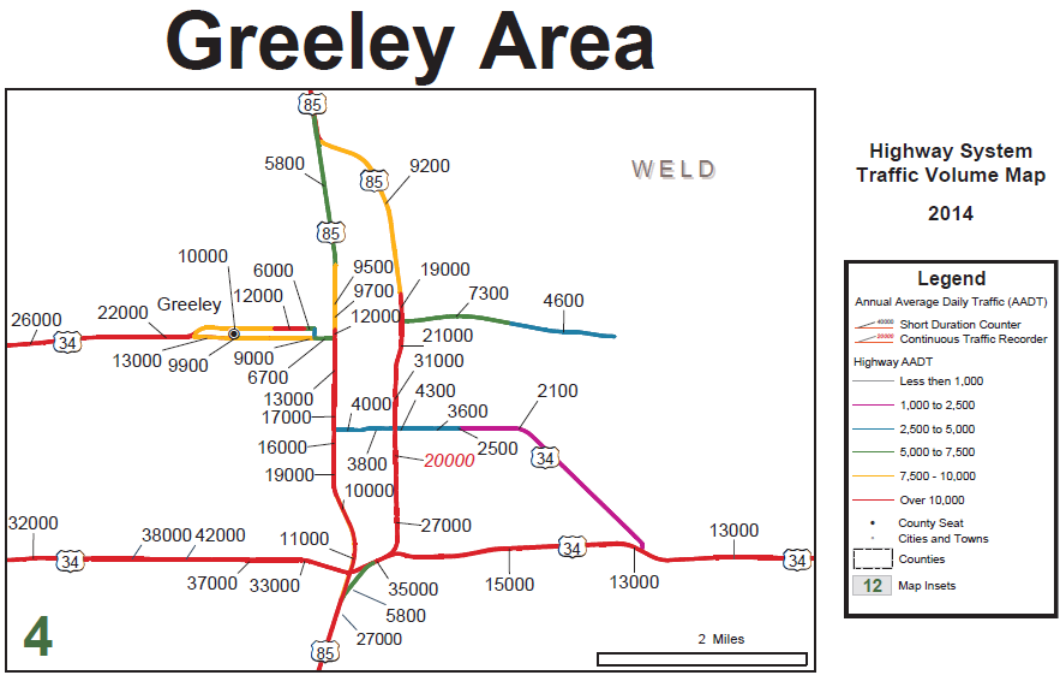


Figure 1-18: CDOT Traffic Volume in Bennett Area

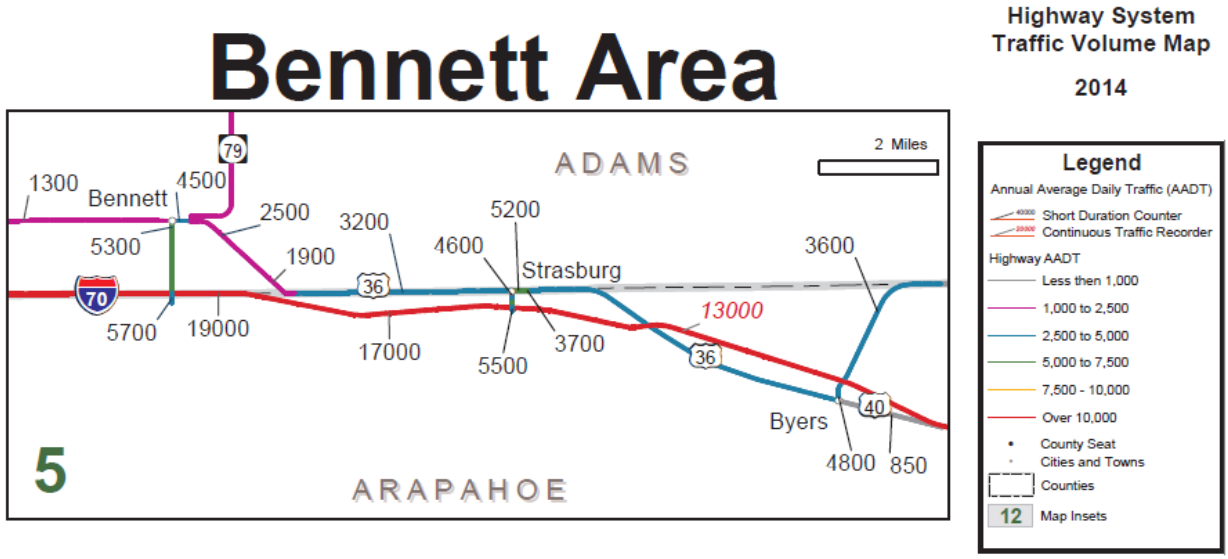
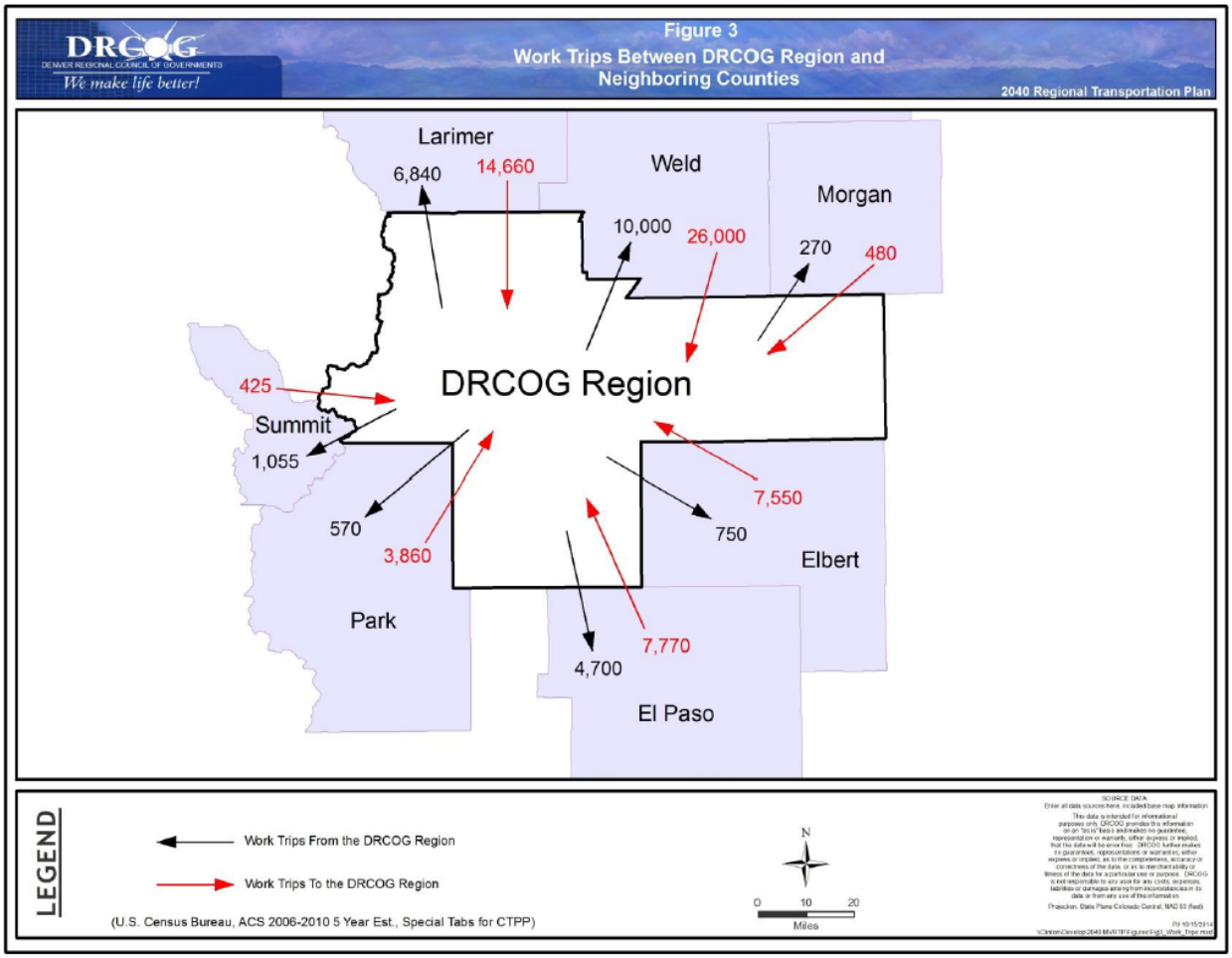


Figure 1-19, below, indicates the number of workers commuting into the Denver Region over a 5-year period 2006-2010. For the purposes of the figure, the Denver Region is composed of Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Gilpin, Jefferson counties.

Figure 1-19: Number of Workers Commuting between Denver Region and Neighboring Counties



The values shown in Figure 1-19 represent all workers commuting between the Denver Region and nearby counties. Since not everyone works every day of the week, the actual number of workers commuting on any given day would be somewhat lower.

In Table 1-7, below, the average vehicle miles traveled by county are shown. The values for Weld County in the table represent the vehicle miles traveled only for the southwest portion of the county. Table 1-8 shows the number of trips between residence and workplace for counties within Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson County.

Table 1-7: County-Level Annual Average Vehicle Miles Travelled

	YR2015		YR2025		YR2035		YR2040	
CountyName	VMT	%VMT	VMT	%VMT	VMT	%VMT	VMT	%VMT
Adams	14,483,101	17.3%	17,225,848	17.8%	20,111,484	18.8%	21,021,001	19.1%
Arapahoe	14,802,244	17.7%	17,384,553	18.0%	18,525,385	17.4%	19,073,286	17.3%
Boulder	7,432,845	8.9%	8,409,822	8.7%	9,204,069	8.6%	9,274,273	8.4%
Broomfield	2,297,786	2.8%	2,648,504	2.7%	3,121,476	2.9%	3,239,347	2.9%
Clear Creek	1,446,242	1.7%	1,676,227	1.7%	1,809,196	1.7%	1,977,498	1.8%
Denver	16,514,702	19.8%	18,699,769	19.4%	20,087,551	18.8%	20,641,570	18.7%
Douglas	9,545,751	11.4%	11,366,540	11.8%	12,920,780	12.1%	13,441,573	12.2%
Gilpin	182,830	0.2%	189,933	0.2%	207,552	0.2%	219,387	0.2%
Jefferson	13,729,808	16.4%	15,456,362	16.0%	16,666,397	15.6%	17,177,702	15.6%
Weld (SW)	3,051,510	3.7%	3,578,051	3.7%	4,053,377	3.8%	4,183,718	3.8%

Counties in the current 8-hour ozone nonattainment area

Table 1-8: Number of Trips Between Residence and Workplace for Counties within the Denver Region

Journey to Work Data by County (Avg. 2006-2010)

	WORKPLACE																			
RESIDENCE	Adams	Arapahoe	Boulder	Broomfield	Clear Creek	Denver	Douglas	Gilpin	Jefferson	SW Weld*	DRCOG Region Total	Weld (Non-DRCOG)	Elbert	El Paso	Larimer	Morgan	Park	Summit	Neighboring County Total	Grand Total
Adams	80,200	14,405	12,385	7,030	95	57,815	2,360	580	22,010	778	197,658	3,112	120	260	795	55	4	120	4,466	202,124
Arapahoe	17,145	136,010	1,925	870	10	88,130	18,635	315	12,465	122	275,687	488	135	1,015	395	45	215	205	2,498	278,185
Boulder	3,860	1,440	118,905	5,570	0	7,555	415	30	5,325	612	143,712	2,448	0	40	1,825	10	35	110	4,468	148,180
Broomfield	4,345	805	6,595	7,780	0	3,745	205	50	2,985	118	26,628	472	10	25	100	0	0	15	622	27,250
Clear Creek	115	125	20	4	2,345	535	0	320	1,370	3	4,837	12	0	0	4	0	0	165	181	5,018
Denver	19,210	43,930	5,300	2,150	40	183,050	8,590	700	26,150	151	289,271	604	10	680	410	50	25	90	1,869	291,140
Douglas	3,610	39,230	590	370	25	25,430	56,625	110	8,835	29	134,854	116	415	2,215	115	10	0	45	2,916	137,770
Gilpin	120	25	535	50	120	215	0	1,340	595	4	3,004	16	0	0	10	0	0	0	26	3,030
Jefferson	18,475	25,265	9,020	4,425	555	65,010	7,085	1,870	136,625	189	268,519	756	55	435	660	45	295	305	2,551	271,070
SW Weld*	1,333	212	2,388	222	0	1,238	54	2	456		5,905	2,000	2	33	2,521	56	0	0	4,612	10,517
DRCOG Region Total	148,413	261,447	157,663	28,471	3,190	432,723	94,029	5,317	216,816	2,006	1,350,075	10,024	747	4,703	6,835	271	574	1,055	24,209	1,374,284
Weld (Non-DRCOG)	5,332	848	9,552	888	0	4,952	216	8	1,824	2,500	26,120		8	132	10,084	224	0	0	10,448	36,568
Elbert	350	2,320	100	0	0	1,605	2,665	0	505	2	7,547	8	3,125	545	0	0	0	15	3,693	11,240
El Paso	495	2,345	190	35	0	2,620	1,510	0	555	15	7,765	60	215	277,090	120	0	25	25	277,535	285,300
Larimer	975	500	7,865	430	10	2,165	90	15	790	1815	14,655	7,260	0	125	123,155	95	0	0	130,635	145,290
Morgan	105	60	4	45	0	125	4	0	45	91	479	364	0	0	15	11,215	0	4	11,598	12,077
Park	225	550	120	25	0	1,030	45	0	1,860	0	3,855	0	0	100	0	0	3,170	745	4,015	7,870
Summit	30	40	15	0	165	115	0	0	60	0	425	0	0	0	0	0	4	15,935	15,939	16,364
Neighboring Counties Total	7,512	6,663	17,846	1,423	175	12,612	4,530	23	5,639	4,423	60,846	7,692	3,348	277,992	133,374	11,534	3,199	16,724	435,723	496,569
Grand Total	155,925	268,110	175,509	29,894	3,365	445,335	98,559	5,340	222,455	6,429	1,410,921	17,716	4,095	282,695	140,209	11,805	3,773	17,779	459,932	1,870,853

Source: US Census Bureau, ACS 2006-2010 5yr est., Special Tabs for CTPP

*Note - 2010 Census population used to determine number of commuters within SW Weld and number of commuters in remaining Weld County. (52,246 out of 252,825 - Approx. 20% SW Weld and 80% Non-DRCOG Weld)

Traffic and Commuting Patterns Conclusion

The region's traffic and commuting patterns illustrate that the vast majority of vehicle trips occur within the current 8-hour ozone nonattainment boundary. Average daily traffic rapidly diminishes beyond the core area of the current nonattainment area. Commuting information also

indicates that work trips into the region are minimal when compared to traffic volumes that exist in the recommended nonattainment area. Because vehicular traffic in the surrounding counties is low by comparison, and the human landscape is rural with small pockets of development, the traffic and commuting information supports the recommended nonattainment designation for the current 8-hour ozone nonattainment area. If future traffic and commuting information indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

Growth Rates and Patterns

The following three tables present population growth rates and patterns for the current nonattainment area, bordering counties and nearby micropolitan statistical areas. In Tables 1-9, 1-10 and 1-11, the population data for Larimer and Weld Counties includes the whole county and does not apportion persons residing in the nonattainment area portion of these counties. The 2015 population for the northern portion of Larimer County (nonattainment area excluded) is estimated at 16,679 persons (~5% of County total). The 2015 population for the northern portion of Weld County (nonattainment area excluded) is estimated at 2,852persons (~1% of County total).

Table 1-9: Recent Population Estimates for Denver Metro Area, North Front Range and Neighboring Counties

County	July 2010 (Estimate)	July 2015 (Estimate)	2010 to 2015 Total % Change	2010 to 2015 Annual % Change	2010 to 2015 Annual % Change Rank
Adams	443,680	491,337	10.7%	2.1%	6
Araphoe	574,727	631,096	9.8%	2.0%	7
Boulder	295,986	319,372	7.9%	1.6%	8
Broomfield	56,271	65,065	15.6%	3.1%	1
Clear Creek	9,083	9,303	2.4%	0.5%	14
Denver	603,300	682,545	13.1%	2.6%	2
Douglas	286,964	322,387	12.3%	2.5%	3
Elbert	23,095	24,735	7.1%	1.4%	11
El Paso	626,916	674,471	7.6%	1.5%	10
Gilpin	5,461	5,828	6.7%	1.3%	12
Grand	14,783	14,615	-1.1%	-0.2%	21
Jackson	1,385	1,356	-2.1%	-0.4%	22
Jefferson	535,625	565,524	5.6%	1.1%	13
Larimer	300,524	333,577	11.0%	2.2%	5
Lincoln	5,469	5,557	1.6%	0.3%	15
Logan	22,130	22,036	-0.4%	-0.1%	20
Morgan	28,172	28,360	0.7%	0.1%	18
Park	16,262	16,510	1.5%	0.3%	16
Summit	28,065	30,257	7.8%	1.6%	9
Teller	23,450	23,385	-0.3%	-0.1%	19
Washington	4,801	4,864	1.3%	0.3%	17
Weld	254,166	285,174	12.2%	2.4%	4
Total for NAA	3,351,243	3,696,077	10.3%	2.1%	
Sum for Other	809,072	861,277	6.5%	1.3%	

Note: NAA total includes the total populations for Weld and Larimer counties

Counties in the current 8-hour ozone nonattainment area

Top 10- 2010 to 2015 Annual % Change

Table 1-10: Population Projections for Denver Metro Area, North Front Range and Neighboring Counties

County	July 2020 (State Estimate)	July 2025 (State Estimate)	July 2030 (State Estimate)	July 2035 (State Estimate)	July 2040 (State Estimate)	July 2045 (State Estimate)	July 2050 (State Estimate)
Adams	545,237	603,716	665,364	726,331	787,411	841,102	893,563
Araphoe	687,520	748,470	810,672	875,381	935,138	981,660	1,016,184
Boulder	337,897	359,908	379,714	398,988	416,942	427,993	436,166
Broomfield	72,388	82,081	92,051	94,178	95,453	95,870	95,658
Clear Creek	9,627	10,873	12,088	13,210	14,344	15,427	16,419
Denver	734,079	770,900	804,797	836,961	867,545	896,110	922,512
Douglas	352,955	389,462	425,395	455,617	482,079	491,393	494,181
Elbert	33,896	42,326	49,029	54,671	59,873	64,743	69,333
El Paso	727,807	786,295	845,985	905,014	964,290	1,017,813	1,070,833
Gilpin	6,054	6,194	6,286	6,542	6,699	6,822	6,944
Grand	16,544	18,699	20,809	22,835	24,731	26,505	28,249
Jackson	1,483	1,535	1,579	1,630	1,673	1,682	1,692
Jefferson	595,849	625,516	652,326	674,241	686,319	693,880	700,173
Larimer	360,434	393,517	424,882	454,593	483,322	513,003	542,039
Lincoln	5,869	6,266	6,699	7,148	7,604	8,030	8,445
Logan	23,247	24,663	26,213	27,807	29,350	30,823	32,271
Morgan	30,232	32,336	34,436	36,619	39,017	41,391	43,710
Park	20,339	24,788	28,101	30,710	32,176	32,693	32,928
Summit	33,366	37,987	42,197	46,066	49,704	53,184	56,606
Teller	25,447	27,449	28,618	29,638	30,524	31,385	32,310
Washington	4,723	4,859	5,005	5,053	5,028	5,001	4,980
Weld	340,265	401,866	466,717	535,889	605,605	671,753	738,396
Total for NAA	4,026,624	4,375,436	4,721,918	5,052,179	5,359,814	5,612,764	5,838,872
Sum for Other	938,634	1,024,270	1,107,045	1,186,943	1,265,013	1,335,499	1,404,720

Note: NAA total includes the total populations for Weld and Larimer counties

Table 1-11: Population Percent Change Projections for Denver Metro Area, North Front Range and Neighboring Counties

County	2015 to 2020 (State Estimate)	2020 to 2025 (State Estimate)	2025 to 2030 (State Estimate)	2030 to 2035 (State Estimate)	2035 to 2040 (State Estimate)	2040 to 2045 (State Estimate)	2045 to 2050 (State Estimate)
Adams	2.2%	2.1%	2.0%	1.8%	1.6%	1.3%	1.2%
Araphoe	1.8%	1.7%	1.6%	1.5%	1.3%	1.0%	0.7%
Boulder	1.2%	1.3%	1.1%	1.0%	0.9%	0.5%	0.4%
Broomfield	2.7%	2.5%	2.3%	0.5%	0.3%	0.1%	0.0%
Clear Creek	1.1%	2.5%	2.1%	1.8%	1.7%	1.5%	1.3%
Denver	1.6%	1.0%	0.9%	0.8%	0.7%	0.7%	0.6%
Douglas	2.0%	2.0%	1.8%	1.4%	1.1%	0.4%	0.1%
Elbert	6.1%	4.5%	3.0%	2.2%	1.8%	1.6%	1.4%
El Paso	1.5%	1.6%	1.5%	1.4%	1.3%	1.1%	1.0%
Gilpin	0.6%	0.5%	0.3%	0.8%	0.5%	0.4%	0.4%
Grand	2.2%	2.5%	2.2%	1.9%	1.6%	1.4%	1.3%
Jackson	1.1%	0.7%	0.6%	0.6%	0.5%	0.1%	0.1%
Jefferson	1.1%	1.0%	0.8%	0.7%	0.4%	0.2%	0.2%
Larimer	1.8%	1.8%	1.5%	1.4%	1.2%	1.2%	1.1%
Lincoln	1.2%	1.3%	1.3%	1.3%	1.2%	1.1%	1.0%
Logan	0.9%	1.2%	1.2%	1.2%	1.1%	1.0%	0.9%
Morgan	1.2%	1.4%	1.3%	1.2%	1.3%	1.2%	1.1%
Park	3.8%	4.0%	2.5%	1.8%	0.9%	0.3%	0.1%
Summit	2.3%	2.6%	2.1%	1.8%	1.5%	1.4%	1.3%
Teller	1.5%	1.5%	0.8%	0.7%	0.6%	0.6%	0.6%
Washington	0.0%	0.6%	0.6%	0.2%	-0.1%	-0.1%	-0.1%
Weld	3.5%	3.4%	3.0%	2.8%	2.5%	2.1%	1.9%

Note: NAA total includes the total populations for Weld and Larimer counties

Growth Rates and Patterns Conclusions

The region's growth rates and patterns illustrate that vast majority of increased population and urbanization will occur within the current 8-hour ozone nonattainment boundary. As shown in Table 1-9, nine of the ten counties with the largest population increase from 2010 to 2015 are contained within the current 8-hour ozone nonattainment area. Population density and developed areas are projected to rapidly diminish beyond the core area of the current nonattainment area. Because projected population and activity in the surrounding counties is low by comparison, and the human landscape is projected to be rural with small pockets of development, the growth information supports the recommended nonattainment designation for the current 8-hour ozone nonattainment area. If future growth information indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

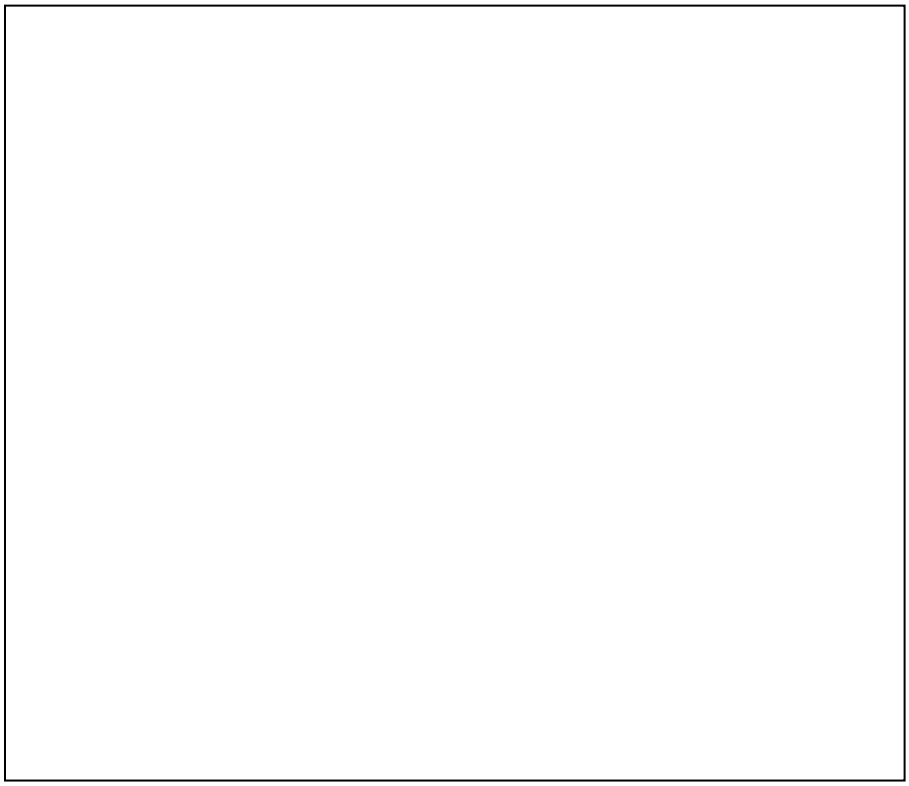
Factor #3: Meteorology

Meteorology is the single most important factor affecting mid-summer ozone in the DM/NFR area, and the Front Range and Platte Valley meteorology are significantly affected by terrain. As reported in a number of papers on the mesoscale meteorology of the area[2,3,4,5,7,8,10,11,12], the South Platte Valley and surrounding plains, the east-west Cheyenne Ridge along Colorado's border with Wyoming to the north of the South Platte Valley, the east-west Palmer Divide to the south of the Denver metro area, and the Continental Divide to the west of the South Platte Valley create local circulations that tend to magnify and constrain the influence of local emissions on air

quality. Although the terrain and these circulations do not prevent transport into or away from the basin, these factors tend to define a natural airshed. This airshed's boundaries provide a geographical focus for air quality control strategies.

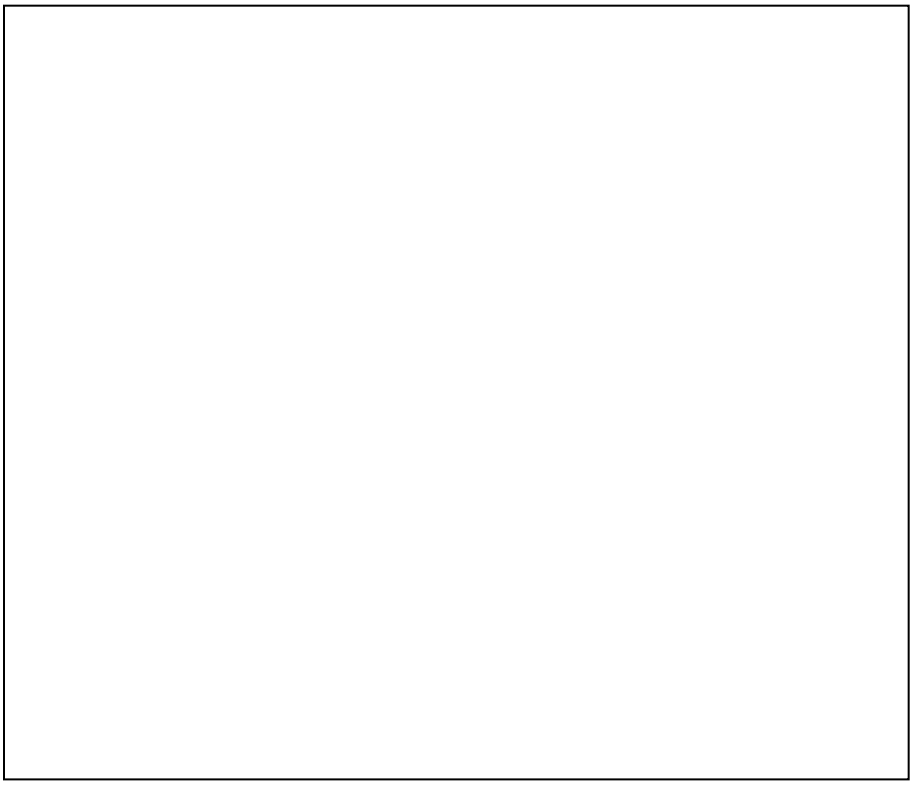
In general, three key circulations affect summer air quality within this basin or airshed. The first of these is nighttime and early-morning down-valley drainage flow. At night, infrared radiation from the surface disproportionately cools the ground and the air next to it. This chilled air is denser than surrounding air and flows downhill. These downhill flows converge to form drainage winds that move surface air down the canyons and valleys toward a widening of the Platte Valley in Weld County (see Figure 1-20). There the wider valley and a constriction further downstream, cause pooling of cooler air. Both the drainage winds and the cold pooling trap nighttime and early morning emissions. This phase contributes to the accumulation of emissions that are later processed by the sun and the daytime mountain-valley circulation during the afternoon.

Figure 1-20: Nighttime Drainage Flows (Red Arrows) into the Platte Valley or Basin



The second key circulation is thermally-driven upslope flow which is a component of a mountain-valley circulation. Daytime solar heating of higher terrain and sun-facing slopes creates areas of low pressure over these surfaces that cause a reversal of the nighttime drainage pattern. Winds tend to blow uphill or up-slope (see Figure 1-21).

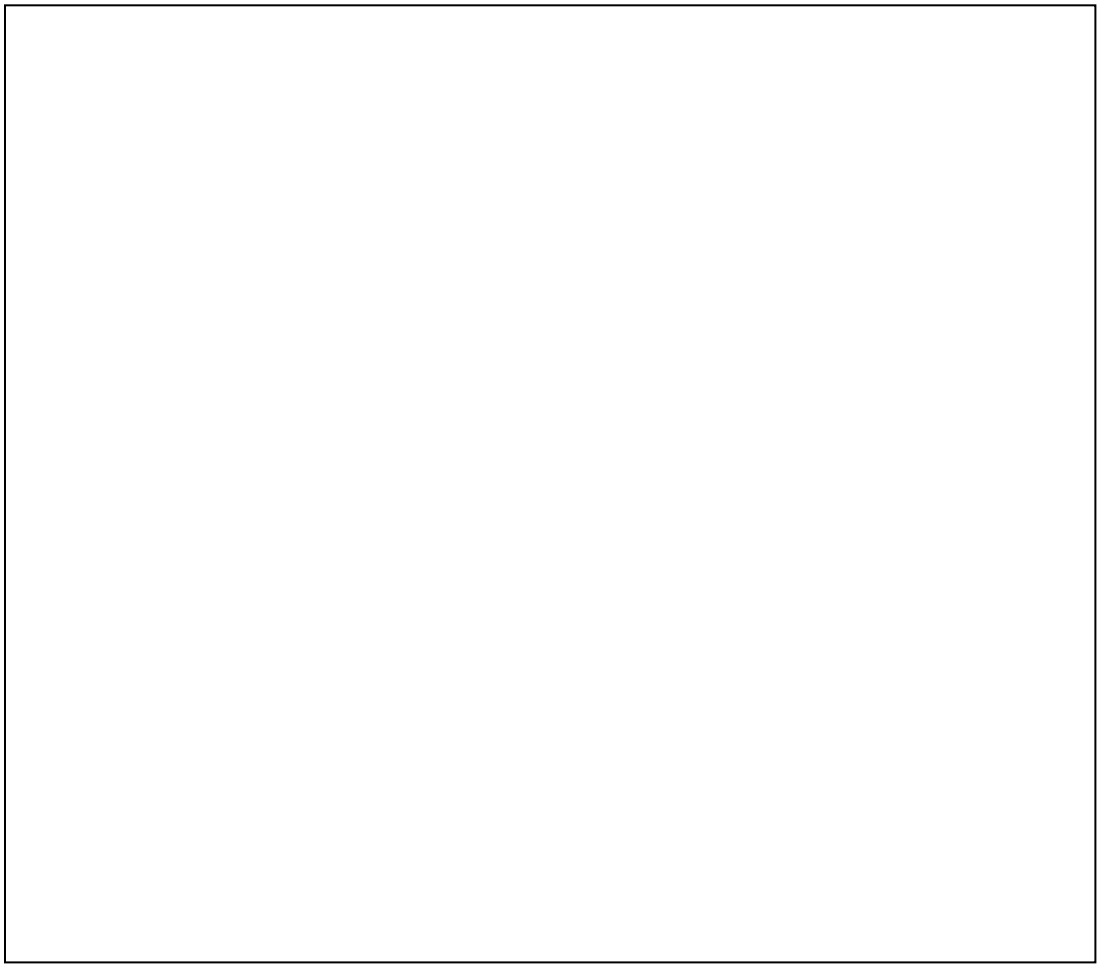
Figure 1-21: Daytime Thermally-Driven Upslope Flows (Red Arrows) Toward Higher Terrain



The third key circulation is the mountain plains solenoid circulation. Its relevance to ozone is described by Reddy and Pfister (2016) and Sullivan et al. (2016). The solenoid circulation consists of thermally-driven surface upslope flow (toward the southwest, west, and northwest) to mountain top level during the afternoon, mixing and transporting vertically, and weak transport to the east at higher altitudes. Vertical mixing and subsidence over plains near Denver closes this loop, tending to keep ozone in the area. Light winds, a deep layer of thermally-driven upslope flow, local vertical recirculation, cloud-free skies, and warm temperatures are key ingredients for high ozone at the surface.

A HYSPLIT (Rolph, 2016, and Stein et al., 2015) back-trajectory analysis on the four highest days for each year in 2006 to 2008 for Fort Collins West, Rocky Flats, and Chatfield was completed for analysis of the existing nonattainment area and the 2008 8-hour standard. Figure 1-22 shows the results of that analysis. The contouring is based on approximately 7,200 points or hours aggregated by 0.1 by 0.1 degree grids representing 24 hours of back trajectories for each of the eight hours contributing to the 4 highest values for each year and each site. Hours represent the aggregate back trajectory points or hours for these events in each grid cell. This analysis confirmed that the highest densities of the back-trajectory points for the prior 24-hours were within the airshed, overlapped with the highest emissions source areas, and were in the nonattainment area.

Figure 1-22: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2006 to 2008 for Fort Collins West, Rocky Flats, and Chatfield



This HYSPLIT analysis was repeated for the nonattainment area for the new 70 ppb standard. In the previous analysis (Figure 1-22), the meteorology used to drive HYSPLIT was the 40 km EDAS40 data assimilation/model product. For the current analysis, the NAM12 12 km pseudo analysis product was used, which provides a reasonable reconciliation of observations and model physics. The EDAS40, because of its coarser resolution and reduced ability to simulate thermally-driven upslope flows, likely attributed more of the elevated ozone to source areas in and near the foothills. Figures 1-23 through 1-26 show the results for Fort Collins West, Rocky Flats, NREL, and Chatfield, respectively, for the four highest ozone events at each site each year from 2013-2015 (data flagged as exceptional events have been excluded). Each site shows the highest areas of influence toward the typical afternoon upslope flow at each location. In other words, these plots point to source areas upwind. The contouring is based on 2,400 points or hours aggregated by 0.1 by 0.1 degree grids representing 24 hours of back trajectories for each of the eight hours contributing to the 4 highest values for each year. Hours represent the aggregate back trajectory points or hours for these events in each grid cell.

Figure 1-23: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for Fort Collins West

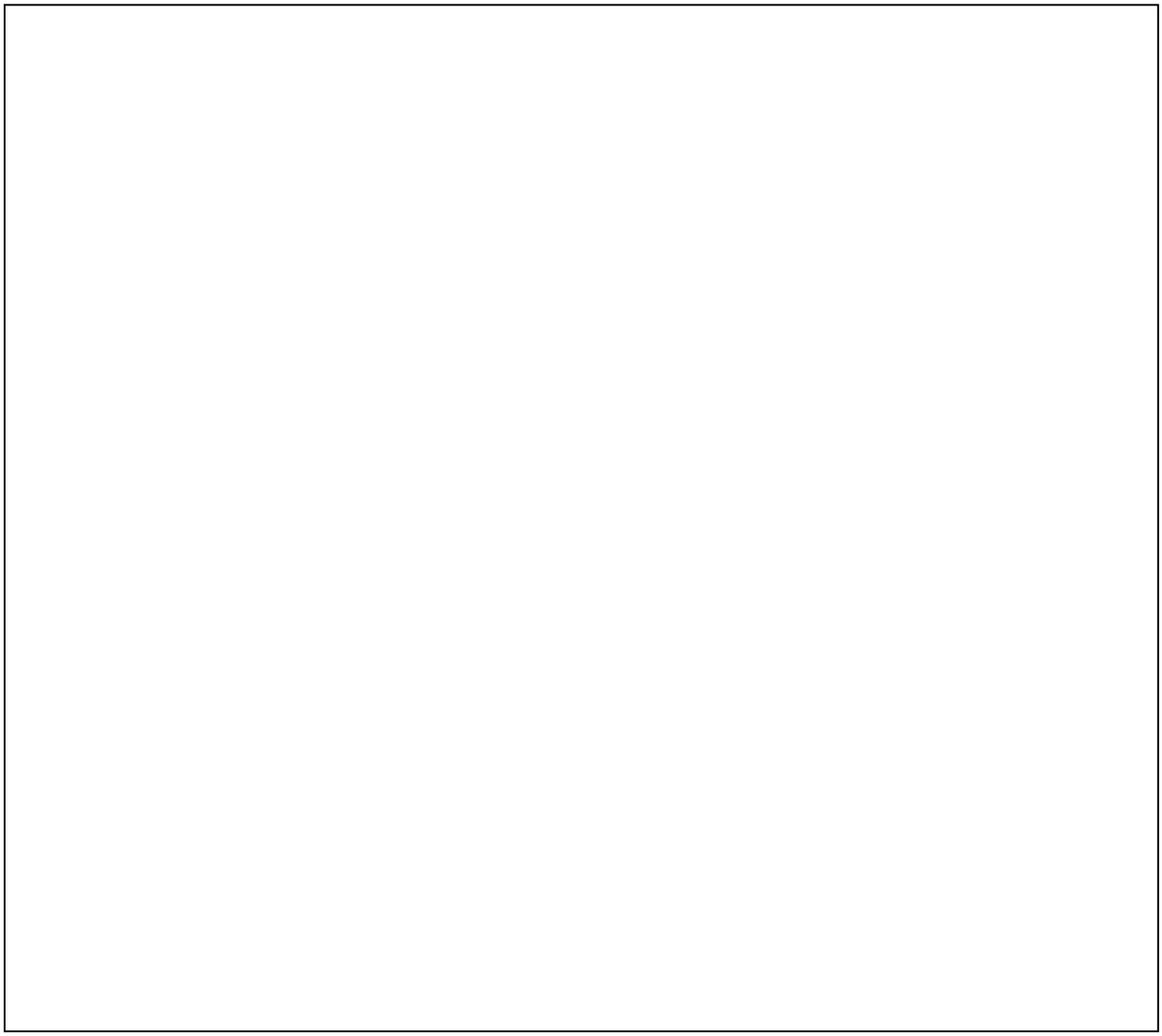


Figure 1-24: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for Rocky Flats

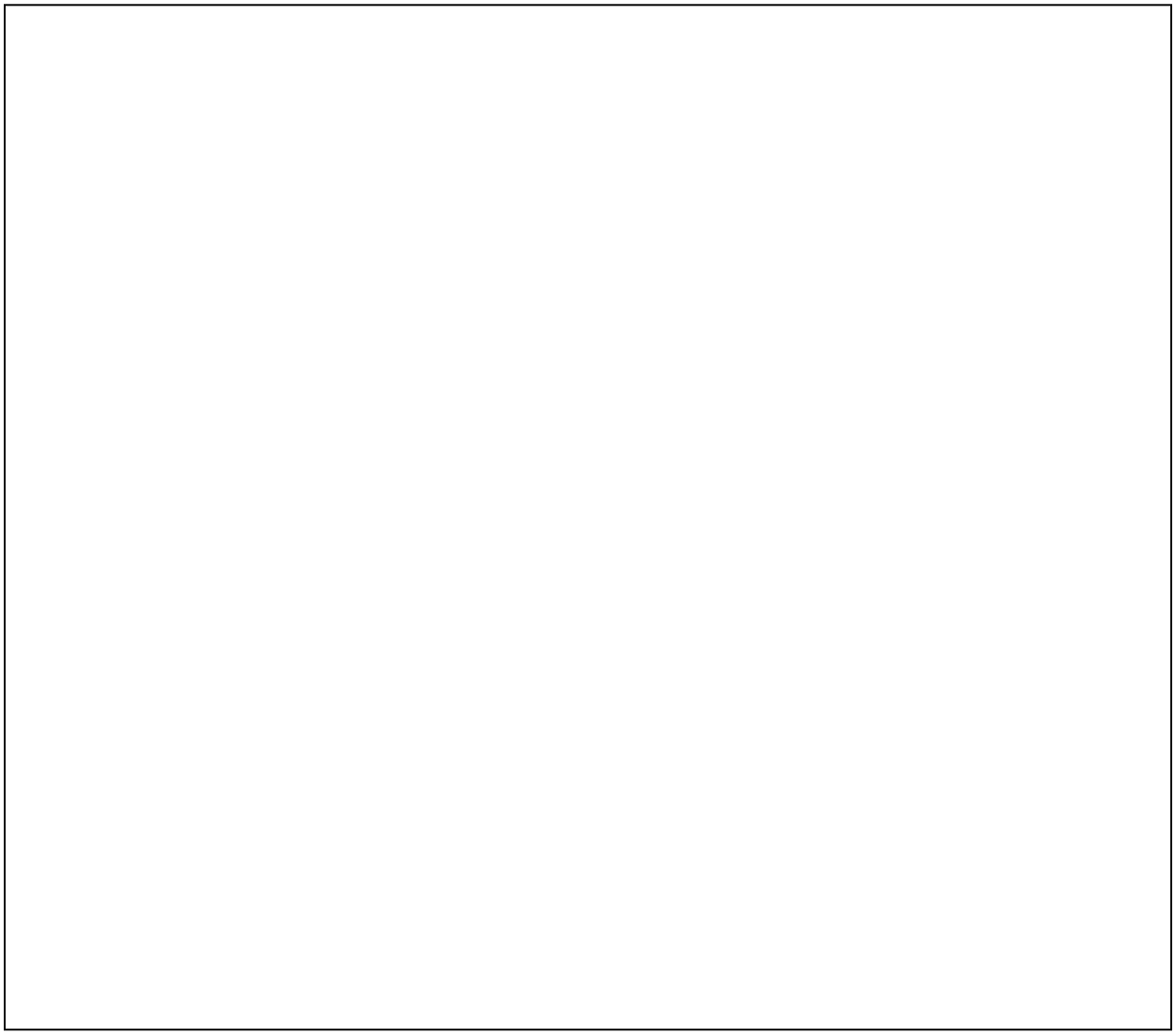


Figure 1-25: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for NREL

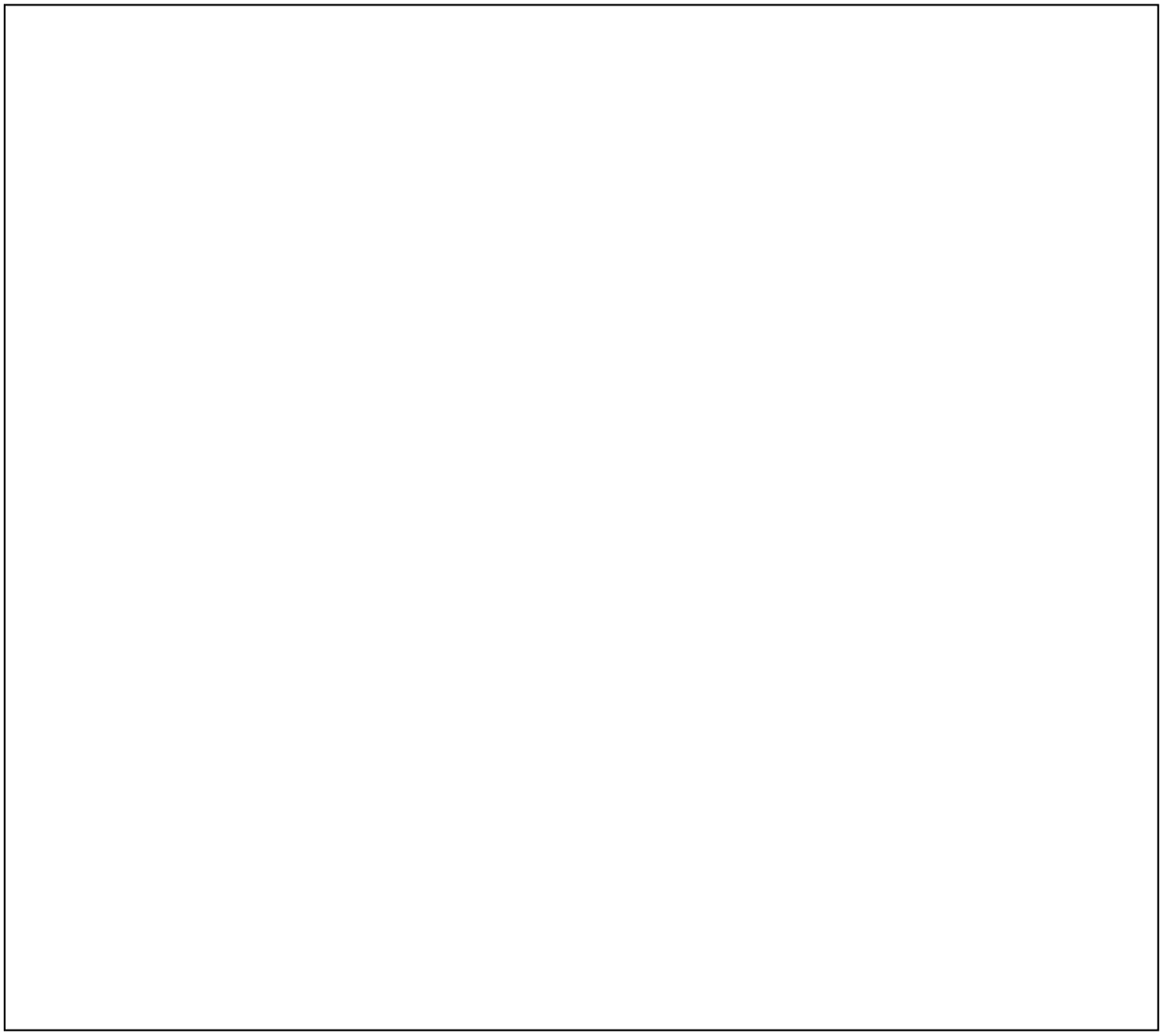
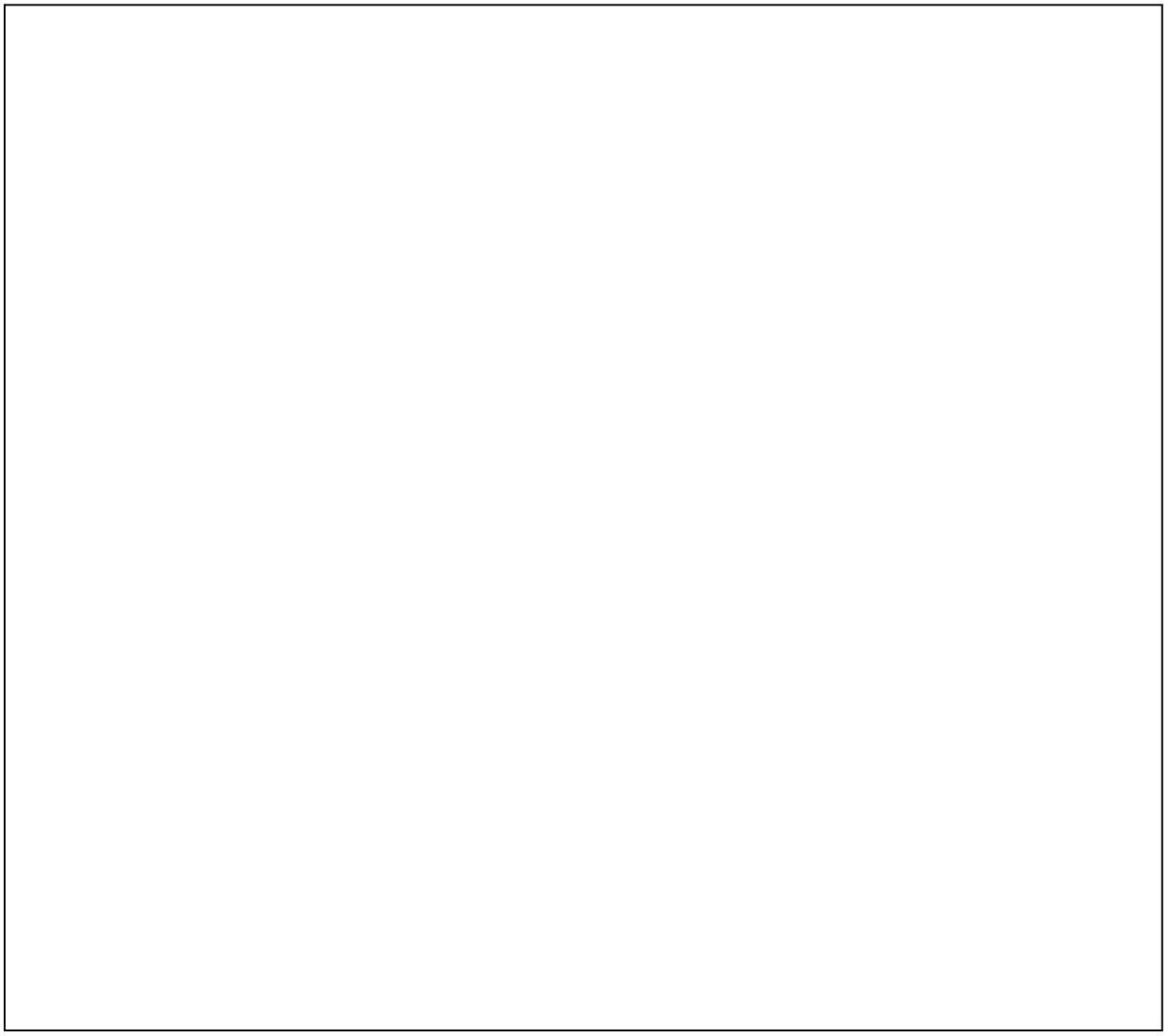


Figure 1-26: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for Chatfield



In Figure 1-27, below, the results of Figures 1-23 – 1-26 have been combined in a composite contour plot for the four sites. The contouring is based on 9,600 points or hours aggregated by 0.1 by 0.1 degree grids representing 24 hours of back trajectories for each of the eight hours contributing to the 4 highest values for each year and each site. Hours represent the aggregate back trajectory points or hours for these events in each grid cell.

Figure 1-27: Composite HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for Fort Collins West, Rocky Flats, NREL, and Chatfield

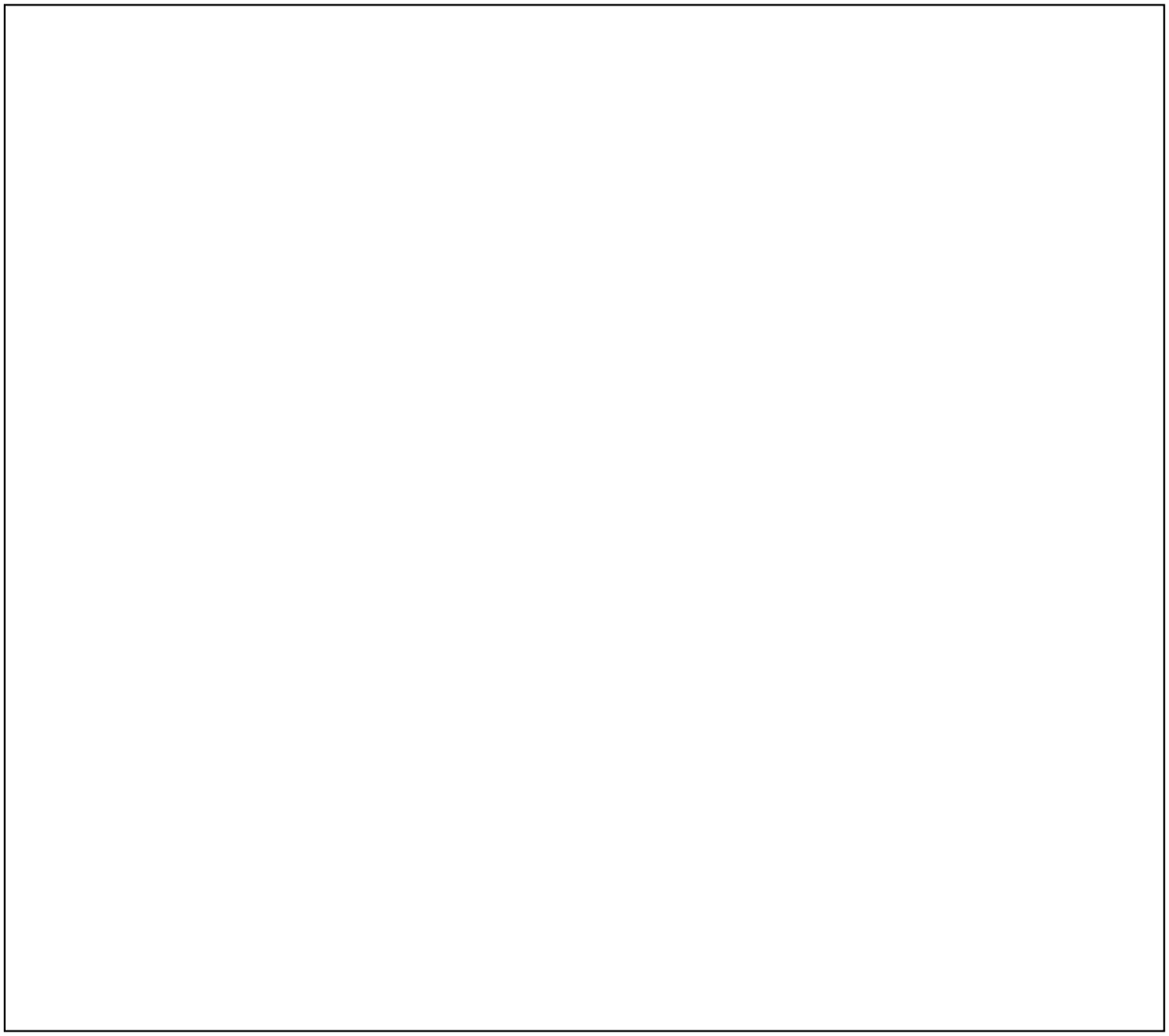


Figure 1-28, below, shows the total hour counts for each 0.1 by 0.1 grid cell, and Figure 1-29 shows the percentage of the total 9,600 back trajectory point hours for all four sites that occurred in each grid cell. These maps show that the areas of greatest influence continue to be within the existing nonattainment area boundary. It is worth noting that some unknown portion of the points/hours from areas to the west of the nonattainment area are likely the result of mountain plains solenoid circulations simulated in the NAM12 data set. These represent ozone and precursors that would be attributable to sources within the nonattainment area boundaries. In these cases, ozone and or its precursors would have completed a loop flow and returned to the nonattainment area.

The plot in Figure 1-28 is based on 9,600 points or hours aggregated by 0.1 by 0.1 degree grids representing 24 hours of back trajectories for each of the eight hours contributing to the 4 highest

values for each year and each site. Hours represent the aggregate back trajectory points or hours for these events in each grid cell.

In Figure 1-29, the percentage of total hours in each grid cell is based on 9,600 points or hours aggregated by 0.1 by 0.1 degree grids representing 24 hours of back trajectories for each of the eight hours contributing to the 4 highest values for each year and each site.

Figure 1-28: HYSPLIT Back-Trajectory for the Four Highest Days for Each year in 2013 to 2015 for Fort Collins West, Rocky Flats, NREL, and Chatfield.

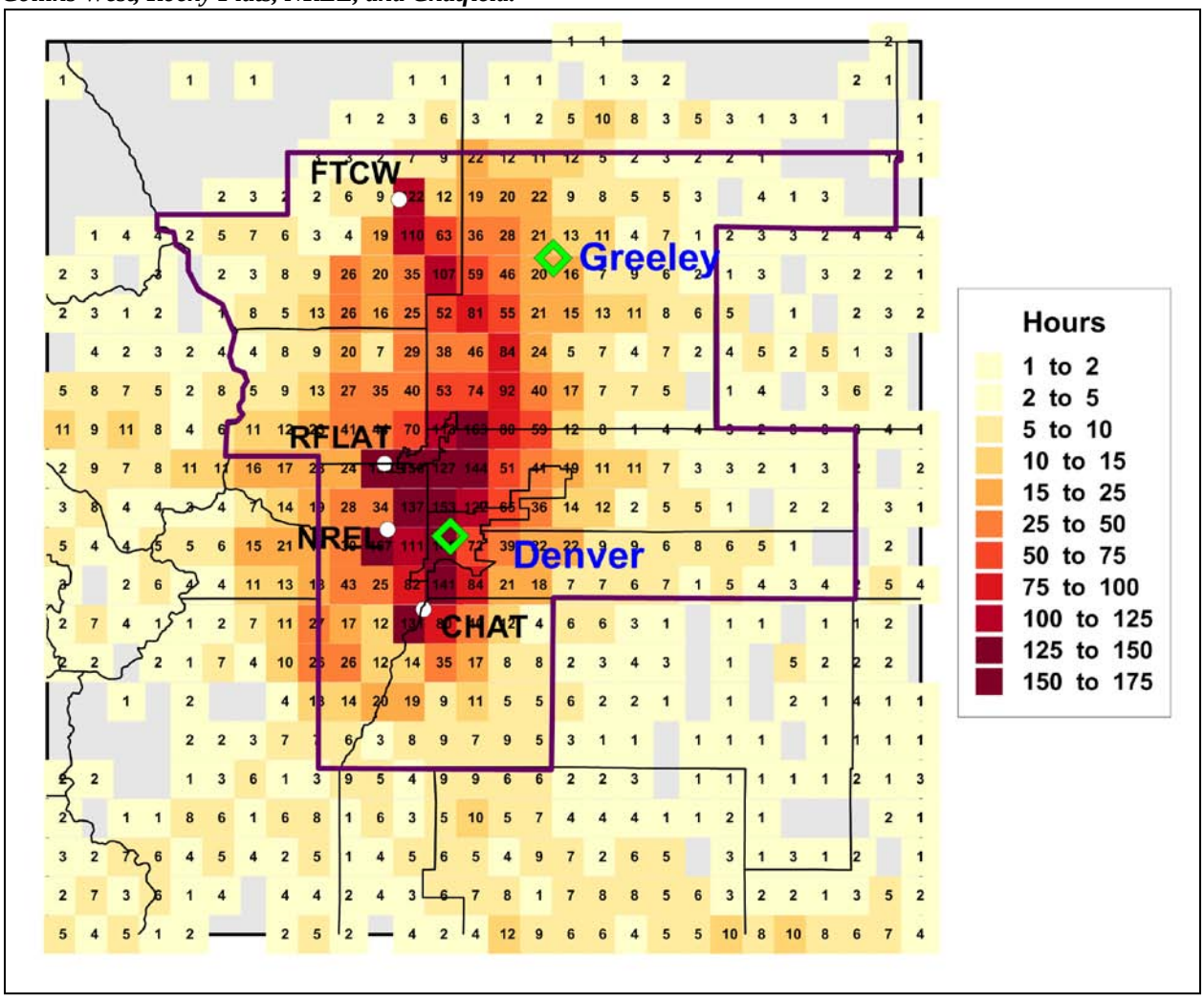
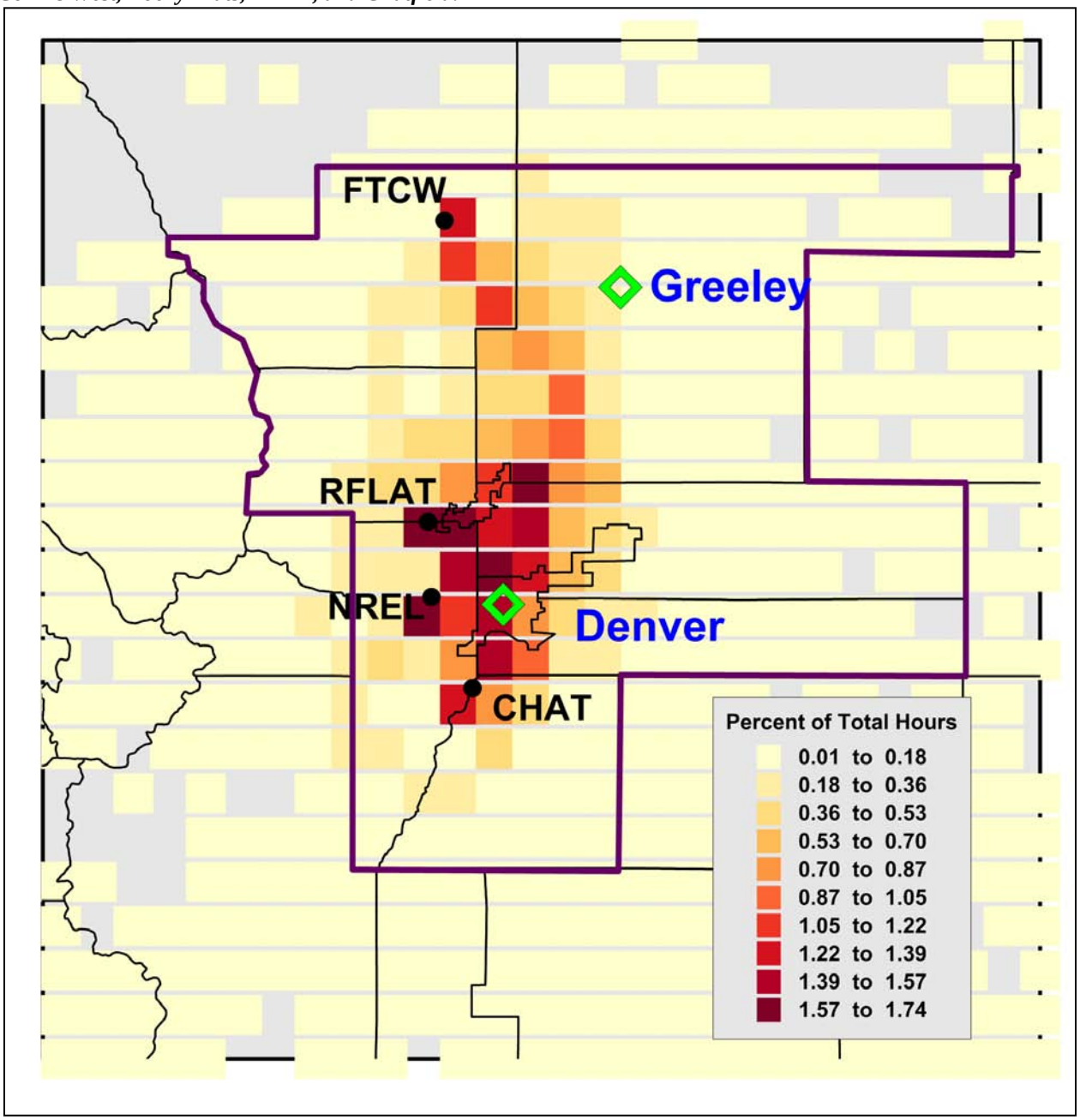


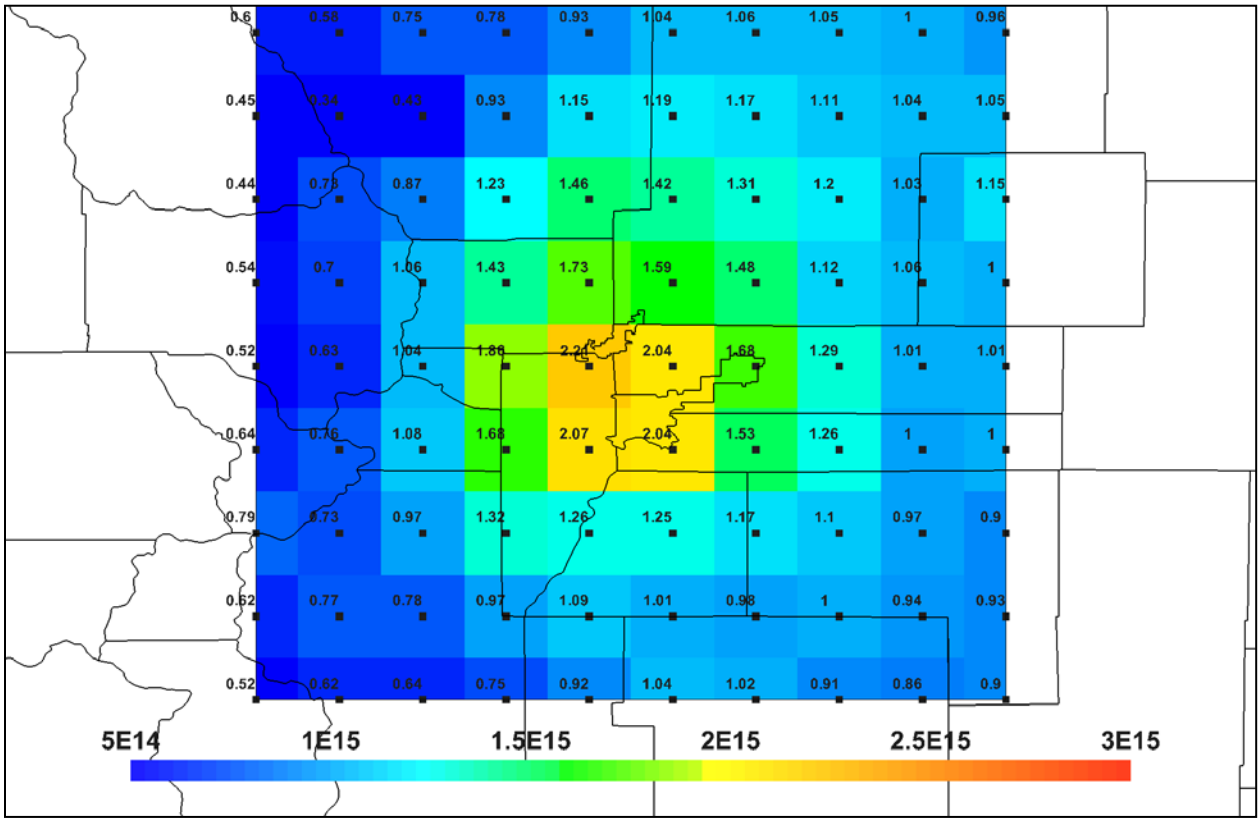
Figure 1-29: HYSPLIT Back-Trajectory for the Four Highest Days for Each Year in 2013 to 2015 for Fort Collins West, Rocky Flats, NREL, and Chatfield.



Tropospheric column NO_2 amounts were acquired from measurements made by the Ozone Monitoring Instrument (OMI) aboard NASA's Aura satellite - Version 003 Level 3 NO_2 data cloud-screened at 30% with a grid resolution of 0.25° by 0.25° based on the NASA algorithm (Bucsela et al., 2013) obtained from the NASA Giovanni website http://giovanni.sci.gsfc.nasa.gov/giovanni/. The mean tropospheric column NO_2 in 10^{15} molecules per square centimeter for June 1 through August 31, 2015, is shown in Figure 1-30. This plot represents conditions at about 13:30 MST each day, and by this time thermally-driven upslope would have shifted NO_2 to the west of the principal urban sources and towards the

foothills. Nevertheless, this data set shows that most of the higher levels of NO_x in the area continue to be within the existing nonattainment area boundaries.

Figure 1-30: Mean OMI Tropospheric Column NO_2 in 10^{15} Molecules per Square Centimeter for Approximately 13:30 MST for June 1 through August 31, 2015.



Meteorology Conclusions

The region's meteorological information indicates that the current 8-hour ozone NAA boundary is appropriate for the recommended ozone NAA. The Division has thoroughly evaluated the region's meteorology over the years and has concluded that the airshed for the region is encompassed by the current 8-hour NAA. Upslope flow from the lower elevation regions through the urbanized and industrialized regions of the air shed dominates on high ozone days. If meteorological information indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

Meteorology References

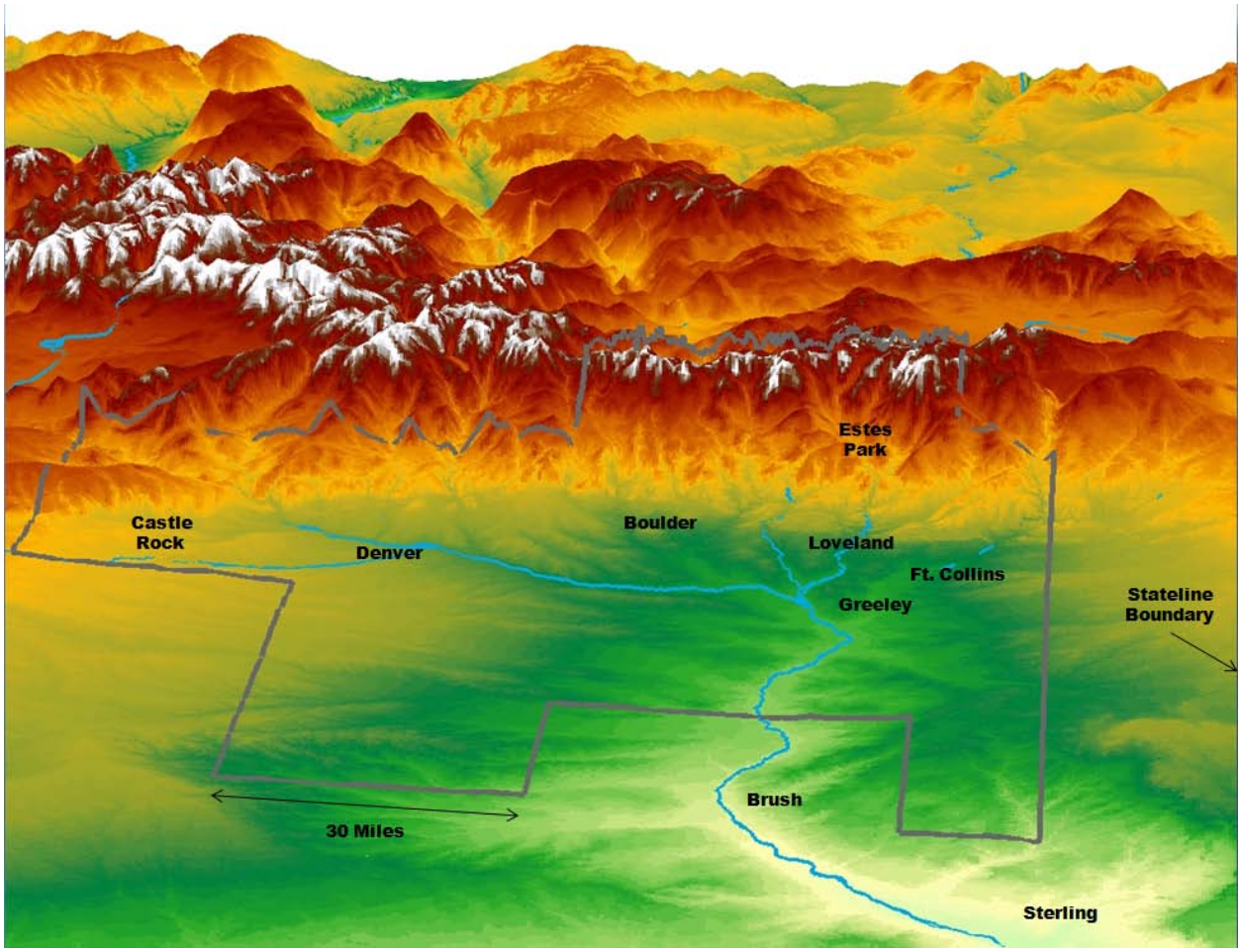
1) Bucsela, E. J., N. A. Krotkov, E. A. Celarier, L. N. Lamsal, W. H. Swartz, P. K. Bhartia, K. F. Boersma, J. P. Veefkind, J. F. Gleason, and K. E. Pickering (2013), A new stratospheric and tropospheric NO2 retrieval algorithm for nadir-viewing satellite

instruments: Applications to OMI, Atmos. Meas. Tech., 6(10), 2607–2626, doi:10.5194/amt-6-2607-2013.
2) Crook, N. A., T. L. Clark, and M. W. Moncrieff, 1990. The Denver Cyclone. Part I: generation in low froude number flow, ***Journal of the Atmospheric Sciences 47***, No. 23, 2725-2742.
3) Crook, N. A., T. L. Clark, and M. W. Moncrieff, 1991. The Denver Cyclone. Part II: interaction with the convective boundary layer, ***Journal of the Atmospheric Sciences 48***, No. 19, 2109-2126.
4) Reddy, P. J., D.E. Barbarick, and R.D. Osterburg, 1995. Development of a statistical model for forecasting episodes of visibility degradation in the Denver metropolitan area, ***Journal of Applied Meteorology 34***, No. 3, 616-625.
5) Reddy, P. J., and G. G. Pfister, 2016, Meteorological factors contributing to the interannual variability of midsummer surface ozone in Colorado, Utah, and other western U.S. states, ***J. Geophys. Res. Atmos***., 121, 2434–2456, doi:10.1002/2015JD023840.
6) Rolph, G.D. (2016). Real-time Environmental Applications and Display sYstem (READY) Website (http://www.ready.noaa.gov). NOAA Air Resources Laboratory, College Park, MD.
7) Sullivan, J. et al., 2016. Quantifying the contribution of thermally-driven recirculation to a high ozone event along the Colorado Front Range using lidar, submitted to ***J. Geophys. Res. Atmos.***
8) Schreibner-Abshire, W. and A. R. Rodi, 1991. Mesoscale convergence zone development in northeastern Colorado under southwest flow, ***Monthly Weather Review 119***.
9) Stein, A.F., Draxler, R.R, Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, Bull. Amer. Meteor. Soc., 96, 2059-2077, http://dx.doi.org/10.1175/BAMS-D-14-00110.
10) Szoke, E. J., and J. A. Augustine, 1990. An examination of the mean flow and thermodynamic characteristics of a mesoscale flow feature: the Denver Cyclone, Preprints, Fourth Conference on Mesoscale Processes, Boulder, American Meteorological Society.
11) Szoke, E. J., 1991. Eye of the Denver Cyclone, ***Monthly Weather Review 119***, 1283-1292.
12) Toth, J. J., and R. H. Johnson, 1985. Summer surface flow characteristics over northeast Colorado, ***Monthly Weather Review 113***, No. 9, 1458-1469

Factor #4: Geography/Topography

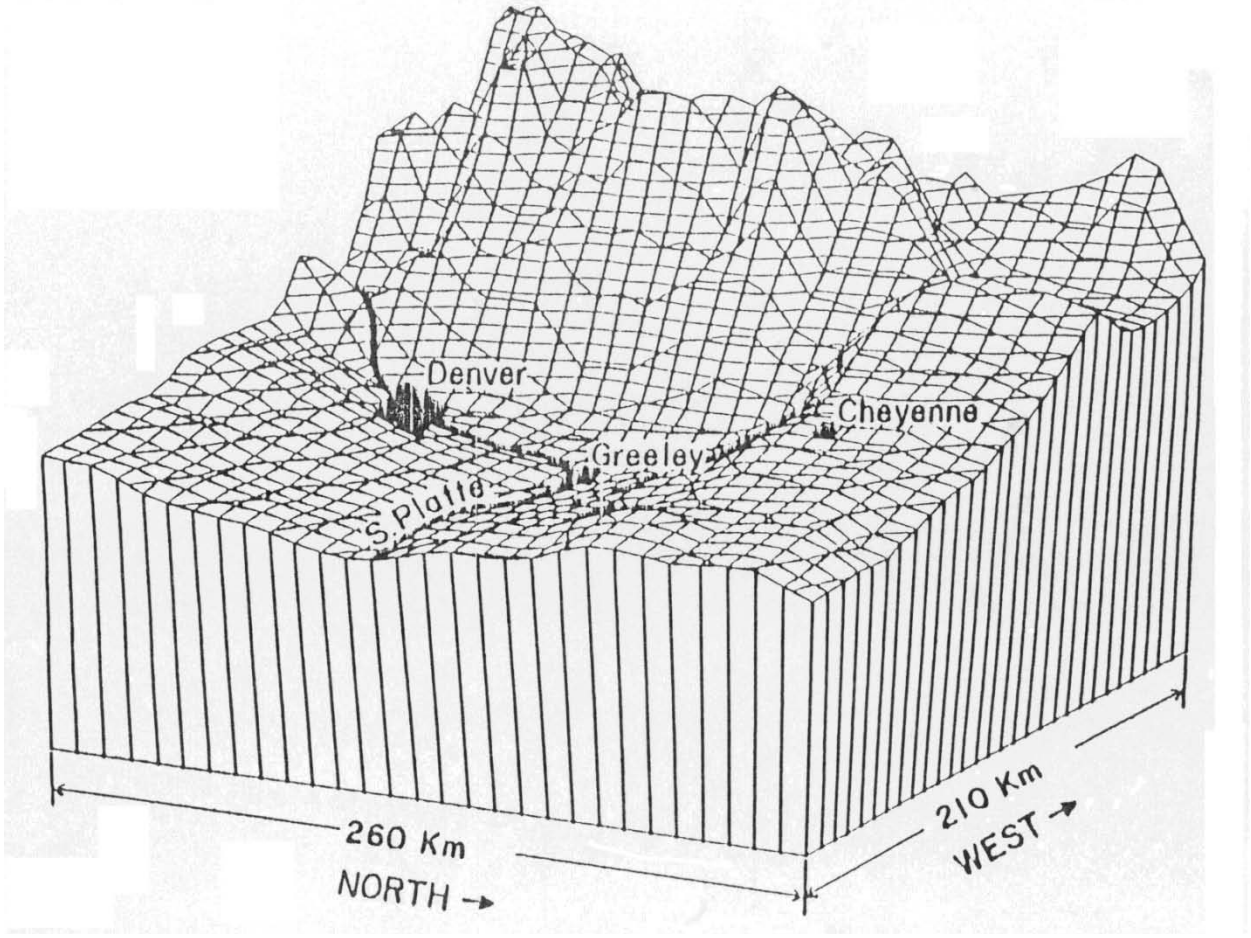
An illustration of the topography of the Denver basin is shown below.

Figure 1-31: Topographic Illustration of Physical Barriers that define the Denver Basin



With the Rocky Mountains to the west, the Palmer Divide to the south, the Cheyenne Ridge to the north, and following the S. Platte River valley to the northeast, the area is commonly referred to as the Denver Basin and serves as the topographic and climatological airshed for the region. The region's geography and topographic features supports the recommended nonattainment designation for the current 8-hour ozone nonattainment area. The following topographic map illustrates the physical barriers that define the Denver Basin.

Figure 1-32: Topographic illustration of physical barriers that define the Denver Basin



Elevation and Ozone Concentrations

Decades of weekly ozonesondes in Boulder, recent aircraft profiles of ozone over the Front Range, and research in other places in the United States -show that ozone concentrations in the boundary layer often increase with altitude above ground. One of the main reasons is that ozone near the ground is diminished by reactions with nitric oxide emitted near the surface by mobile and point sources. Ozone at ground level is also reduced to some extent by oxidation reactions with vegetation and other materials on the surface. Ozone near the top of the boundary layer may also be elevated because of complex re-circulation effects, residual layer processes, and prolonged residence times that allow for an accumulation of ozone aloft.

High ozone concentrations are possible in the higher terrain of the Front Range. It is known that individual concentrations in excess of the new standard have been measured at NOAA's Niwot Ridge Tundra monitor at 11,500 feet in Boulder County (located in the existing 8-hour ozone non-attainment area) and a short-term exploratory monitor operated by the United States Forest Service (USFS) for several seasons at Kenosha Pass in Park County. The Niwot Ridge Tundra site uses an "equivalent" analyzer, but to our knowledge the NOAA air monitoring does not meet the QA/QA requirements as set forth in 40CFR58, Appendix A. At Kenosha Pass, the USFS used the 2B-Tech analyzer. This monitor is not designated as a "reference" or "equivalent"

analyzer as set forth in 40CFR53, and the monitoring effort did not meet the QA/QA requirements as set forth in 40CFR58, Appendix A. Presently, there is no federal reference method data that show that ozone concentrations are in violation of the standard in Clear Creek, Gilpin, or Park Counties

In response to the possibility of elevated ozone in the higher elevations or the Front Range foothills, where public exposure to elevated ozone is of particular concern, the Division added two ozone monitors, one located at Aspen Park (elevation 8,095 feet - near Conifer) and the other in Rist Canyon (elevation 6,750 feet - west of Fort Collins). Both monitors began operation in 2009 and the Rist Canyon monitor ceased operation in 2013 when it fulfilled its monitoring objectives. The Aspen Park monitor is currently showing attainment with the revised standard.

In addition to the long-term federal reference method ozone monitor located near Longs Peak at an elevation of about 9,000 feet in Rocky Mountain National Park, the Division began operation of a non-federal reference monitor at Mines Peak in 2014. The Mines Peak ozone monitor is located above Berthoud Pass at an elevation over 12,400 feet, which has an average 4th maximum ozone concentration around 69 ppb.

While it is certainly possible that high concentrations may occur at high altitudes in these Clear Creek, Gilpin, or Park Counties, it is important to note that the primary source for this ozone is most likely the urbanized area of the plains to the east. Anthropogenic emissions from these mountain areas are expected to have an insignificant contribution to ozone in the nonattainment area.

Geography/Topography Conclusion

The region's east-facing open bowl topography indicates that the current 8-hour ozone nonattainment boundary is appropriate for the recommended ozone nonattainment area. If future refined modeling indicates that additional counties or regions should be included in the nonattainment area, the existing nonattainment boundary will be revaluated and expanded as necessary.

Factor #5: Jurisdictional Boundaries

Regional Air Quality Council

The Regional Air Quality Council (RAQC) is designated as the lead air quality planning agency for the Denver metropolitan area and the DM/NFR ozone nonattainment area. In this capacity, the mission of the RAQC is to develop effective and cost efficient air quality initiatives with input from state and local government, the private sector, stakeholder groups, and private citizens. The RAQC's primary task is to prepare state implementation plans (SIPs) for compliance with federal air quality standards. The RAQC consists of a 24 member board appointed by the Governor. Since July 2007, the RAQC has been directed by the Governor to develop effective plans (SIPs) to reduce ozone in the DM/NFR Area as well as to propose measures to further reduce ozone concentrations.

North Front Range Transportation and Air Quality Planning Council

The North Front Range Transportation and Air Quality Planning Council is designated by the Governor as the lead air quality planning organization for the North Front Range region. It is a nonprofit, public organization of 15 local and county governments in Larimer and Weld counties and is funded through federal and state grants, and local funds. The goal of the council is to enhance air quality and mobility among northern Colorado communities and between the North Front Range and the Denver Metro area by developing cooperative working relationships and financial partnerships among its member governments, the Colorado Department of Transportation (CDOT), Federal Highway Administration (FHA), the Federal Transit Administration (FTA), and the private sector. The council is responsible for proposing air quality measures affecting the North Front Range and performing conformity determinations to ensure its transportation plans and programs comply with the state implementation plan.

Colorado Air Quality Control Commission

The Colorado Air Quality Control Commission (AQCC) is the regulatory body with responsibility for adopting air quality regulations consistent with state statute including the responsibility and the authority to adopt state implementation plans (SIPs) and implementing regulations. The AQCC takes action on SIPs and regulations through a public rulemaking process. The AQCC has nine members who are appointed by the Governor and confirmed by the State Senate.

Level of Control of Emission Sources

The current recommended nonattainment area has been subject to numerous and aggressive emission control programs. Some of these programs are listed below:

Stationary Source Emission Controls:

- Oil and gas controls
  - 90% emission reduction from existing condensate tanks
  - 95% control efficiency for new and modified condensate tanks
  - Low-bleed pneumatics only
  - 95% control efficiency for air pollution control equipment
  - Leak detection and repair program
  - Flash separator or flash tank on glycol natural gas dehydrator reduce VOC's by 90%
  - Auto-igniters required on combustion devices for VOC control
- Stationary source controls for VOCs and NOx in Regulations 3, 6, 7 and 8
- Paint shops, solvent usage, industrial process changes
- Colorado Clean Air Clean Jobs Act
- Regional Haze SIP provisions – contained in regulation No. 3

Mobile Source Emission Controls:

- Federal diesel fuel standards
- 7.8 reid vapor pressure with 1 PSI Ethanol Waiver (8.8 RVP)
- Stage I vapor recovery
- Tier II Low Sulfur Gasoline
    - 30ppm average/80ppm max
        - Statewide/Year Round
        - Phased-in from 2004
- Enhanced I/M throughout the region
- Federal tailpipe standards – TIER II
- Ozone transportation conformity
- Diesel school bus retrofits
- Federal alternative fuels programs
- Federal/state tax credits for hybrids/alternative fuels use
- Federal on-road and non-road mobile source standards and regulations
- Non-Road Engines, Vehicles, Equipment
    - Large Non–Road Diesel Engine Rule – Tier 4 (Phased–In Model Years (MY) 2008–2015)
    - Locomotive Engine Rule (MY 2015+)
    - Federal Non–Road Spark–Ignition Engines and Equipment (Phased–In MY 2008–2016)
    - Recreational Spark–Ignition (SI) Engine Standards (Phased–In MY 2008+)
- On-Road Engines and Vehicles
    - Tier 2 Standards for Light–Duty and some Medium–Duty Vehicles (Phased–In MY 2004– 2009)
    - Tier 3 Standards for Light–Duty and some Medium–Duty Vehicles (Phased–In MY 2017– 2025)
    - Heavy–Duty Engine and Vehicle Standards (Phased–In MY 2007+)
    - Light–Duty Vehicle Greenhouse Gas Rule (Phase 1 (Phased–In MY 2012–2016); Phase 2 – (Phased–In MY 2017–2025))
    - Medium and Heavy–Duty Vehicle Greenhouse Gas Rules (Phase 1 (Phased–In MY 2014– 2018))
- Fuels
    - Tier 3 Fuel Standards (Effective 2017 for large refineries, 2020 for small refineries)
    - Renewable Fuel Standard Program (RFS2) (Effective 2015)
    - Control of Hazardous Air Pollutants From Mobile Sources (Effective 2007)
    - Ultra–Low–Sulfur Diesel (ULSD) (Effective 2006)

<u>Area Source Emission Controls:</u>

- Architectural/traffic/industrial and consumer products standards
- Prescribed burning limits
- Low emission gasoline cans

Education/Outreach:

An extensive media-advertising program to raise public awareness about ozone solutions has been implemented - emphasis on motor vehicle solutions

- High ozone forecasting
- Paid advertising
- Media and education outreach
- Lawn mower exchange
- Gas can exchange
- Car care clinics
- Gas cap checks for municipal fleets
- Pre- and post-study surveys to determine effectiveness of the outreach and education efforts in affecting behavior change
- Outreach, awareness and education
- Rideshare/transit programs
- Local voluntary programs to reduce VMT
- Repair your air program - local high emitter identification/repair program
- Repair Your Air Campaign aggressively utilizes available “cash-for-clunkers” monies

Summary Conclusions for DM/NR 8-hour Nonattainment Area

The data and analysis presented in the five factors provide documentation and compelling evidence supporting a finding of nonattainment and for maintaining the current nonattainment area for the revised 8-hour ozone area.

SECTION 2

Rangely Area of Rio Blanco County

SECTION 2: Rangely Area of Rio Blanco County – Five Factor Analysis for Ozone Attainment

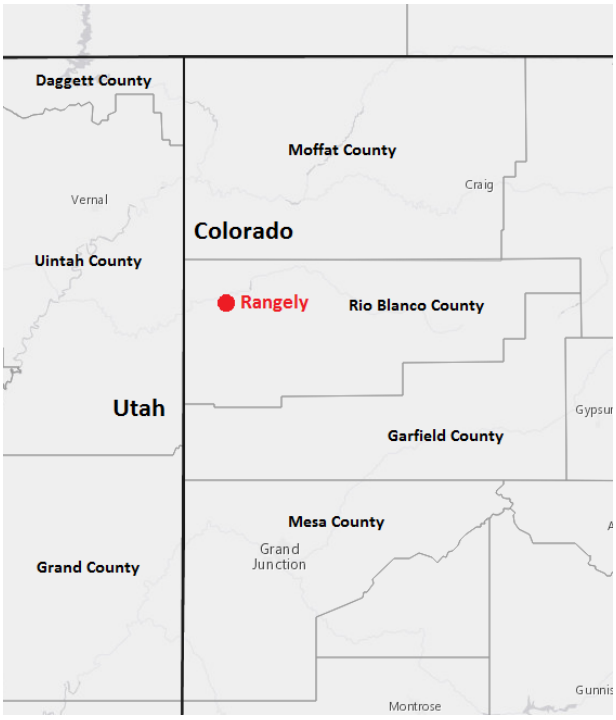
Designation Recommendation

The State recommends designating the Rangely area of Rio Blanco County as attainment/unclassifiable for the 2015 revised 8-hour ozone standard (0.070 ppm). The three-year average of the 4th maximum 8-hour ozone concentration over the period of 2013 - 2015 at the Rangely monitor (operated by the Bureau of Land Management) is in violation of the revised 8-hour ozone standard; however, the State is recommending an attainment/unclassifiable designation based on the following technical review using a five-factor analysis.

Rangely Area Overview

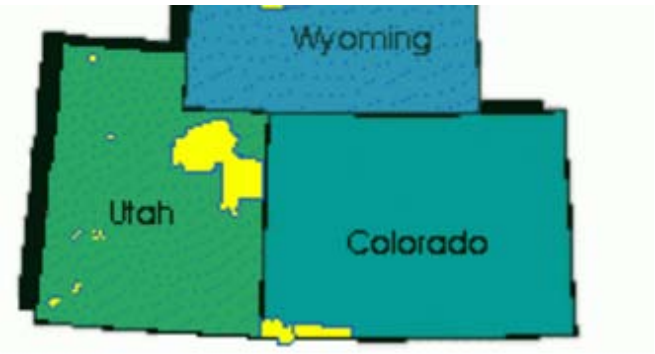
The town of Rangely is located in northwest Colorado in western Rio Blanco County, see Figure 2-1. Rangely is approximately 13 miles from the Utah border and Uintah County. Rio Blanco County is rural and sparsely populated.

Figure 2-1: Rangely Location



The Ute Indian Tribe of the Uintah and Ouray Reservation is located to the west in Uintah County on the border with Rio Blanco County, as shown in Figure 2-2. EPA Region 8 has full air quality management authority over the tribal lands in this area.

Figure 2-2: Utah/Colorado Tribal Lands Map



The Piceance and Uinta geologic basins lie beneath southwest Colorado, including the Rangely area, and northeast Utah as shown in Figure 2-3. These basins are the source of commercial oil and gas production.

Figure 2-3: Uinta/Piceance Basin Map

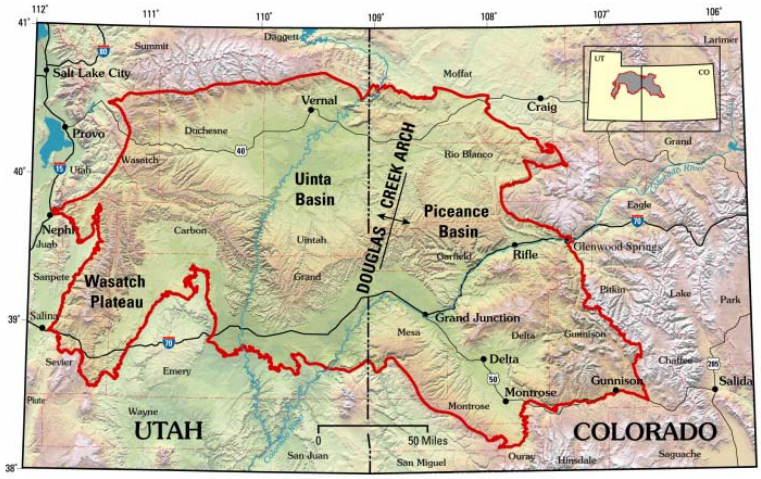


Figure 1. Digital elevation model showing the location and topography of the Uinta-Piceance Province (red line).

Current maps of the oil and gas wells in the Piceance and Uinta Basins are shown below in Figures 2-4 and 2-5. A 2012/2013 map showing both the Uinta and Piceance oil and gas well locations is shown in Figure 2-6. The Utah Department of Environmental Quality (DEQ) estimates that about 70% of the oil and gas production in the Uinta Basin takes place in tribal lands.

Figure 2-4: Colorado Piceance Basin Well Location Map

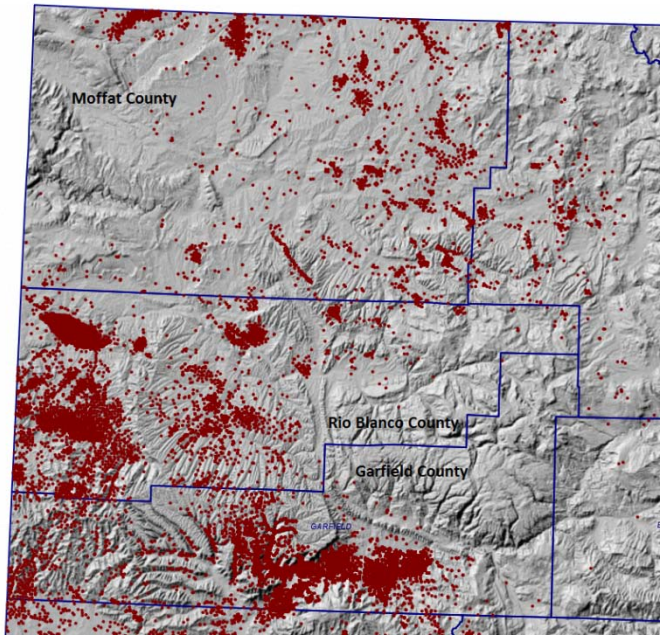


Figure 2-5: Utah Uinta Basin Well Location Map

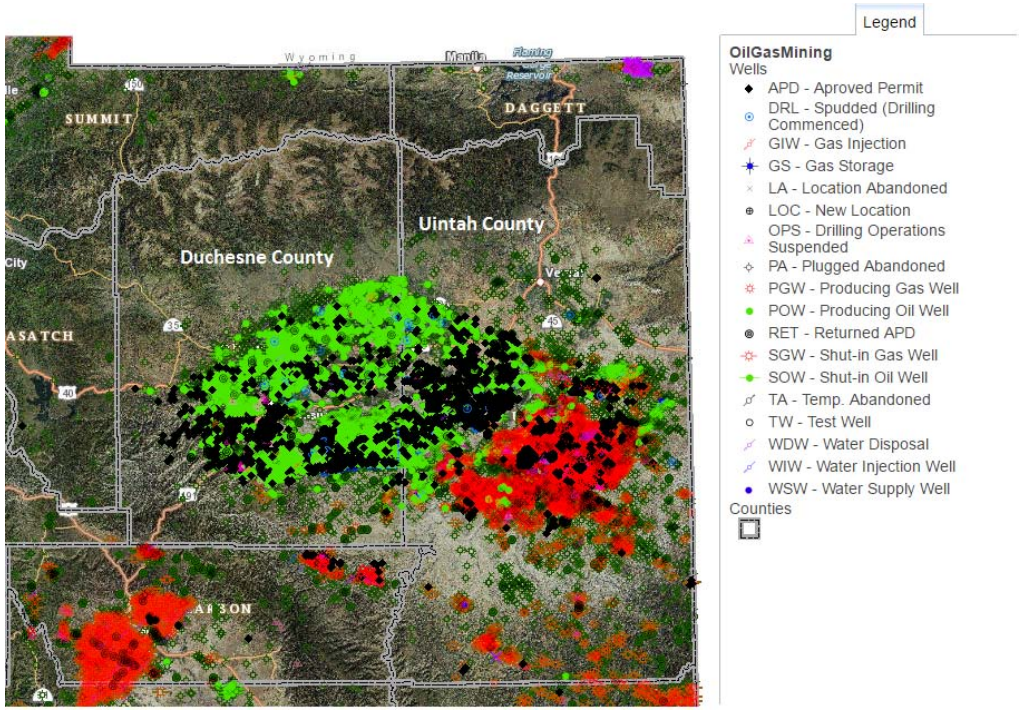
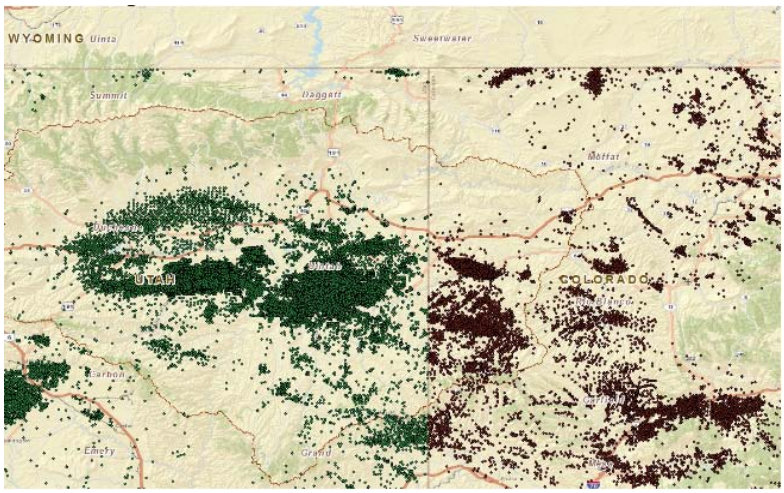


Figure 2-6: Piceance/Uinta Basins Well Location Map



Factor #1: Air Quality Data

The Rangely area of Rio Blanco County is part of Air Quality Control Region (AQCR) 11. AQCR 11 is made up of Garfield, Mesa, Moffat and Rio Blanco counties. There are currently 8 ozone monitors operating in AQCR 11 (Lay Peak was discontinued at the end of 2014 due to the site meeting its monitoring objectives). There are also numerous ozone monitors in the Uinta Basin that were examined in this technical analysis. A map of the monitoring stations in this area is shown in Figure 2-7. For the monitoring locations shown in Figure 2-7, 2013-2015 monitoring data is summarized in Table 2-1 (the monitors currently in violation of the revised 2015 standard are highlighted in red) and historic monitoring data is shown in Figures 2-8 and 2-9.

Figure 2-7: Ozone Monitoring Sites for AQCR 11 and Utah

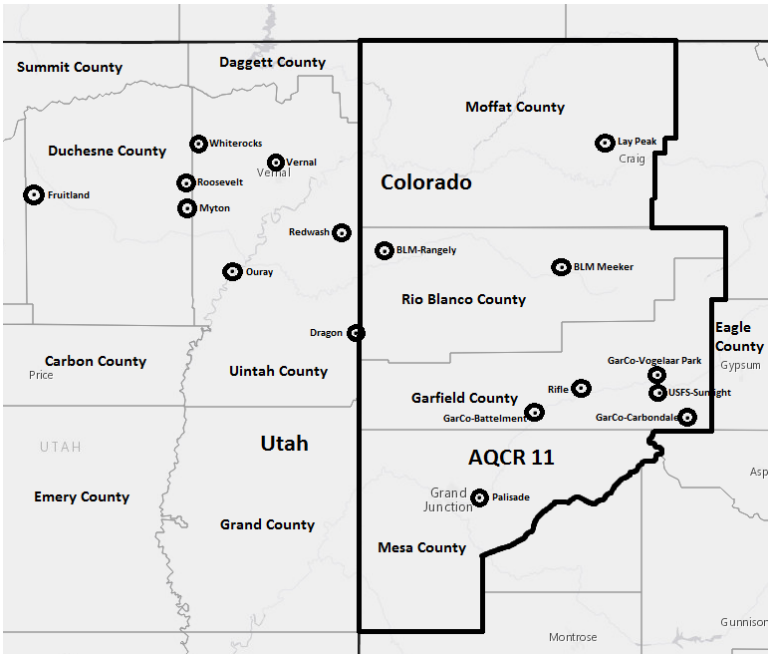


Table 2-1: Ozone Monitoring Data for AQCR 11

AQCR 11 Sites 4th Maximum 8-Hour Ozone Values and 3-Year Averages					
Site Name	AQS#	Year			3-Year Average
		2013	2014	2015	
CDPHE-APCD Sites					
Rifle	08-045-0012	0.062	0.061	0.068	0.063
Palisade	08-077-0020	0.066	0.062	0.065	0.064
Lay Peak	08-081-0002	0.065	0.062	-	-
Other Agency Sites					
USFS-Sunlight Mtn	08-045-0016	-	0.055	-	-
GarCo-Battlement	08-045-0019	0.069	0.061	-	-
GarCo-Vogelaar Park	08-045-0020	-	-	0.064	0.000
GarCo-Carbondale	08-045-0021	0.058	0.059	0.066	0.061
BLM-Meeker	08-103-0005	0.064	0.062	0.064	0.063
BLM-Rangely	08-103-0006	0.091	0.062	0.066	0.073
Uinta Basin					
Roosevelt, Utah	49-013-0002	0.104	0.062	0.060	0.075
Fruitland, Utah	49-013-1001	0.069	-	-	-
U&O Myton, Utah	49-013-7011	0.108	0.067	0.066	0.080
Vernal, Utah	49-047-1003	0.102	0.062	0.064	0.076
Redwash, Utah	49-047-2002	0.112	0.064	0.067	0.081
Ouray, Utah	49-047-2003	0.133	0.079	0.068	0.093
Dragon, Utah	49-047-5632	0.082	-	-	-
U&O Whiterocks, Utah	49-047-7022	0.095	0.064	0.068	0.075

Figure 2-8: AQCR 11- 8-hour (4th Max) Ozone Values

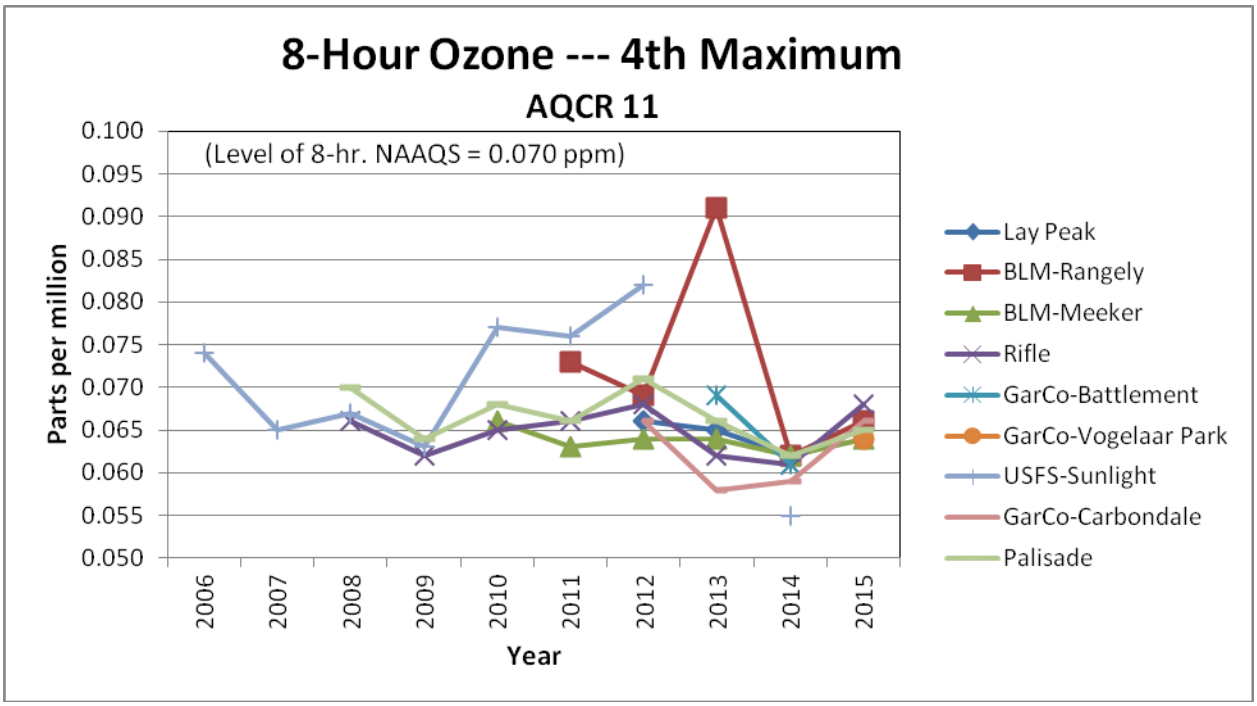
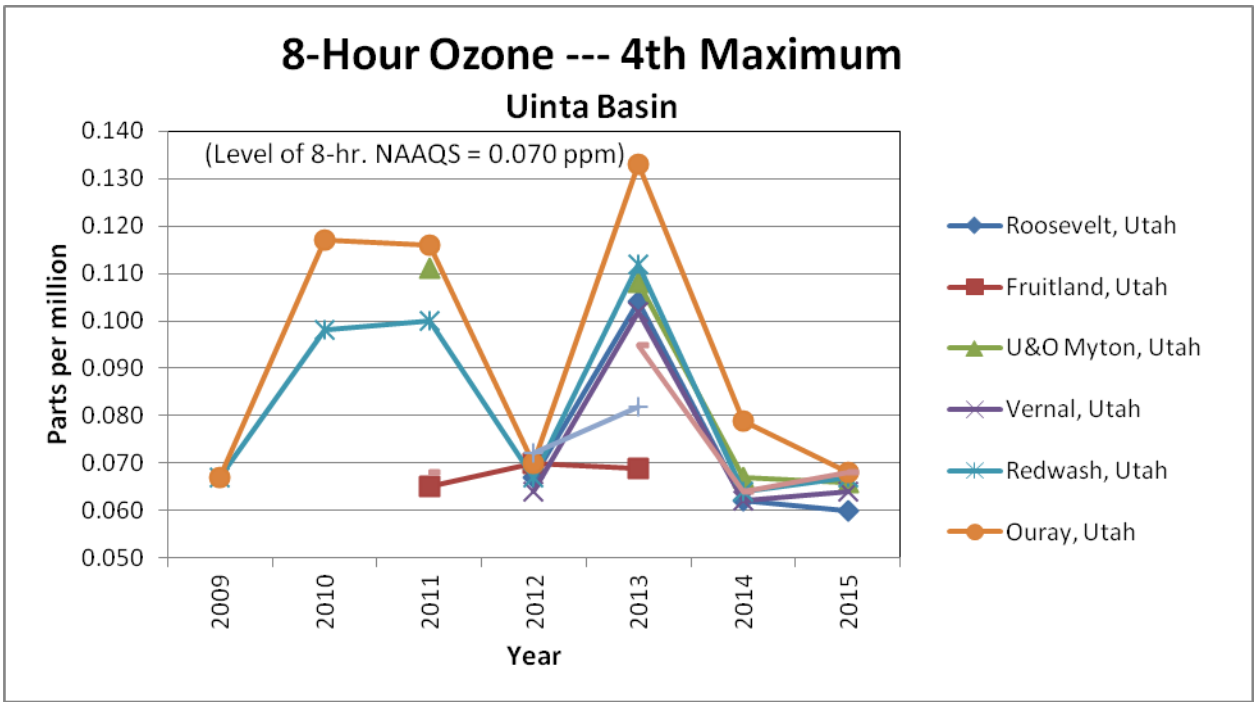


Figure 2-9: Uinta Basin- 8-hour (4th Max) Ozone Values



Air Quality Data Conclusions

As shown in Table 2-1 the three-year average of the 4th maximum 8-hour concentration from 2013-2015 at the BLM Rangely monitor is 0.073 ppm, which is in violation of the revised 8-hour ozone standard. However, the violation of the standard is due to an unusually high value in 2013

(0.091 ppm) that is associated with wintertime ozone formation. This unusually high year is also seen for all monitors in the Uinta Basin, as shown in Figure 2-9. Since 2013 ozone levels were very uncharacteristic, and that 2013 data will not be used by the EPA in determining compliance with the standard, the State recommends the area be designated as attainment/unclassifiable.

Factor #2: Emissions and Emissions-Related Data

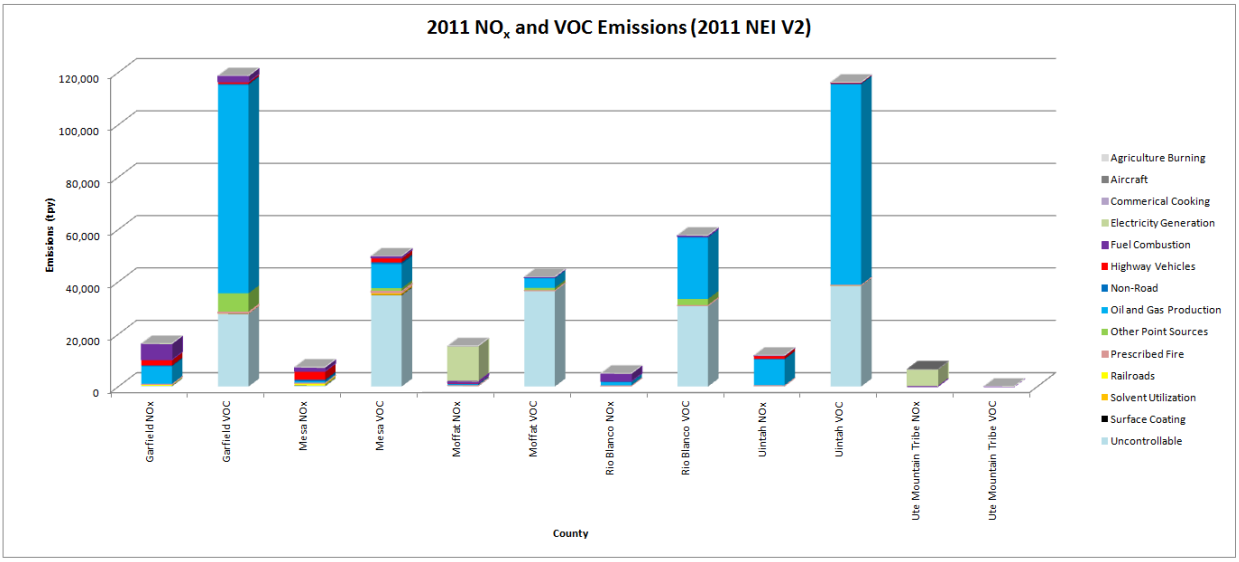
Table 2-2 includes the 2011 emissions for NO_x and VOC emissions for 16 source categories for AQCR 11 and Uintah County along with emissions from the Ute Mountain Ute Tribe of the Ute Mountain Reservation (includes Ute Indian Tribe of the Uintah and Ouray Reservation, Southern Ute Tribe and Ute Mountain Ute Tribe). The emission sources are categorized into controllable and uncontrollable emissions. Biogenic, agricultural livestock waste and wildfire emissions comprise the uncontrolled emission sources.

Table 2-2: 2011 Ozone Precursor Emissions Data for AQCR 11 and Surrounding Areas

	Garfield		Mesa		Moffat		Rio Blanco		Uintah		Ute Mountain Tribe	
Category	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)
Agriculture Burning	0	0	1	2	4	9	1	3	7	17	0	0
Aircraft	1	2	33	14	0	0	2	4	1	4	0	0
Commercial Cooking	0	4	0	6	0	1	0	0	0	1	0	0
Electricity Generating Units	47	18	62	1	13,557	65	1	2	0	0	6,590	46
Prescribed Fire	23	393	32	585	3	26	4	66	0	3	0	0
Fuel Combustion	6,081	2,283	1,479	707	687	155	2,987	488	67	46	0	0
Highway Vehicles	2,258	847	3,241	1,724	338	203	174	103	1,275	463	0	0
Non-Road	327	322	561	670	135	183	170	318	191	286	0	0
Oil and Gas Production	6,762	79,607	639	9,142	332	3,577	1,434	23,432	10,033	76,502	0	0
Other Point Sources	96	7,162	100	1,222	122	1,085	19	2,489	14	167	0	0
Railroads	518	26	864	50	112	6	0	0	0	0	0	0
Solvent Utilization	0	314	0	821	0	82	0	40	0	310	0	0
Surface Coating	6	21	27	89	0	4	18	2	0	28	0	0
Total- Controllable	**16,119**	**90,999**	**7,039**	**15,032**	**15,290**	**5,397**	**4,809**	**26,948**	**11,588**	**77,826**	**6,590**	**46**
Biogenics	290	27,634	353	34,591	224	36,306	217	30,849	294	38,181	0	0
Agriculture- Livestock Waste	0	0	0	0	0	0	0	0	0	0	0	0
Wildfires	4	76	20	245	18	220	1	12	15	200	0	0
Total- Uncontrollable	**294**	**27,710**	**373**	**34,836**	**242**	**36,526**	**218**	**30,861**	**309**	**38,381**	**0**	**0**
Total- Controllable + Uncontrollable	**16,413**	**118,709**	**7,412**	**49,868**	**15,532**	**41,923**	**5,027**	**57,809**	**11,897**	**116,207**	**6,590**	**46**

A summary of the above tabular data is provided in the following graph, Figure 2-10.

Figure 2-10: 2011 Ozone Emissions for AQCR 11 and Surrounding Areas



The NO_x and VOC emissions in AQCR 11 and northeast Utah by county and the large and small point sources in northwest Colorado and northeast Utah are shown in Figures 2-11 and 2-12.

Figure 2-11: NW CO and NE Utah NO_x Emissions Map

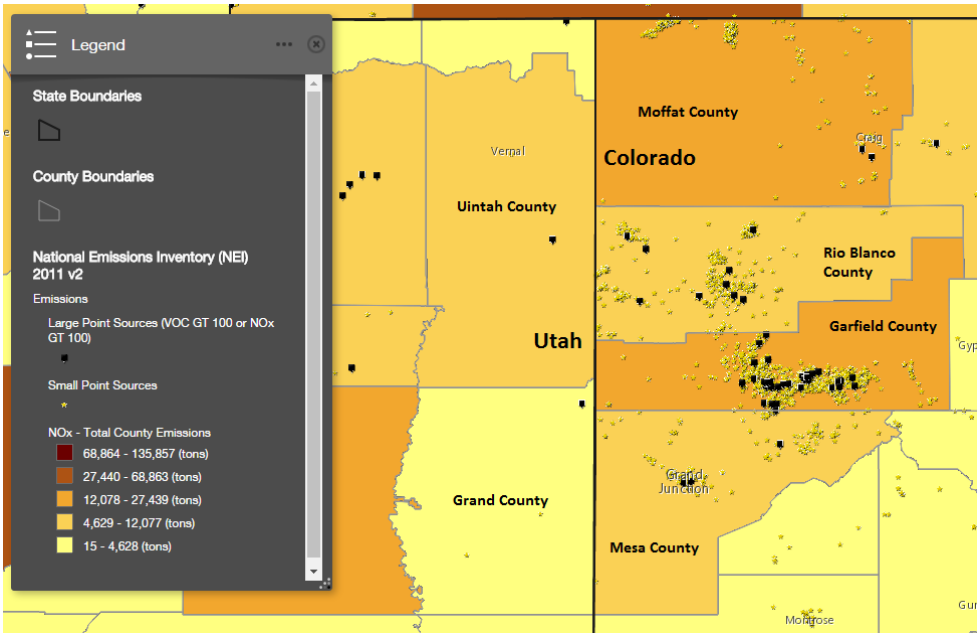
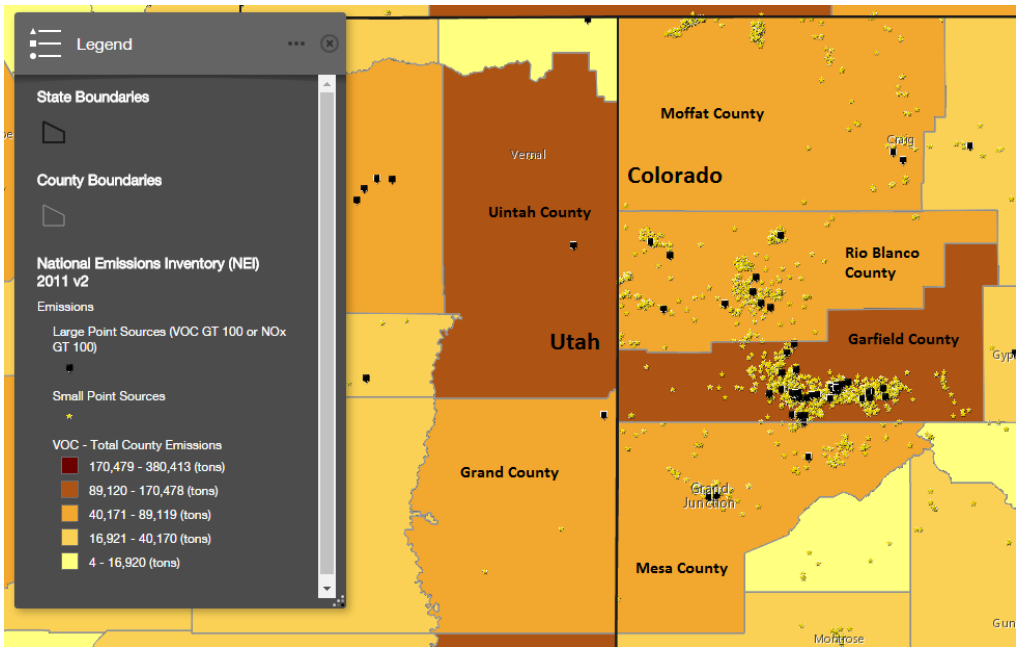


Figure 2-12: NW CO and NE Utah VOC Emissions Map



Emissions Data Conclusions

Based on Figure 2-10, the NO_x and VOC emissions in Rio Blanco County are substantially below other nearby counties, and about half of the total VOC precursor emissions are uncontrollable (biogenic, agricultural livestock and forest fire emissions). Oil and gas sources are a significant contributor to VOC emissions in Rio Blanco County, but are far below Uintah County, where oil and gas VOC emissions are more than double. Colorado's stringent oil and gas regulations in Regulation Number 7 require control VOC emissions from the majority of oil and gas sources.

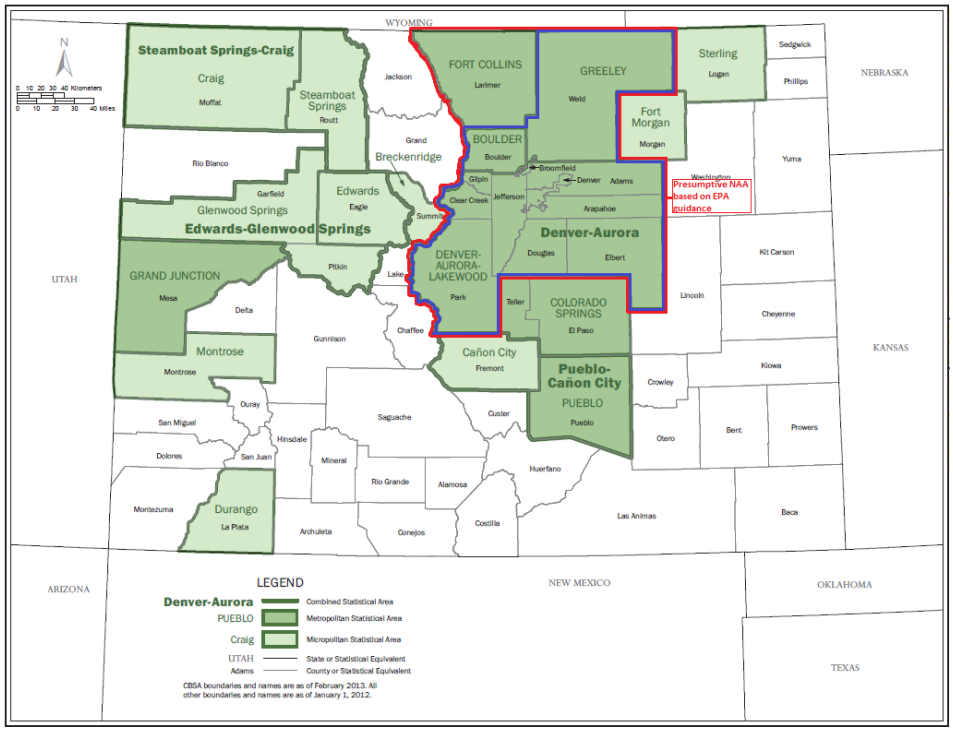
Because anthropogenic emissions in Rio Blanco County and Rangely are low and the State has implemented stringent oil and gas regulations, this supports the State recommending the area be designated as attainment/unclassifiable.

Population Density and Degree of Urbanization

CSA and CBSA Analysis

EPA suggests that because ground-level ozone and ozone precursor emissions are pervasive and readily transported, it is important to examine ozone-contributing emissions across a relatively broad geographic area. Accordingly, EPA states they will consider information associated with counties in Statistical Area (CBSA) or Combined Statistical Area (CSA) associated with a violating monitor(s). See Figure 2-13 for a map of CBSA and CSA areas in Colorado.

Figure 2-13: CBSAs and CSAs and Counties in Colorado



As shown in Figure 2-13, Rio Blanco County is not part of a CSA or CBSA. In the case of a violating monitor not being located in a CSA or CBSA, the EPA states that it will review information associated with the county and other adjacent nearby counties. To comply with this requirement, the State's analysis examines Rio Blanco County, nearby counties in AQCR 11 and Uintah County in Utah.

Population Density

Figure 2-14, below, shows the population density in northwest Colorado and northeast Utah and Table 2-3 summarizes the population.

Figure 2-14: Population Density and Degree of Urbanization of NW Colorado and NE Utah

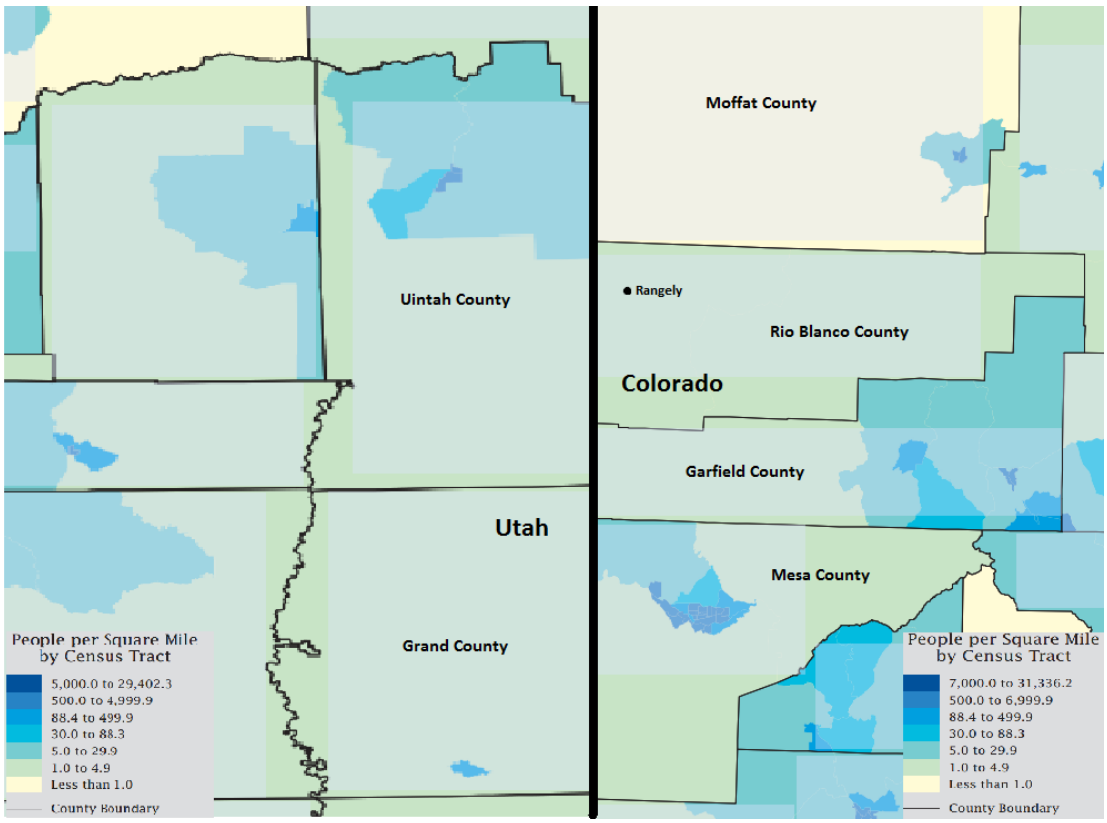


Table 2-3: County-Level Population

County	July 2010 (Estimate)	July 2015 (Estimate)	2010 to 2015 Total % Change	2010 to 2015 Annual % Change
Garfield	56,094	58,095	3.57%	0.71%
Mesa	146,489	148,513	1.38%	0.28%
Moffat	13,812	12,937	-6.34%	-1.27%
Rio Blanco	6,669	6,571	-1.47%	-0.29%
Uintah, UT	32,444	37,928	16.90%	3.38%

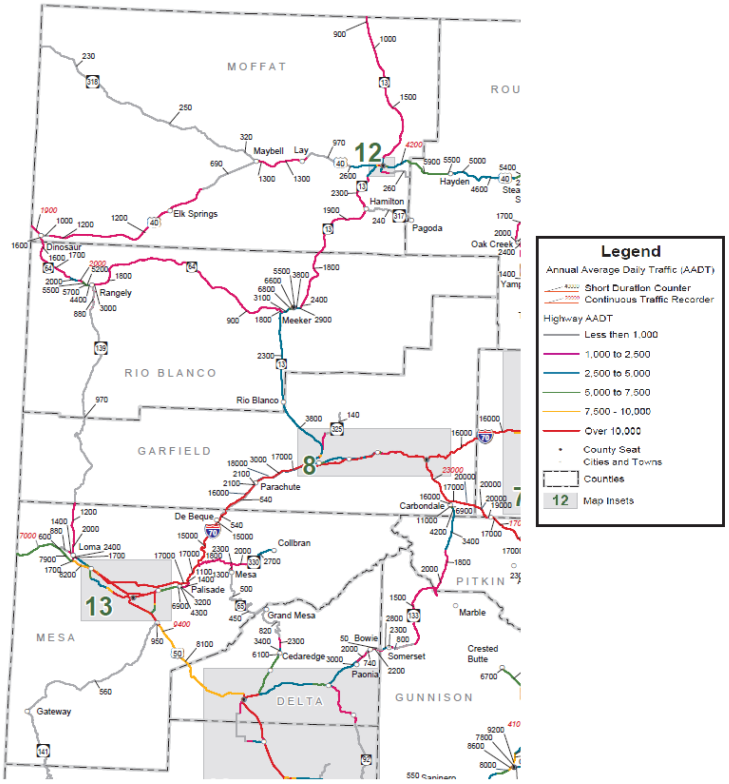
Population Density and Degree of Urbanization Conclusions

As shown in Figure 2-14, the population density in Rio Blanco County is less than 5 people per square mile. Table 2-3 shows the population in Rio Blanco County actually decreased from 2010 to 2015, whereas the population in Uintah County is increasing at a rate of about 3.4% per year. The sparse population density of Rio Blanco County and adjoining counties along with the other components of the 5-factor analysis support the State's recommendation of designating the area as attainment/unclassifiable.

Traffic and Commuting Patterns

The traffic volumes in AQCR 11 are shown below in Figure 2-15.

Figure 2-15: CDOT Traffic Volume in AQCR 11



Traffic and Commuting Patterns Conclusions

Figure 2-15, displays the annual average daily traffic (AADT) volume for northwest Colorado. Generally, the highest traffic volumes in Rio Blanco County occur around the Meeker area but the Rangely area does have a peak AADT volume of 5,700 with the majority of the traffic volumes much lower. Since Rio Blanco County is very rural and far from major employment centers, it seems unlikely that a significant number of residents are commuting daily to neighboring counties. Commuters from other adjoining counties into Rio Blanco County are not expected to be a significant because of sparse population. Consequently, the very low traffic volumes in Rio Blanco County and adjoining counties along with likely insignificant commuter trips further supports the State's recommendation of attainment/unclassifiable for Rio Blanco County and Rangely.

Growth Rates and Patterns

The following two tables present growth rates and patterns for Rio Blanco County and neighboring counties.

Table 2-4: Population Projections for AQCR 11

County	July 2020 (State Estimate)	July 2025 (State Estimate)	July 2030 (State Estimate)	July 2035 (State Estimate)	July 2040 (State Estimate)	July 2045 (State Estimate)	July 2050 (State Estimate)
Garfield	64,080	72,030	80,631	88,974	97,153	105,205	113,249
Mesa	162,034	175,675	189,162	202,261	215,237	227,593	239,618
Moffat	12,987	13,366	13,947	14,403	14,733	15,033	15,325
Rio Blanco	6,688	6,787	6,985	7,185	7,377	7,556	7,724

Table 2-5: Annual Population Percent Change Projections for AQCR 11

County	2020 to 2025 (State Estimate)	2025 to 2030 (State Estimate)	2030 to 2035 (State Estimate)	2035 to 2040 (State Estimate)	2040 to 2045 (State Estimate)	2045 to 2050 (State Estimate)
Garfield	2.5%	2.4%	2.1%	1.8%	1.7%	1.5%
Mesa	1.7%	1.5%	1.4%	1.3%	1.1%	1.1%
Moffat	0.6%	0.9%	0.7%	0.5%	0.4%	0.4%
Rio Blanco	0.3%	0.6%	0.6%	0.5%	0.5%	0.4%

Growth Rates and Patterns Conclusions

Rio Blanco County is projected to have minimal growth through 2050, with the highest increase only being 0.6% in a year. Because the county is not growing at a significant rate, the State's recommendation of an attainment/unclassifiable designation for Rangely and Rio Blanco County is further supported.

Factor #3: Metrological Data

In recent years, ozone concentrations above the 2008 (75 ppb) standard have been observed in the Uinta Basin in northeastern Utah during the winter when snow cover is present within the basin. These exceedances of the standard are associated with a unique combination of conditions including large quantities of oil and gas emissions within the basin, cold temperatures and cold pooling in the basin, light winds, a shallow surface mixed layer of between 50 and 200 meters depth (Ahmadov et al., 2015; Oltmans et al., 2014) and the reflective nature of snow. The snow increases the strength and longevity of the shallow surface inversions and reflects sunlight which increases the radiation available for photochemistry. The winter, cold-pool, photochemistry in the center of the basin is highly VOC sensitive. High ozone concentrations require both the local VOC emissions from oil and gas activities in the basin and the intense and shallow decoupling of surface air, which will always be at a maximum at the core of the basin in Utah.

Figure 5 of the paper by Ahmadov et al., 2015, shows a west-east cross section of the basin with modeled ozone and winds. These reveal a shallow layer of high-concentration ozone of between 50 and 200 meters depth attached to the basin floor and sidewalls and influenced by terrain-mediated winds and vertical mixing. The vast majority of the high-concentration ozone is formed within the Utah portion of the basin. Occasionally, winds and mixing can transport this ozone into extreme western Rio Blanco County which is located within the easternmost corner of the basin. These transport events have caused exceedances of the standard at Rangely, Colorado, which is at an altitude of 5,200 feet (1,585 meters) above sea level compared to 4,700 feet (1,433 meters) for the center of the basin. The elevation difference between Rangely and the center of the basin is about 150 meters. The fourth maximum 8-hour ozone concentrations at Rangely

have been 73, 69, 91, 62, and 66 ppb for 2011 through 2015, respectively. High concentrations in 2013 were associated with winter cold pool events within the Uinta Basin.

Figure 2-16 shows the terrain of the basin and area daily maximum 8-hour ozone concentrations for February 14, 2011, a cold pool ozone event day. The highest concentrations are clearly located at the center of the basin at 106 to 146 ppb. Peak ozone drops to 88 ppb at Rangely and 54 ppb at Meeker which is outside the basin.

Figure 2-16: Daily max 8-hour ozone Contours in ppb and Site Concentrations in and Near the Uinta Basin on February 14, 2011

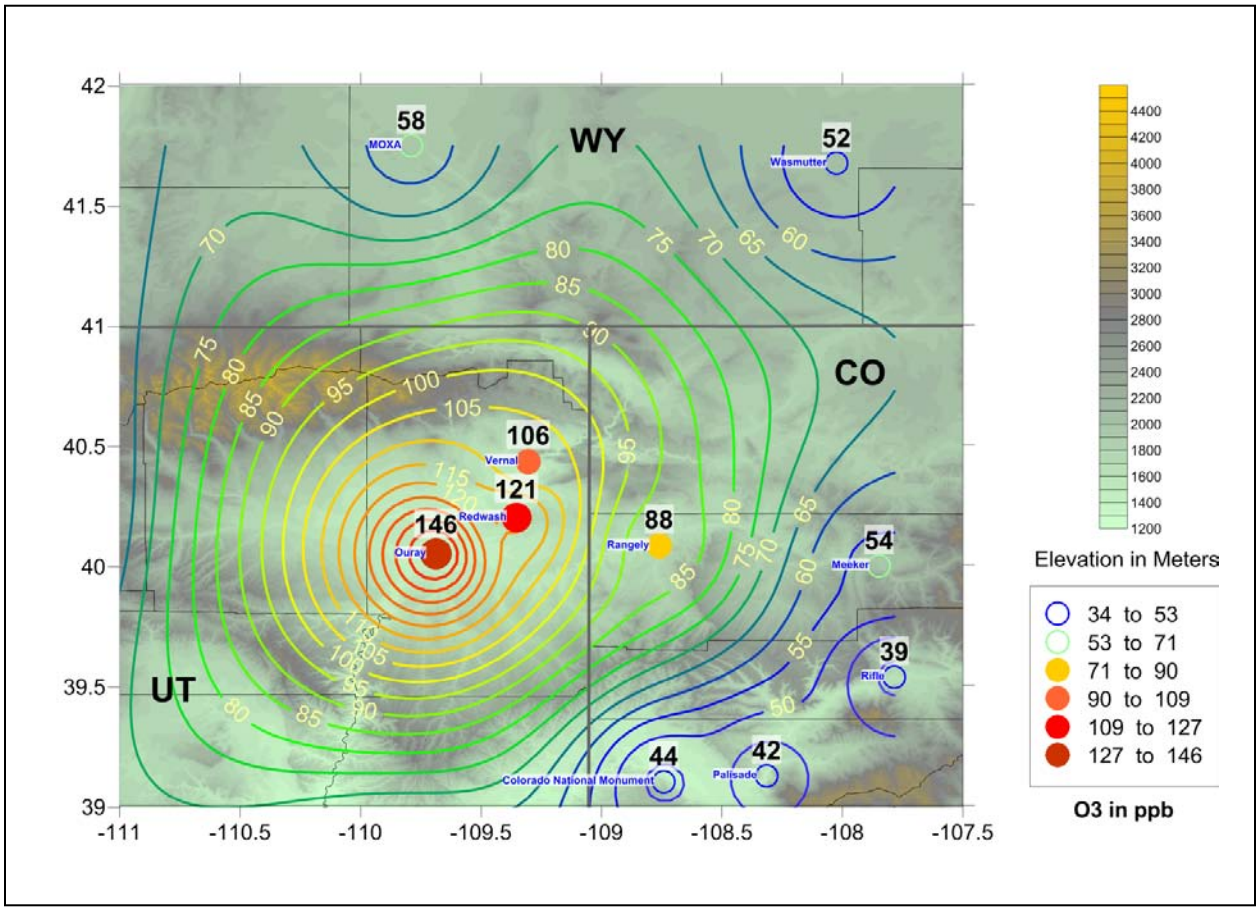


Figure 2-17 shows the hourly ozone concentrations from February 3 through 16, 2011, for select sites in and near the Uinta Basin, and these show that the highest concentrations were at sites within or closer to the core of the basin. Redwash and Ouray are in the center of the basin, and Dinosaur National Monument is closer to the edge of the basin. Meeker is outside of the basin and located to the east.

Figure 2-17: Hourly Ozone Concentrations in ppb from February 3 through 16, 2011, for Select Sites in and Near the Uinta Basin

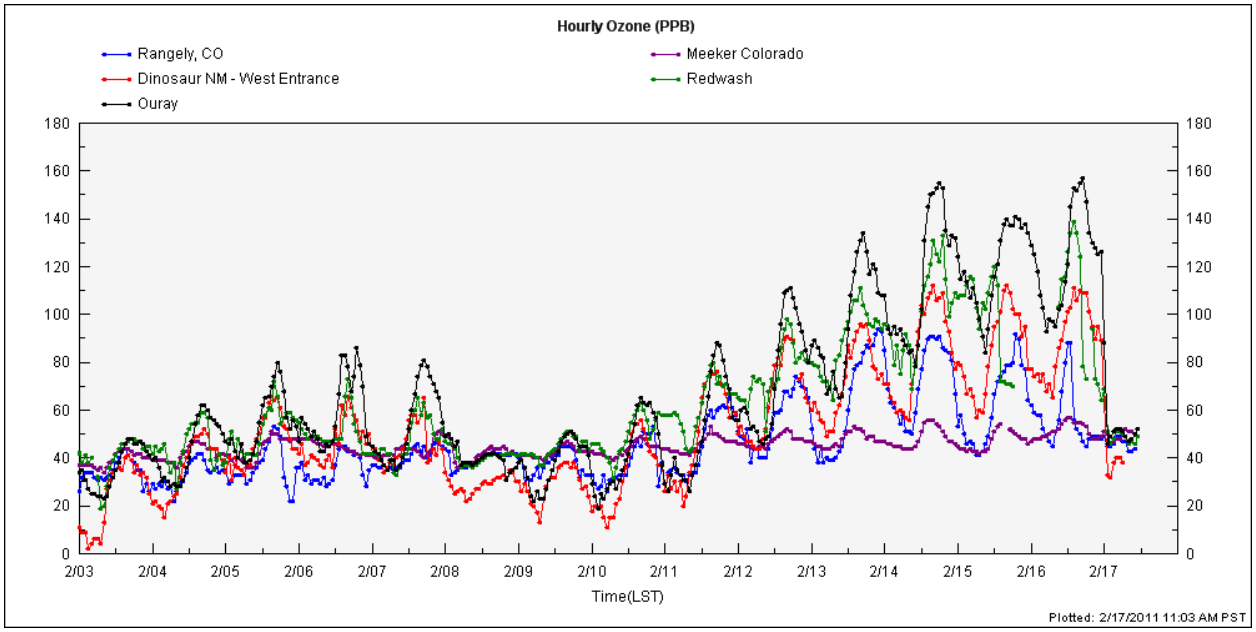


Figure 2-18 shows surface potential temperatures in the region for 13 MST on February 14, 2011. Blue and green contours in the basin reveal a temperature inversion and decoupled air mass near the core of the basin with Rangely located higher up within the inversion stratification. This horizontal and vertical gradient in surface potential temperatures indicates that mixing was poor and high concentrations in the core of the basin would need an assist from local transport winds in order to influence ozone at Rangely.

Figure 2-18: NOAA LAPS Analysis Surface Potential Temperatures in Degrees K for 13 MST February 14, 2011

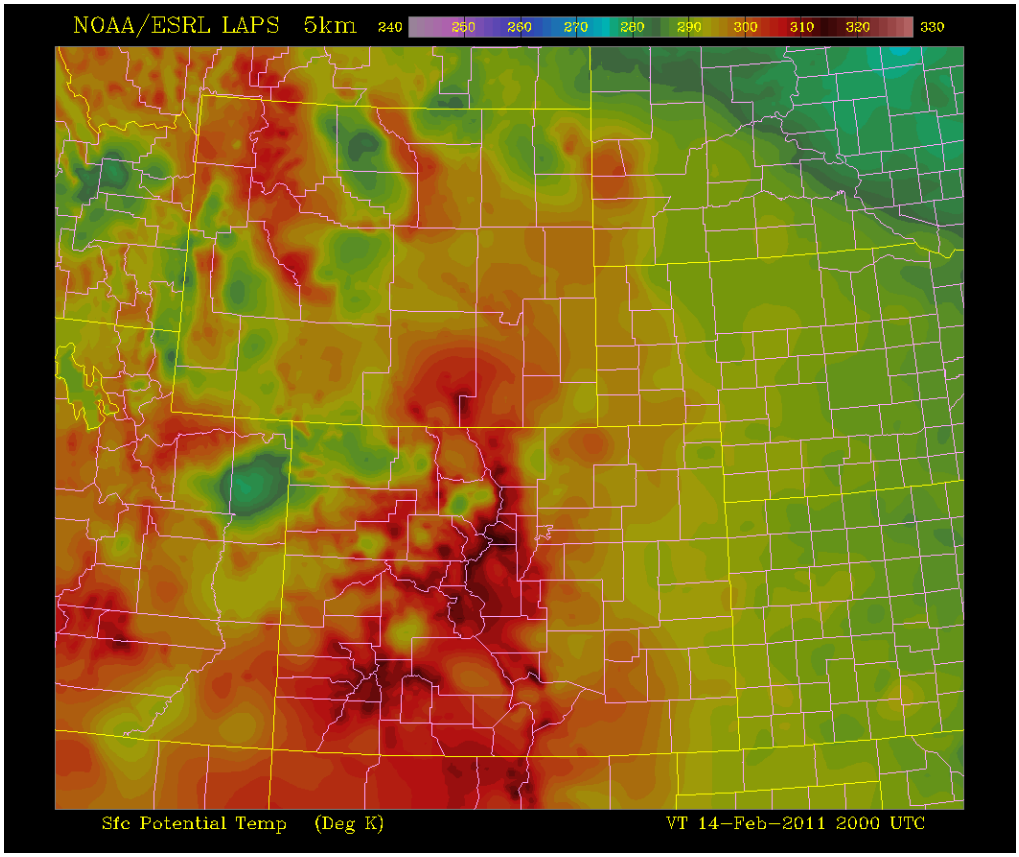
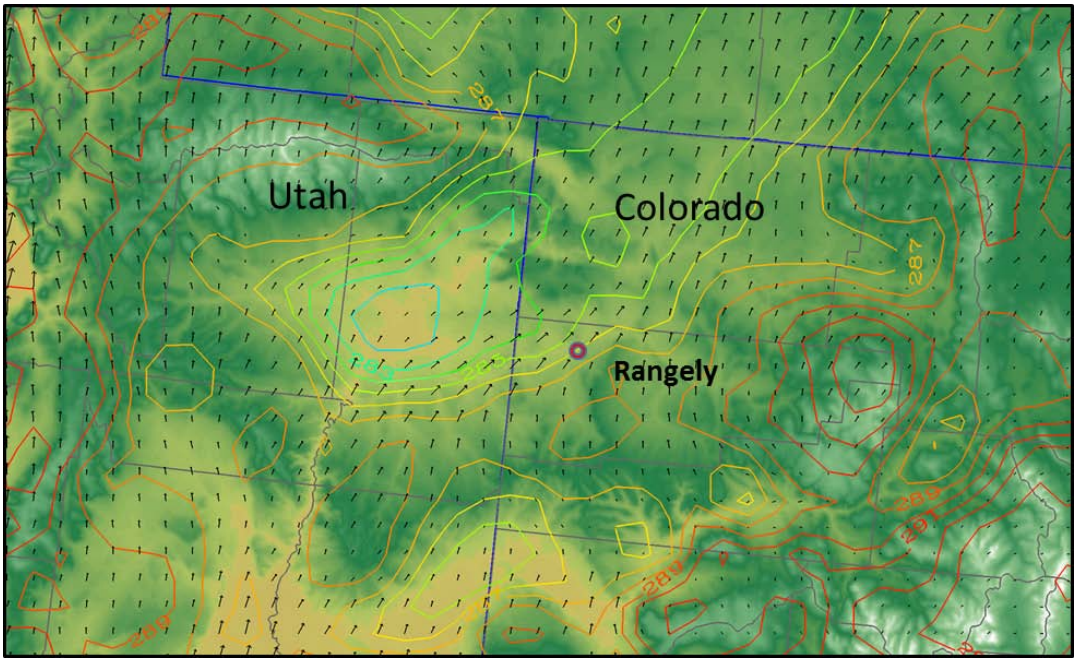


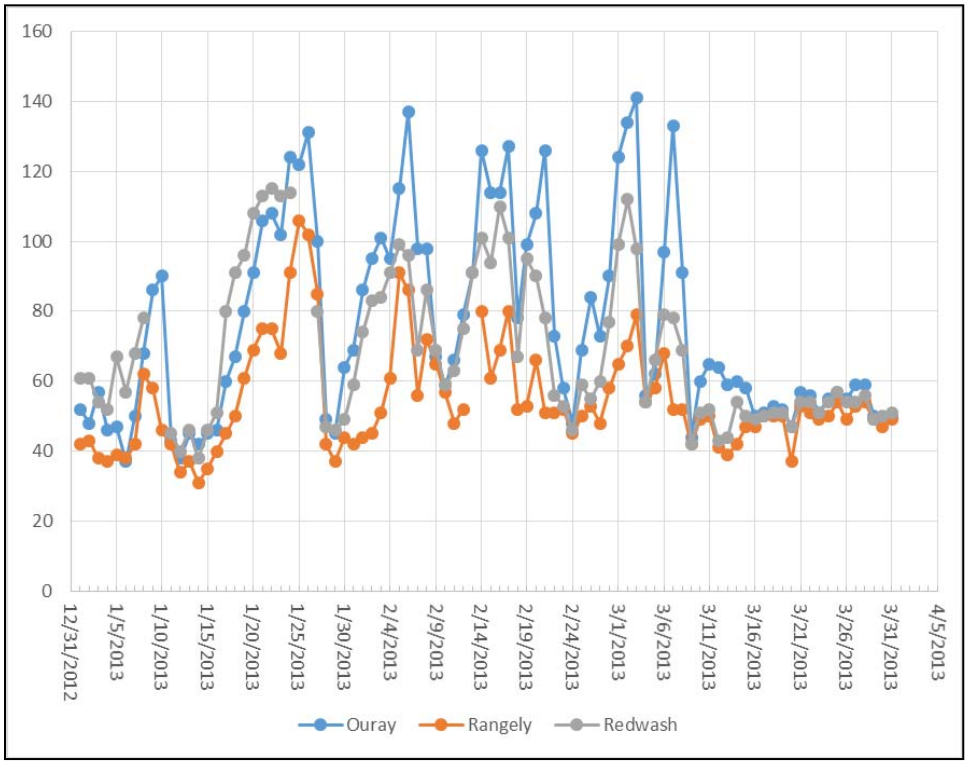
Figure 2-19 is a plot of surface potential temperatures and near-surface transport winds from the analysis run of the NAM12 model at 11 MST on February 14, 2011 (analysis runs reconcile a multitude of surface weather observations with model physics) showing surface potential temperature contours (blue through red lines) and near-surface winds at the 800 mb level in Utah and Colorado. Colder or blue contours over the Uinta Basin highlight a cold pooling event with a shallow, steep, surface inversion. Transport winds were moving air from near the core of the basin towards Rangely, and this is the likely cause of the exceedance at Rangely. HYSPLIT back trajectories were not used for this analysis because of poor simulation of transport out of the cold pool.

Figure 2-19: NAM12 Analysis Run at 18z or 11 MST Showing Surface Potential Temperature and Near-Surface Winds at the 800 mb Level for February 14, 2011, in Utah and Colorado



Since Rangely is not at the core of cold pool events or near the primary sources of ozone precursors for these events, high concentrations at Rangely are typically much lower than those within the center of the basin and often lag these sites by many hours or days. Figure 2-20, shows hourly ozone at Rangely and at two sites within the center of the basin (Ouray and Redwash) for January 1 through March 31, 2013, illustrates this point. The depth of the surface ozone layer must increase or this ozone must be transported eastward before there are significant impacts at Rangely.

Figure 2-20: Hourly Ozone Concentrations in ppb at the Ouray and Redwash Monitors in the Core of the Uinta Basin and Rangely, Colorado, from January 1 through March 31, 2013



Additional plots of near-surface transport winds and surface potential temperatures for the highest 5 concentration days at Rangely in 2013 are presented in Figures 2-21 – 2-25. These show conditions on January 24-26 and February 5-6, respectively. Surface potential temperature contours show that a cold pool and vertical and horizontal temperature stratification was in place and that near-surface winds were generally bringing some of this cold pool air into the Rangely area.

Figure 2-21: NAM12 Analysis Run at 18z or 11 MST Showing Surface Potential Temperature Contours (Blue Through Red Lines) and Near-Surface Winds at the 800 mb level for January 24, 2013, in Utah and Colorado

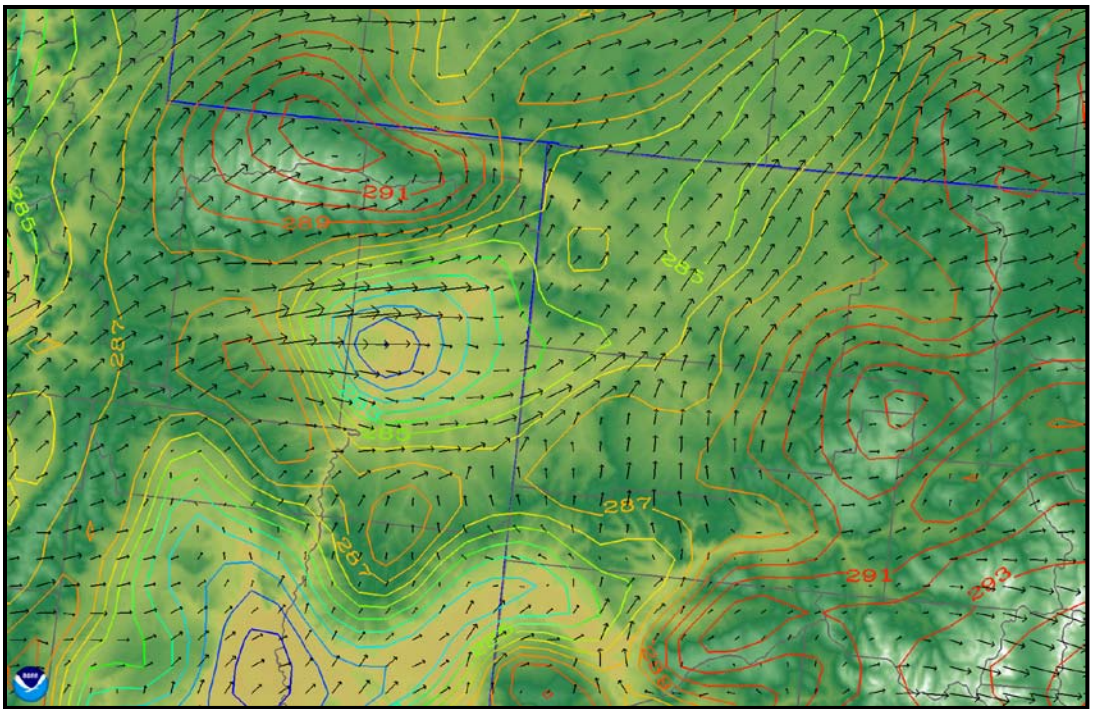


Figure 2-22: NAM12 Analysis Run at 18z or 11 MST Showing Surface Potential Temperature Contours (Blue Through Red Lines) and Near-Surface Winds at the 800 mb Level for January 25, 2013, in Utah and Colorado.

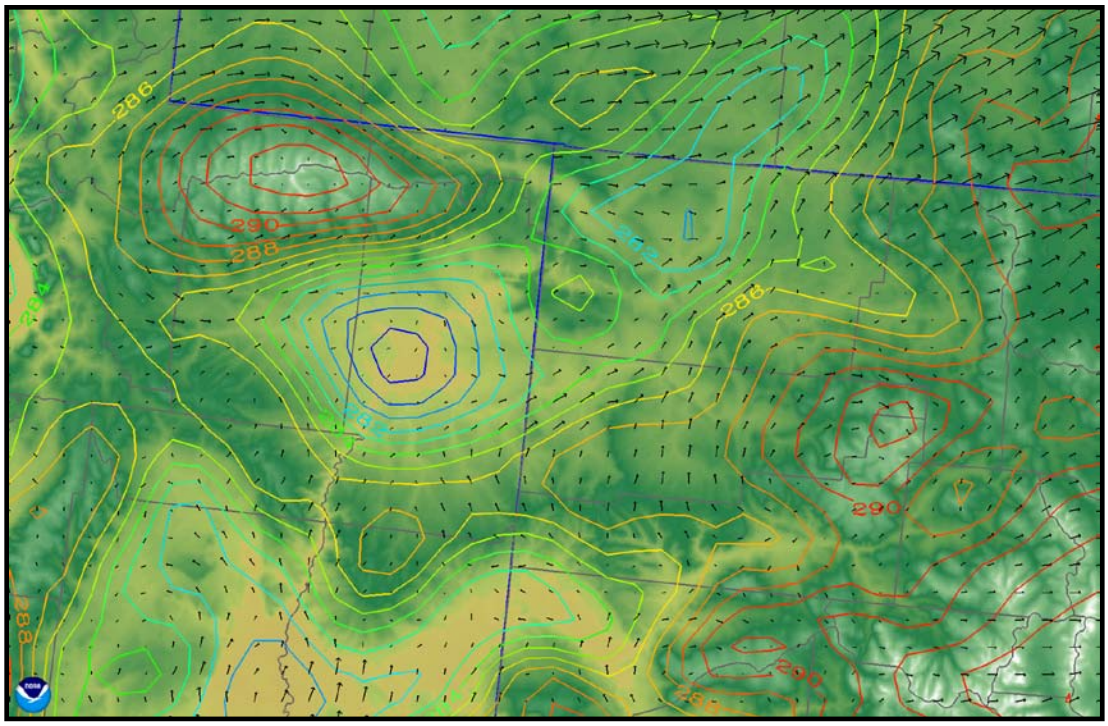


Figure 2-23: NAM12 Analysis Run at 0z (January 27, 2013) or 17 MST (January 26, 2013) Showing Surface Potential Temperature Contours (Blue Through Red Lines) and Near-Surface Winds at the 800 mb Level in Utah and Colorado.

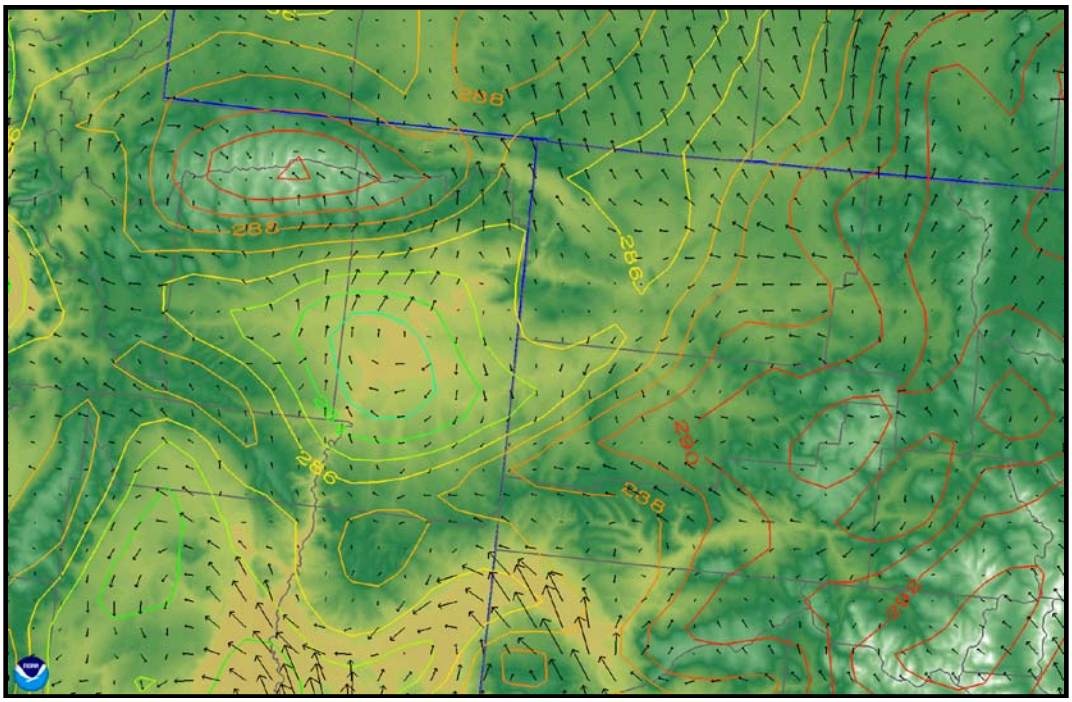


Figure 2-24: NAM12 Analysis Run at 18z or 11 MST Showing Surface Potential Temperature Contours (Blue Through Red Lines) and Near-Surface Winds at the 775 mb Level for February 5, 2013, in Utah and Colorado.

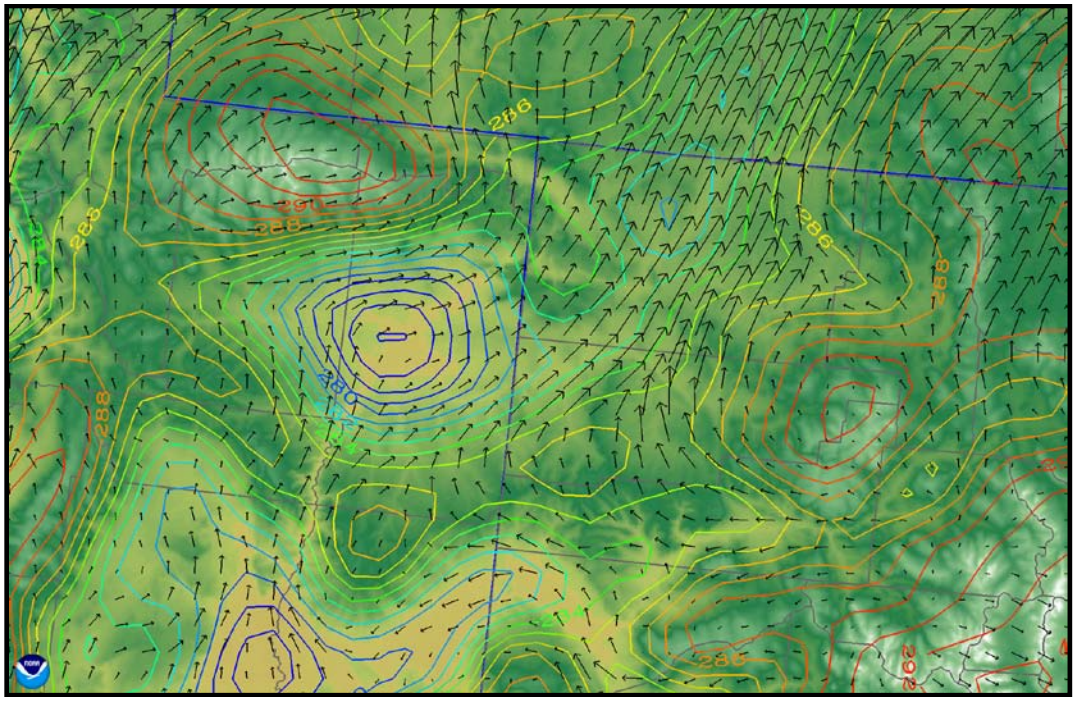


Figure 2-25: NAM12 Analysis Run at 18z or 11 MST Showing Surface Potential Temperature Contours (Blue Through Red Lines) and Near-Surface Winds at the 800 mb Level for February 6, 2013, in Utah and Colorado.

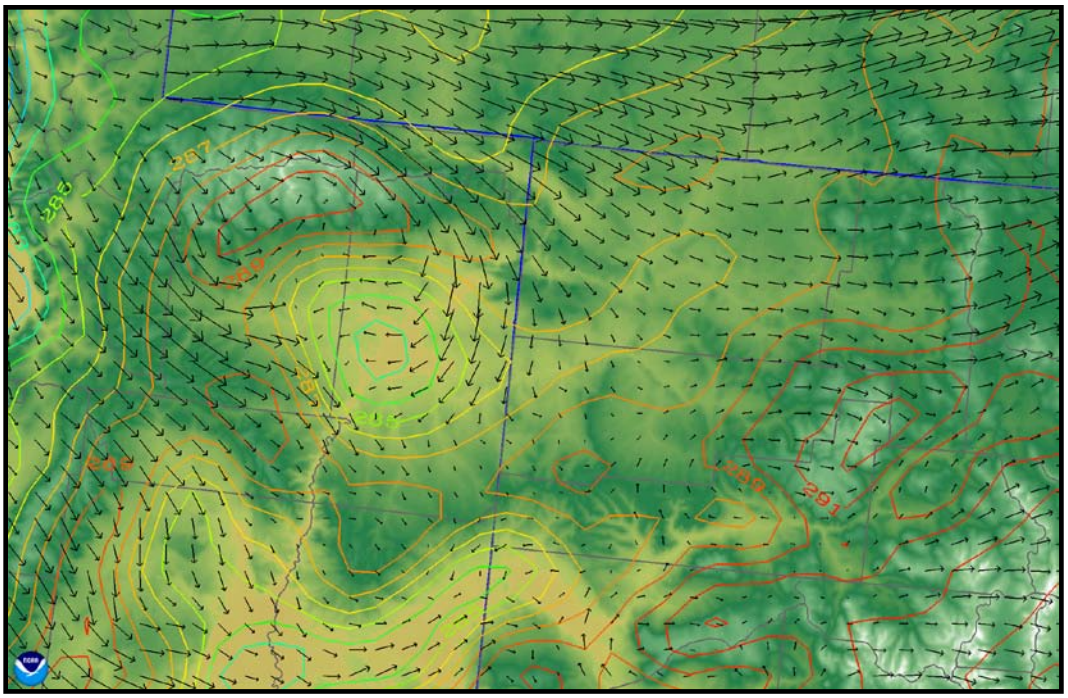
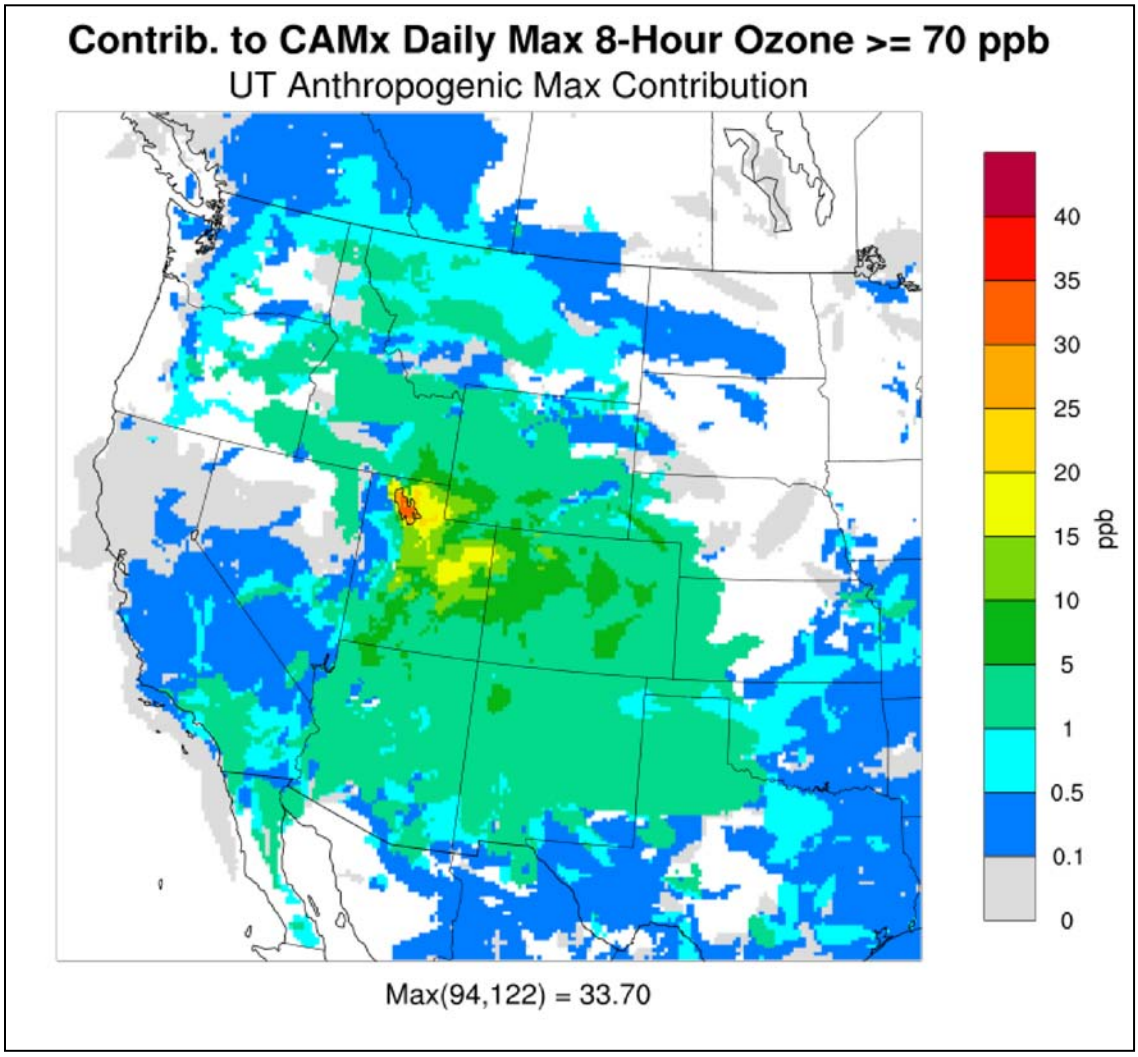


Figure 2-26 from Moore et al., 2014, shows CAMx modeling of Utah's 2008 contribution to regional daily maximum 8-hour ozone of 70 ppb or higher. This suggests that the Uinta Basin emissions in Utah would contribute as much as 15 ppb to maximum ozone near Rangely in the eastern corner of the basin. This is additional evidence that the source for the high ozone at Rangely during winter events is located in Utah.

Figure 2-26: WestJump Air Quality Modeling of Utah's 2008 Contribution to Regional Ozone at Max 8-Hour Concentrations of 70 ppb or Higher.



Maps and data from the Intermountain West Data Warehouse (IWDW) (http://views.cira.colostate.edu/TSDW/) and satellite-derived NO2 data provide further evidence that Utah is the primary source region for high wintertime ozone at Rangely. IWDW Western Air Quality Study 2011b base case inventory data shows that oil and gas related VOC emissions are 86,217 tons per year in Uintah County in Utah, which is almost entirely in the basin, and 24,417 tons per year in Rio Blanco County, which is almost entirely out of the basin. This is illustrated in Figure 2-27. Tropospheric column NO_2 amounts were acquired from measurements made by the Ozone Monitoring Instrument (OMI) aboard NASA's Aura satellite - Version 003 Level 3 NO_2 data cloud-screened at 30% with a grid resolution of 0.25° by 0.25° based on the NASA algorithm (Bucsela et al., 2013) obtained from the NASA Giovanni website http://giovanni.sci.gsfc.nasa.gov/giovanni/. The mean tropospheric column NO_2 in 10^{15} molecules per square centimeter for December 1, 2012, through February 28, 2013 is shown in Figure 2-28. Significantly higher amounts of NO_2 are found in Uintah County in Utah compared with Rio Blanco County in Colorado. Some of this higher NO_2 in Uintah County, however, may

be due to emissions from the Bonanza power plant, and these emissions are often above the surface decoupled layer (Oltmans et al., 2014).

Figure 2-27: Western Air Quality Study 2011b Base Case VOC Emissions Inventory Data for Oil and Gas Related Sources.

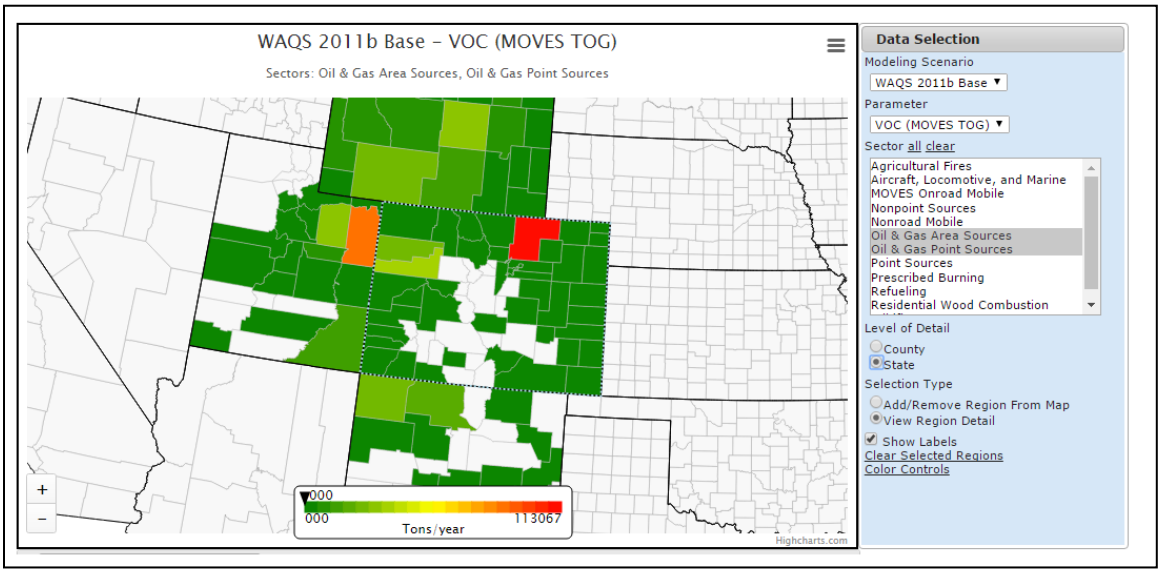
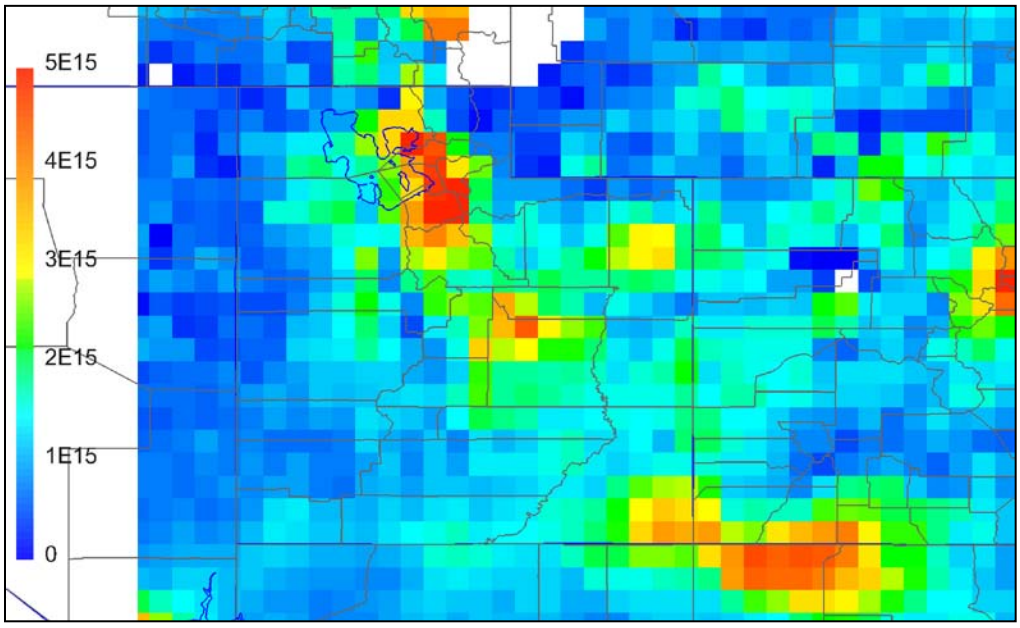


Figure 2-28: Mean OMI Satellite Tropospheric NO_2 in 10^{15} Molecules per Square Centimeter for December 1, 2012, through February 28, 2013



Meteorological Conclusions

In summary, meteorological data, evidence from recent research (Ahmadov et al., 2015), air quality modeling results, satellite-derived NO_2 data, and emissions inventory data suggest that the Utah portion of the Uinta Basin is responsible for the high ozone concentrations at Rangely,

Colorado, during winter cold pool events. The winter, cold-pool, photochemistry in the center of the basin is highly VOC sensitive. High ozone concentrations require both the local VOC emissions from oil and gas activities in the basin and the intense and shallow decoupling of surface air which will always be at a maximum at the core of the basin in Utah. Because of this, the State is recommending Rangely area of Rio Blanco County be designated as attainment/unclassifiable for the revised standard.

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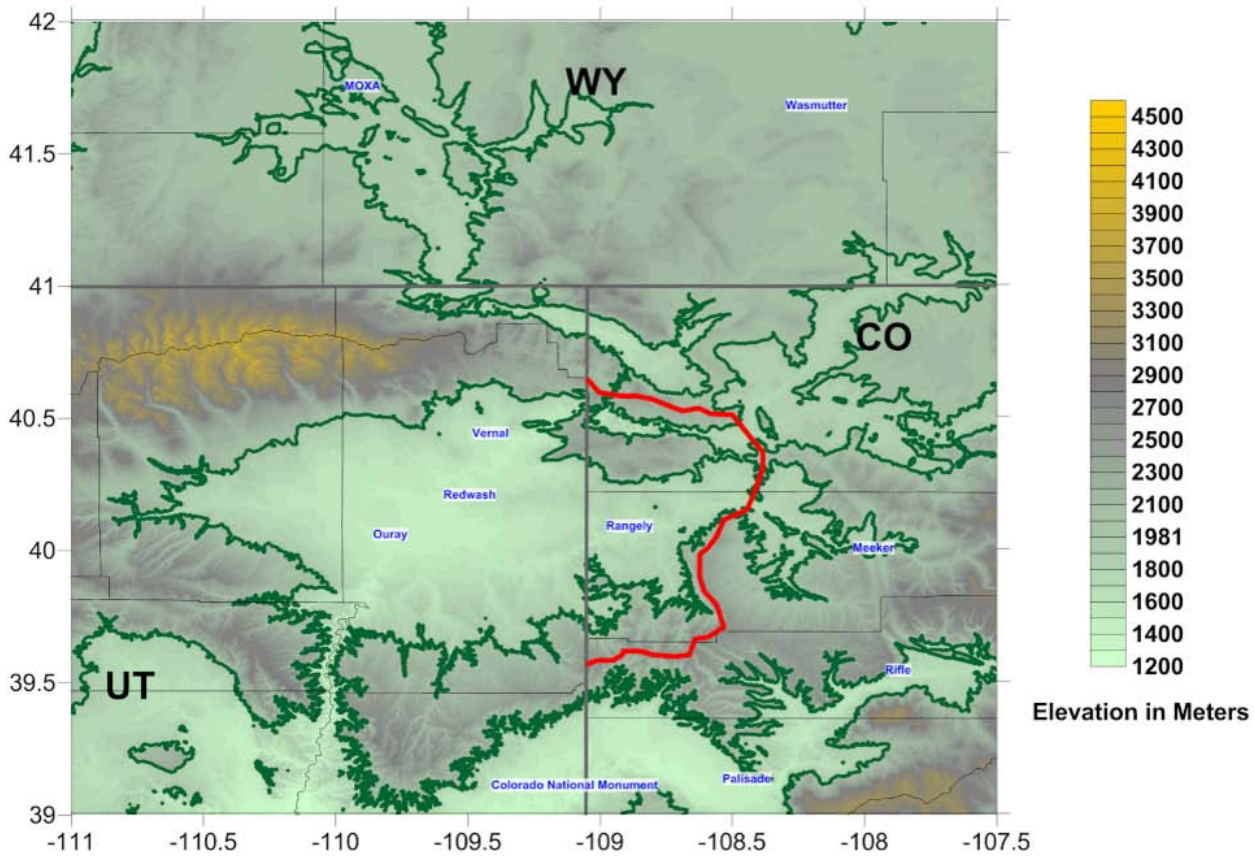
Factor #4: Geography/Topography

The town of Rangely is at an altitude of 5,200 feet (1,585 meters) above sea level. The center of the Uinta Basin is 4,700 feet (1,433 meters). The elevation difference between Rangely and the center of the basin is about 150 meters. As stated in the section above, the geography and meteorology of the Uinta Basin cause high levels of ozone in Utah to be transported to Colorado and impact ozone levels in Rangely. Figure 2-29, below, shows the elevation of Rangely and surrounding areas relative to the Uinta Basin.

Figure 2-28: Rangely and Uinta Basin Elevation Map



Geography/Topography Conclusions

The geography and meteorology of the Uinta Basin combine to cause the high levels of ozone in Utah to impact ozone levels in Rangely. Because of this, the state recommends that the Rangely area of Rio Blanco County be designated as attainment/unclassifiable for the revised ozone standard.

Factor #5: Jurisdictional Boundaries

The State of Colorado's Air Quality Control Commission and Air Pollution Control Division have jurisdictional authority for air quality management in Rio Blanco County and surrounding Colorado counties. Air quality regulatory authority for the tribal lands of the Ute Indian Tribe of the Uintah and Ouray Reservation are presently administered by the EPA. The Utah DEQ exercises air quality jurisdiction in non-tribal areas of Uintah County. Colorado would note for EPA's consideration that the inclusion of Rio Blanco County or portion thereof within any potential nonattainment area, would add notable multi-jurisdictional complexity in the management of a nonattainment area.

Level of Control of Emission Sources

The State has implemented numerous and effective emission control programs throughout the state. Some of these programs include but are not limited to the following:

- Oil and gas controls
    - 95% control efficiency for new and modified condensate tanks
    - Low-bleed pneumatics or no-bleed where on-site electrical grid power is being used for new pneumatics
    - 95% control efficiency for air pollution control equipment
    - Leak detection and repair program
    - Auto-igniters required on combustion devices for VOC control
- Stationary source controls for VOCs and NOx in Regulations 3, 6, 7 and 8
- Paint shops, solvent usage, industrial process changes
- Regional Haze SIP provisions – contained in regulation No. 3

Mobile Source Emission Controls:

- Federal diesel fuel standards
- 7.8 reid vapor pressure with 1 PSI Ethanol Waiver (8.8 RVP)
- Stage I vapor recovery
- Tier II Low Sulfur Gasoline
    - 30ppm average/80ppm max
        - Statewide/Year Round
        - Phased-in from 2004
- Federal tailpipe standards – TIER II
- Diesel school bus retrofits
- Federal alternative fuels programs
- Federal/state tax credits for hybrids/alternative fuels use
- Federal on-road and non-road mobile source standards and regulations
- Non-Road Engines, Vehicles, Equipment
    - Large Non–Road Diesel Engine Rule – Tier 4 (Phased–In Model Years (MY) 2008–2015)
    - Locomotive Engine Rule (MY 2015+)
    - Federal Non–Road Spark–Ignition Engines and Equipment (Phased–In MY 2008–2016)
    - Recreational Spark–Ignition (SI) Engine Standards (Phased–In MY 2008+)
- On-Road Engines and Vehicles
    - Tier 2 Standards for Light–Duty and some Medium–Duty Vehicles (Phased–In MY 2004– 2009)
    - Tier 3 Standards for Light–Duty and some Medium–Duty Vehicles (Phased–In MY 2017– 2025)
    - Heavy–Duty Engine and Vehicle Standards (Phased–In MY 2007+)
    - Light–Duty Vehicle Greenhouse Gas Rule (Phase 1 (Phased–In MY 2012–2016); Phase 2 – (Phased–In MY 2017–2025))
    - Medium and Heavy–Duty Vehicle Greenhouse Gas Rules (Phase 1 (Phased–In MY 2014– 2018))
- Fuels
    - Tier 3 Fuel Standards (Effective 2017 for large refineries, 2020 for small refineries)

- Renewable Fuel Standard Program (RFS2) (Effective 2015)
- Control of Hazardous Air Pollutants From Mobile Sources (Effective 2007)
- Ultra–Low–Sulfur Diesel (ULSD) (Effective 2006)

Area Source Emission Controls:

- Architectural/traffic/industrial and consumer products standards
- Prescribed burning limits
- Low emission gasoline cans

Summary Conclusions for Rangely

The data and analysis presented in the five factor review provide documentation and compelling evidence supporting a finding that the Rangely area of Rio Blanco County should be designated as attainment/unclassifiable for the 2015 ozone NAAQS, despite recorded violations of the ozone standard at the Rangely monitor.

A summary of the basis for recommending that Rangely area of Rio Blanco County should be designated as attainment/unclassifiable are as follows:

1. Ozone monitoring in Rangely only violates standard because of exceptionally high values in 2013 that are associated with wintertime ozone formation, and 2013 data will not be used by the EPA in determining compliance with the standard
2. Oil/gas emissions sources in Colorado are already well controlled; and
3. Population density, expected population growth and traffic volumes in the Rangely area are extremely low.

SECTION 3

Remainder of Colorado

SECTION 3: Remainder of Colorado

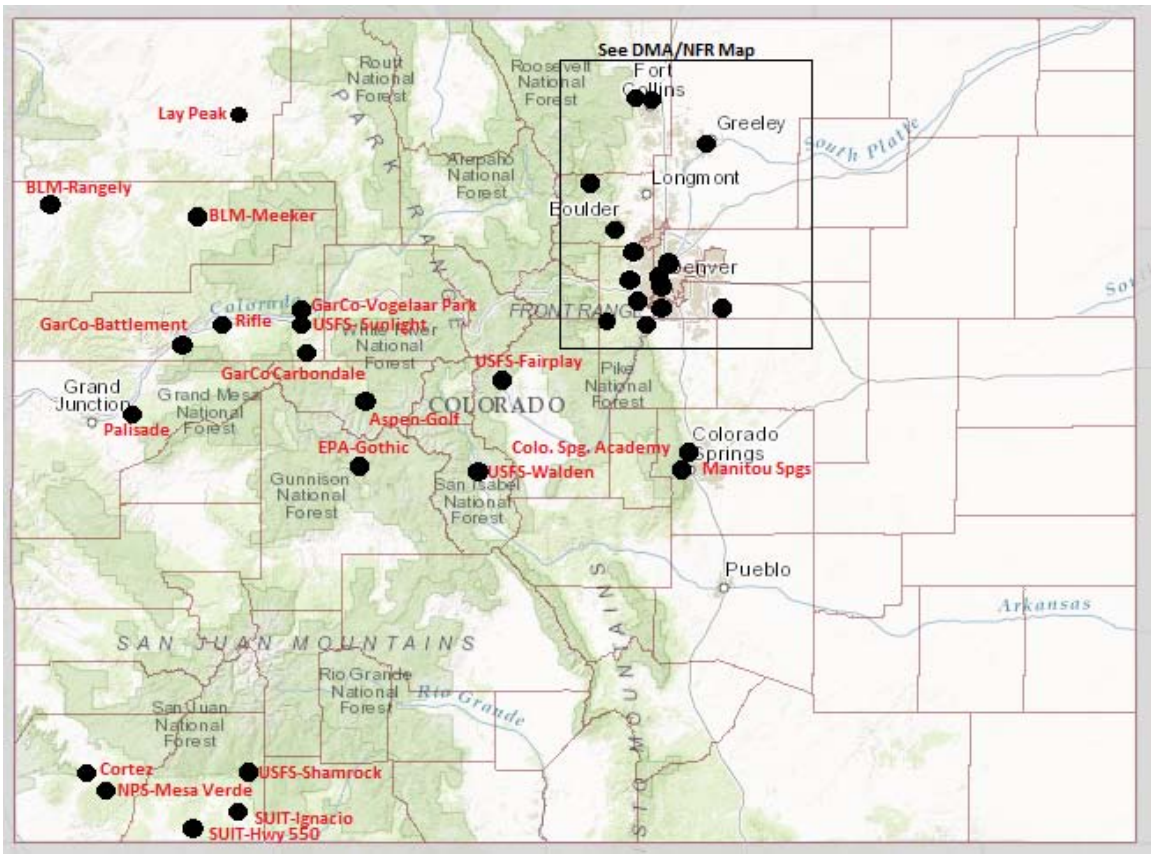
Designation Recommendation

Although there are population centers and emission sources throughout Colorado that cause or contribute to elevated ozone levels, the State presumes that the rest of the State is attaining the 2015 8-hour ozone standard and recommends a designation of attainment/unclassifiable for all other Air Quality Control Regions in the remainder of Colorado. The tribal lands of the Southern Ute (located in Archuleta, La Plata and Montezuma Counties) and Ute Mountain Ute (located in La Plata and Montezuma Counties) are excluded from the recommended designations because those tribes or the EPA are responsible for making such recommendations and determinations. The State reached this conclusion based on reviewing the ambient air monitoring data, and examining precursor emissions in the State's AQCRs.

Map of Ozone Monitor Locations

The State is recommending the designation of attainment/unclassifiable based on monitoring data from CDPHE operated ozone monitors along with information from other agencies' ozone monitors in the state. A map showing the monitors operated by CDPHE and other agencies throughout the state is shown in Figure 3-1.

Figure 3-1: Ozone Monitoring Sites for Areas Outside of the Denver Metro/North Front Range Region



Ozone Monitoring Data from CDPHE and Other Agency Sites

There are five active ozone monitors (see Table 3-1) operated by CDPHE in the state of Colorado outside of the DM/NFR region. The Lay Peak monitor was discontinued at the end of 2014 due to the site meeting its monitoring objectives. The table below, Table 3-1, summarizes 4th maximum 8-hour concentrations for all monitoring locations in the state of Colorado from 2013-2015.

Table 3-1: Ozone Monitoring Data for Areas Outside of the Denver Metro/North Front Range Region

Colorado Sites Outside DMA/NFR 4th Maximum 8-Hour Ozone Values and 3-Year Averages					
Site Name	AQS#	Year			3-Year Average
		2013	2014	2015	
CDPHE-APCD Sites					
Colorado Springs- Academy, CO	08-041-0013	0.074	0.064	0.067	0.068
Manitou Springs, CO	08-041-0016	0.072	0.062	0.065	0.066
Rifle	08-045-0012	0.062	0.061	0.068	0.063
Palisade	08-077-0020	0.066	0.062	0.065	0.064
Lay Peak	08-081-0002	0.065	0.062	-	-
Cortez	08-083-0006	0.064	0.062	0.061	0.062
Other Agency Sites					
USFS-Sunlight Mtn	08-045-0016	-	0.055	-	-
GarCo-Battlement	08-045-0019	0.069	0.061	-	-
GarCo-Vogelaar Park	08-045-0020	-	-	0.064	
GarCo-Carbondale	08-045-0021	0.058	0.059	0.066	0.061
EPA-Gothic	08-051-1991	0.064	0.063	0.068	0.065
USFS-Walden	08-057-0003	0.064	0.059	0.061	0.061
USFS-Shamrock	08-067-1004	0.072	0.064	0.068	0.068
SUIT-Ignacio	08-067-7001	0.069	0.067	0.068	0.068
SUIT-Hwy 550	08-067-7003	0.067	0.065	0.066	0.066
NPS-Mesa Verde	08-083-0101	0.069	0.065	0.066	0.066
USFS-Fairplay	08-093-0002	-	-	0.067	-
Aspen-Golf	08-097-0007	-	0.062	0.065	-
BLM-Meeker	08-103-0005	0.064	0.062	0.064	0.063
BLM-Rangely	08-103-0006	0.091	0.062	0.066	0.073

As the table demonstrates, all monitoring locations outside of the DM/NFR are in compliance with the revised 2015 8-hour ozone standard excluding the BLM-Rangely site (see Section 2 of this TSD for discussion around its area designation). This supports the states recommendation that the remainder of the state be classified as attainment/unclassifiable.

Ozone Monitoring Trends for Areas Outside of the Denver Metro/North Front Range Region

The following figures provide historical trend data of the 8-hour ozone 4th maximum for areas in the state outside of the DM/NFR Region. For discussion of Rangely area of Rio Blanco County, please see Section 2 of this Technical Support Document.

Figure 3-2: Ozone Monitoring Trends for Southeastern Colorado

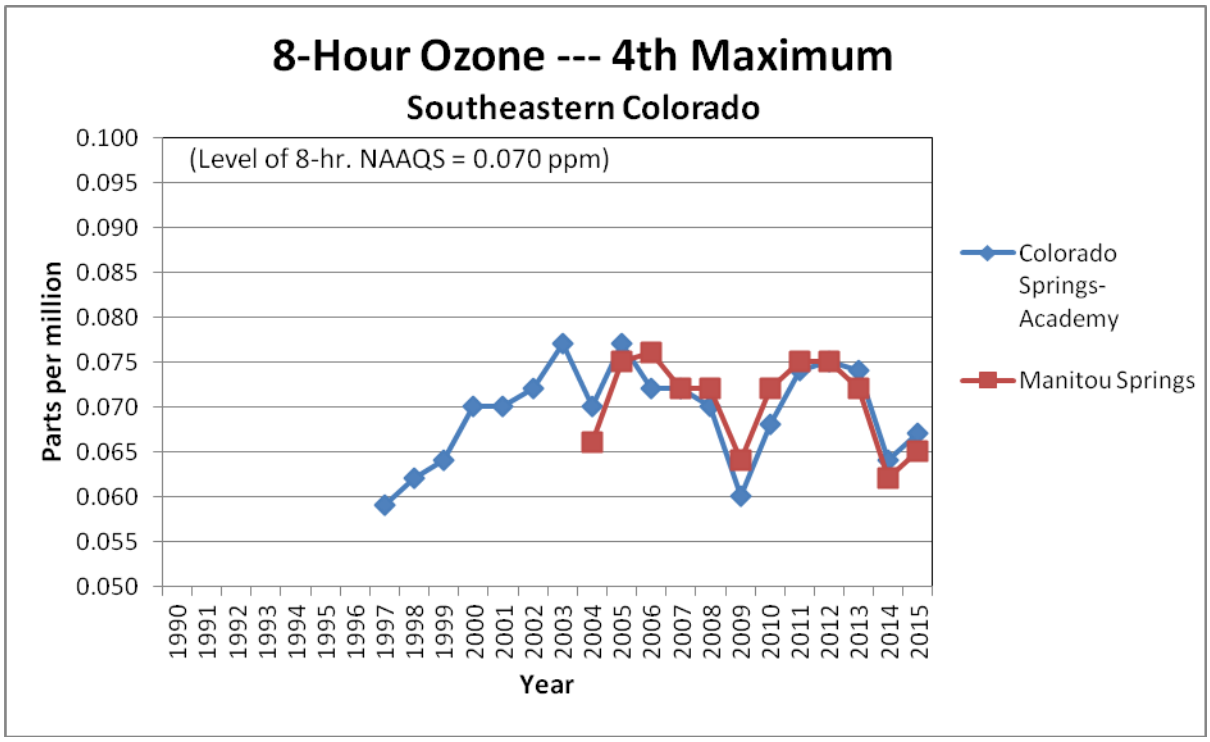


Figure 3-3: Ozone Monitoring Trends for Central Colorado

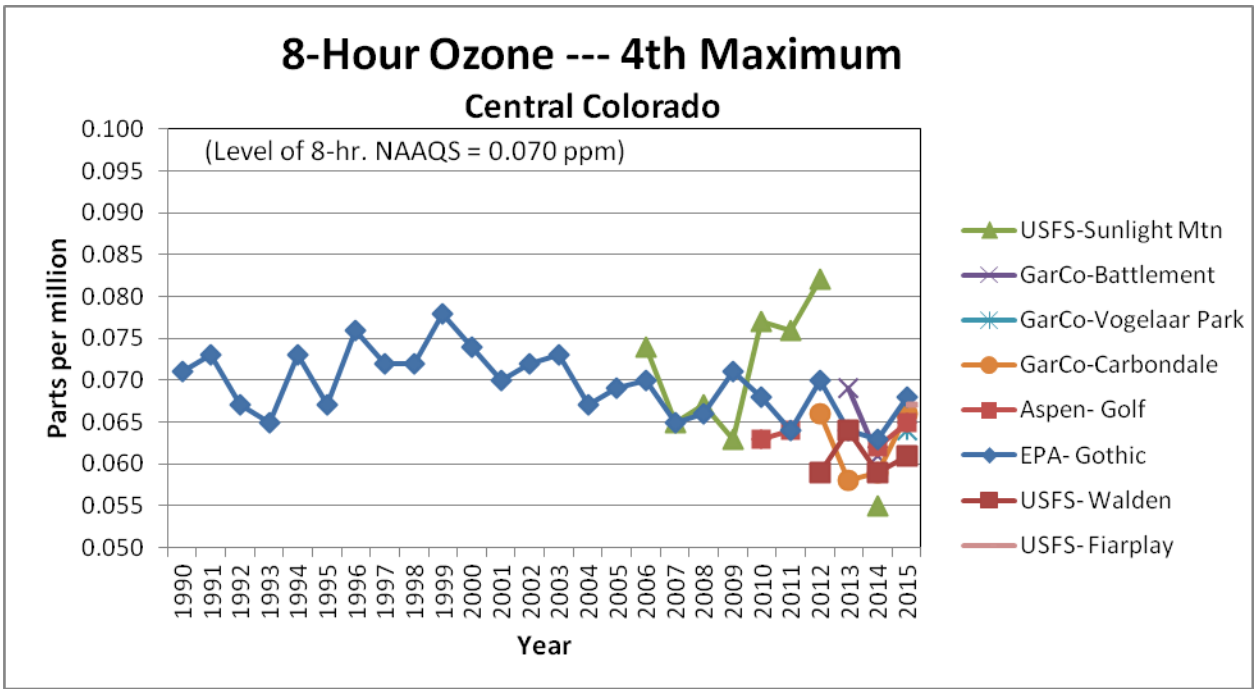


Figure 3-4: Ozone Monitoring Trends for Southwestern Colorado

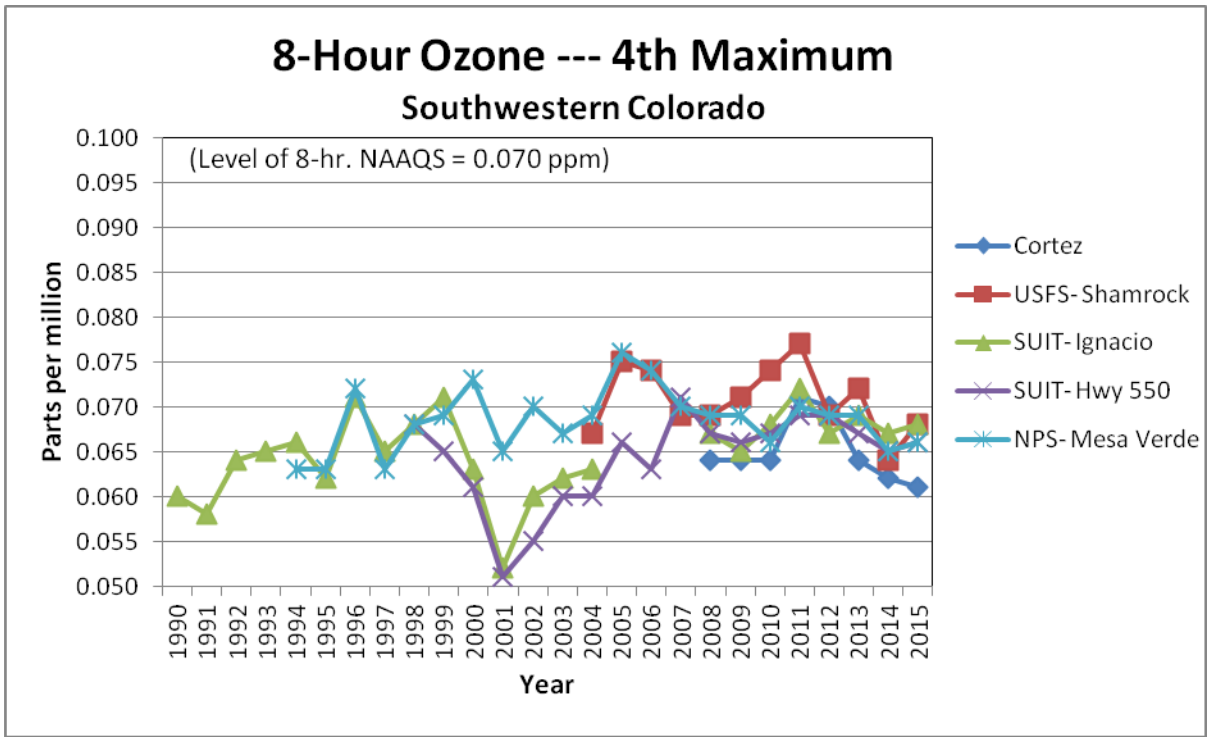
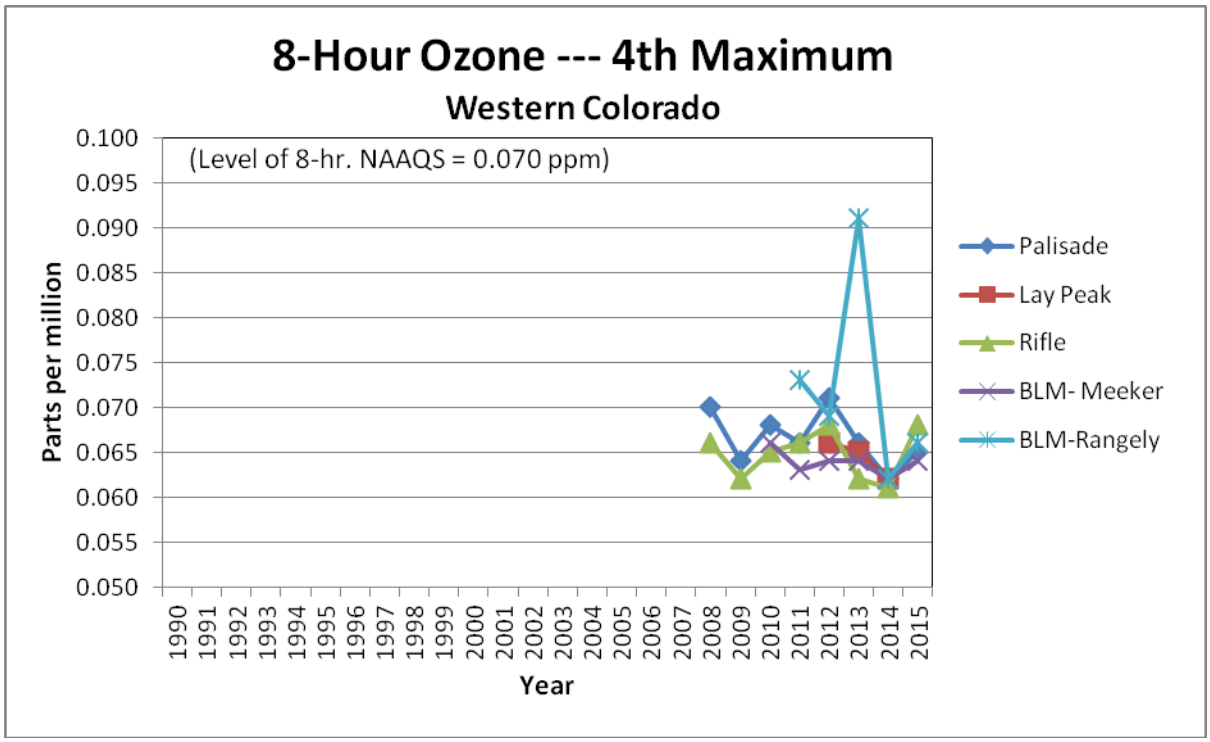


Figure 3-5: Ozone Monitoring Trends for Western Colorado

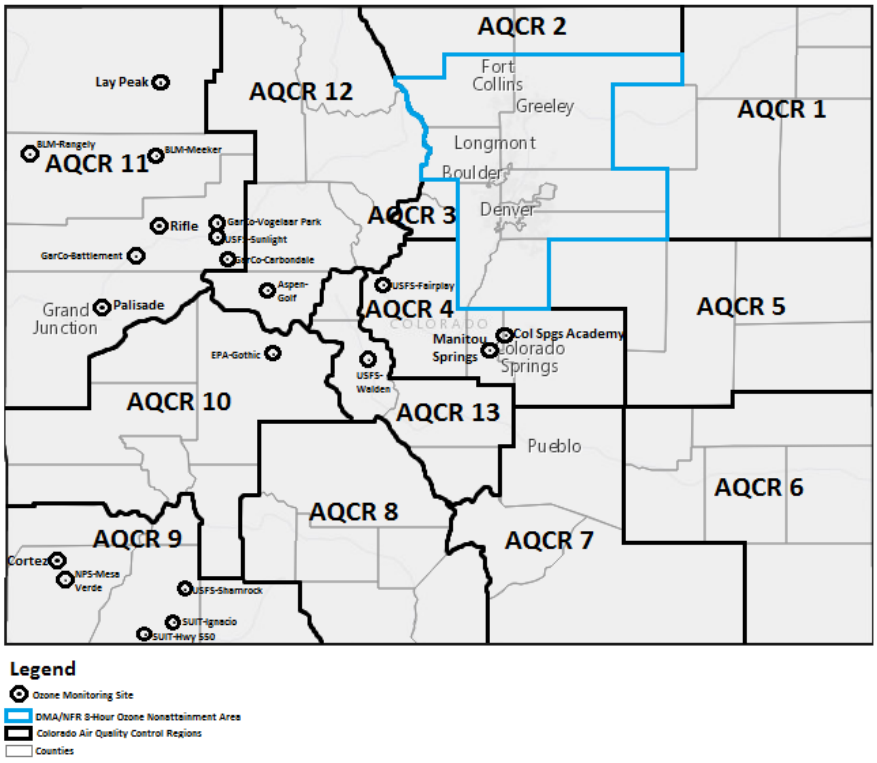


AQCRs and Emission Inventory

Air Quality Control Regions

There are 13 air quality control regions (AQCR's) in Colorado. The figure below (Figure 3-6) shows the 13 AQCR's relative to the monitoring locations in the state (including monitors operated by other agencies) outside of the existing nonattainment area.

Figure 3-6: Ozone Monitoring Sites in Colorado Relative to AQCR's



Emissions Inventory

In support of the recommendation of attainment/unclassifiable designation for the remainder of the state, an analysis of NO_x and VOC emissions are provided. The two figures and table below show the NO_x and VOC emissions by county based on the 2011 V2 NEI. In Table 3-2 the emission sources are categorized into controllable and uncontrollable emissions. Biogenic, agricultural livestock waste and wildfire emissions comprise the uncontrolled emission sources.

Figure 3-7: 2011 NO_x Emissions Map by County

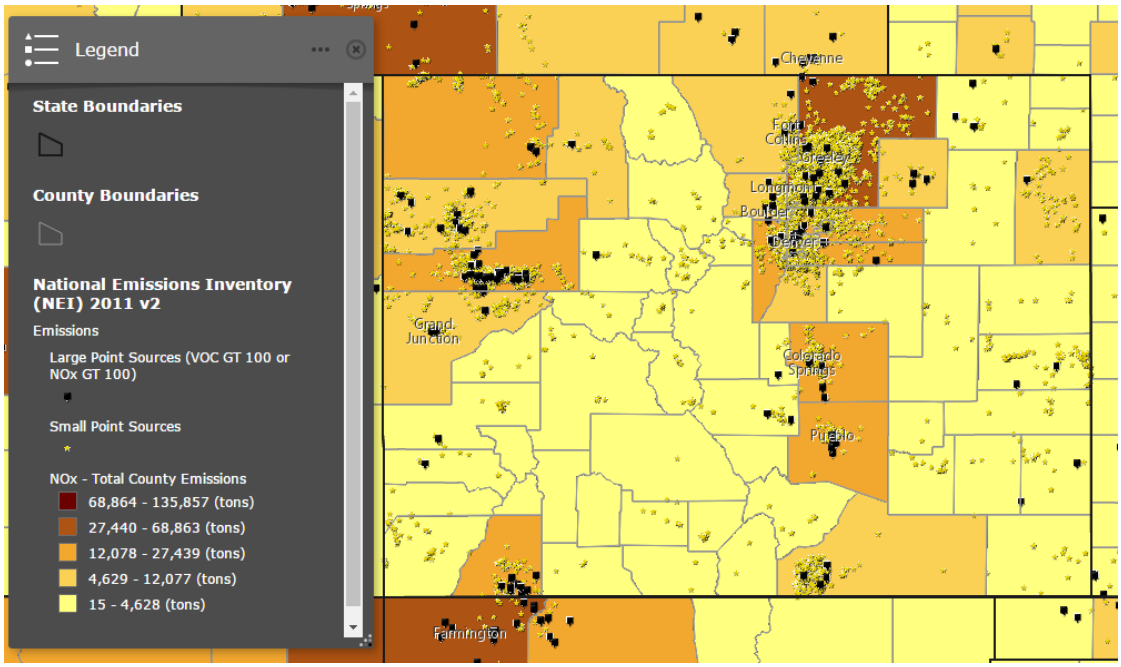


Figure 3-8: 2011 VOC Emissions Map by County

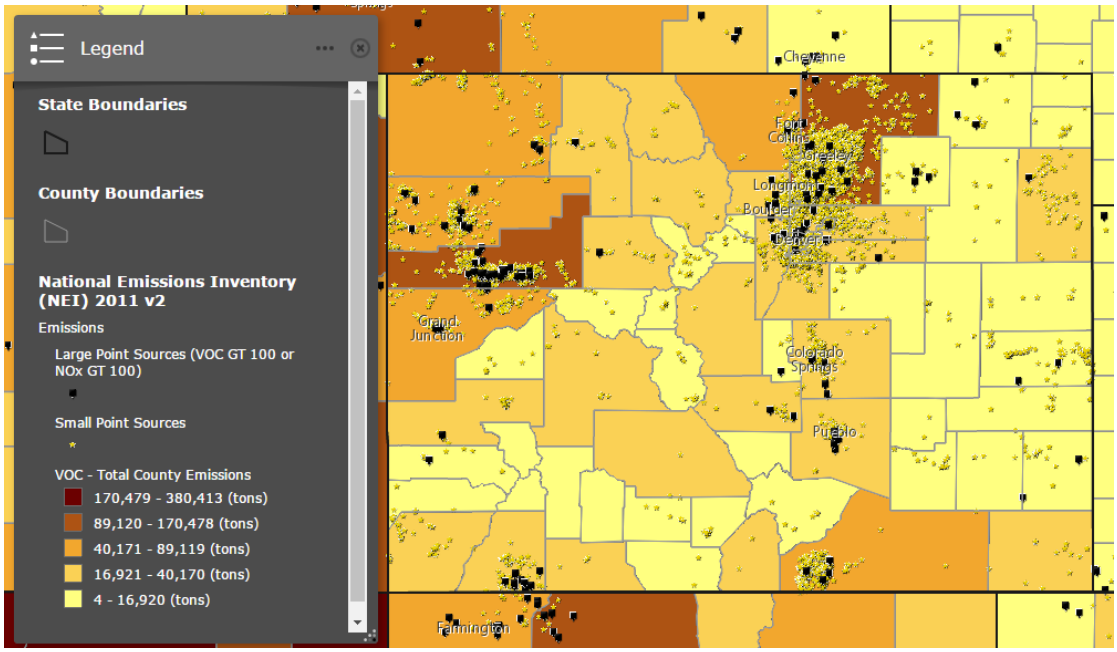


Table 3-2: Ozone Precursor Emissions by AQCR in Colorado

County	AQCR	Recommended 8-Hour Ozone Designation	2011 NOx Emissions			2011 VOC Emissions			Total Precursors		
			Total (tpy)	Controllable (tpy)	Uncontrolled (tpy)	Total (tpy)	Controllable (tpy)	Uncontrolled (tpy)	Total (tpy)	Controllable (tpy)	Uncontrolled (tpy)
Logan	1	Attainment/Unclassifiable	4,374	3,268	1,106	11,066	2,494	8,572	15,440	5,762	9,678
Morgan	1	Attainment/Unclassifiable	7,997	7,078	920	9,786	2,311	7,475	17,784	9,388	8,395
Phillips	1	Attainment/Unclassifiable	1,652	1,105	548	4,204	892	3,313	5,857	1,997	3,860
Sedgwick	1	Attainment/Unclassifiable	1,346	952	394	3,045	353	2,692	4,391	1,306	3,086
Washington	1	Attainment/Unclassifiable	2,991	1,453	1,538	14,919	3,649	11,270	17,910	5,102	12,808
Yuma	1	Attainment/Unclassifiable	6,254	4,655	1,599	24,071	12,538	11,533	30,325	17,194	13,132
Clear Creek	3	Attainment/Unclassifiable	1,829	1,767	62	5,139	729	4,409	6,967	2,496	4,471
Gilpin	3	Attainment/Unclassifiable	490	457	33	3,924	260	3,664	4,414	717	3,698
El Paso	4	Attainment/Unclassifiable	21,605	20,752	853	32,833	18,236	14,597	54,438	38,988	15,450
Park	4	Attainment/Unclassifiable	1,438	955	483	17,398	3,485	13,913	18,836	4,440	14,396
Teller	4	Attainment/Unclassifiable	1,600	1,479	121	10,454	2,057	8,397	12,054	3,536	8,518
Cheyenne	5	Attainment/Unclassifiable	4,204	3,116	1,088	11,818	1,155	10,663	16,022	4,271	11,751
Elbert	5	Attainment/Unclassifiable	2,411	1,490	921	10,363	1,169	9,194	12,774	2,660	10,114
Kit Carson	5	Attainment/Unclassifiable	3,329	1,841	1,488	11,521	933	10,588	14,850	2,774	12,075
Lincoln	5	Attainment/Unclassifiable	2,672	1,298	1,374	14,262	868	13,395	16,934	2,166	14,768
Baca	6	Attainment/Unclassifiable	3,224	1,631	1,593	19,206	822	18,384	22,429	2,453	19,977
Bent	6	Attainment/Unclassifiable	2,308	1,249	1,059	15,476	661	14,815	17,784	1,911	15,873
Crowley	6	Attainment/Unclassifiable	800	323	476	6,608	243	6,365	7,407	566	6,841
Kiowa	6	Attainment/Unclassifiable	1,524	467	1,057	11,869	704	11,165	13,393	1,171	12,222
Otero	6	Attainment/Unclassifiable	2,223	1,444	779	10,913	1,040	9,873	13,136	2,485	10,651
Prowers	6	Attainment/Unclassifiable	3,120	2,039	1,081	13,102	858	12,245	16,222	2,897	13,326
Huerfano	7	Attainment/Unclassifiable	1,653	1,149	504	15,342	1,113	14,229	16,996	2,262	14,734
Las Animas	7	Attainment/Unclassifiable	8,570	6,184	2,386	56,008	3,757	52,251	64,579	9,942	54,637
Pueblo	7	Attainment/Unclassifiable	12,670	11,568	1,102	23,375	5,576	17,799	36,045	17,143	18,901
Alamosa	8	Attainment/Unclassifiable	859	713	146	7,297	1,933	5,364	8,156	2,646	5,511
Conejos	8	Attainment/Unclassifiable	747	494	254	10,988	1,188	9,799	11,735	1,682	10,053
Costilla	8	Attainment/Unclassifiable	922	748	175	18,966	9,154	9,813	19,889	9,901	9,988
Mineral	8	Attainment/Unclassifiable	389	244	145	9,052	1,004	8,049	9,441	1,248	8,194
Rio Grande	8	Attainment/Unclassifiable	980	758	222	10,419	3,366	7,053	11,399	4,124	7,275
Saguache	8	Attainment/Unclassifiable	1,070	559	511	25,719	2,895	22,825	26,789	3,454	23,336
Archuleta	9	Attainment/Unclassifiable	1,024	884	139	23,561	1,567	21,994	24,585	2,451	22,134
Dolores	9	Attainment/Unclassifiable	701	523	177	14,504	1,754	12,750	15,204	2,277	12,927
La Plata	9	Attainment/Unclassifiable	12,428	12,189	240	28,261	6,744	21,517	40,689	18,932	21,757
Montezuma	9	Attainment/Unclassifiable	3,078	2,779	298	33,617	10,375	23,243	36,695	13,154	23,541
San Juan	9	Attainment/Unclassifiable	174	96	78	3,944	1,097	2,847	4,118	1,193	2,925
Delta	10	Attainment/Unclassifiable	1,663	1,437	226	14,234	1,189	13,045	15,897	2,626	13,271
Gunnison	10	Attainment/Unclassifiable	1,525	1,192	333	32,033	3,510	28,522	33,557	4,702	28,856
Hinsdale	10	Attainment/Unclassifiable	262	87	175	10,252	1,408	8,844	10,514	1,495	9,019
Montrose	10	Attainment/Unclassifiable	3,038	2,736	302	27,603	4,545	23,058	30,642	7,281	23,361
Ouray	10	Attainment/Unclassifiable	463	355	108	7,710	938	6,772	8,173	1,292	6,880
San Miguel	10	Attainment/Unclassifiable	876	717	159	14,015	1,134	12,881	14,891	1,851	13,040
Garfield	11	Attainment/Unclassifiable	16,413	16,119	294	118,709	90,999	27,710	135,122	107,118	28,003
Mesa	11	Attainment/Unclassifiable	7,412	7,039	373	49,868	15,032	34,836	57,280	22,071	35,210
Moffat	11	Attainment/Unclassifiable	15,532	15,290	242	41,923	5,397	36,526	57,456	20,688	36,768
Rio Blanco	11	Attainment/Unclassifiable	5,027	4,809	218	57,809	26,948	30,861	62,836	31,757	31,079
Eagle	12	Attainment/Unclassifiable	3,412	3,252	161	18,568	2,973	15,596	21,981	6,224	15,757
Grand	12	Attainment/Unclassifiable	2,564	2,378	186	34,100	14,328	19,772	36,664	16,706	19,958
Jackson	12	Attainment/Unclassifiable	632	431	202	20,813	5,239	15,575	21,445	5,669	15,776
Pitkin	12	Attainment/Unclassifiable	834	696	138	11,400	1,049	10,350	12,234	1,746	10,488
Routt	12	Attainment/Unclassifiable	7,951	7,723	228	29,165	3,583	25,582	37,116	11,306	25,810
Summit	12	Attainment/Unclassifiable	1,634	1,536	98	8,919	2,131	6,788	10,554	3,667	6,886
Chaffee	13	Attainment/Unclassifiable	872	673	199	11,012	1,501	9,512	11,884	2,173	9,711
Custer	13	Attainment/Unclassifiable	632	223	409	13,961	1,309	12,652	14,593	1,533	13,061
Fremont	13	Attainment/Unclassifiable	3,406	3,110	297	19,952	3,442	16,510	23,359	6,551	16,807
Lake	13	Attainment/Unclassifiable	283	198	85	3,837	547	3,290	4,120	745	3,375
Adams	NAA	Non-Attainment	25,245	24,521	724	22,243	17,195	5,048	47,488	41,716	5,772
Arapahoe	NAA	Non-Attainment	13,022	12,538	484	19,381	15,317	4,064	32,403	27,855	4,548
Boulder	NAA	Non-Attainment	9,764	9,533	231	19,497	9,674	9,823	29,260	19,206	10,054
Broomfield	NAA	Non-Attainment	1,552	1,492	60	2,783	2,125	658	4,335	3,617	718
Denver	NAA	Non-Attainment	20,042	19,920	122	17,144	15,593	1,551	37,185	35,513	1,672
Douglas	NAA	Non-Attainment	8,048	7,809	239	17,384	6,933	10,451	25,432	14,742	10,690
Jefferson	NAA	Non-Attainment	14,406	14,279	127	27,388	15,287	12,100	41,794	29,566	12,228
Larimer	NAA	Non-Attainment	11,577	10,905	672	53,798	22,142	31,656	65,375	33,047	32,328
Weld	NAA	Non-Attainment	32,696	30,463	2,233	150,982	133,972	17,010	183,678	164,434	19,243
Southern Ute	N/A		5,139	5,139	-	2,033	2,033	-	7,173	7,173	-
Ute Mountain	N/A		6,590	6,590	-	46	46	-	6,636	6,636	-
				Top 5 Emissions			Top 5 Emissions			Top 5 Emissions	

Controllable= Anthropogenic emissions excluding livestock waste
Uncontrollable= Biogenic emissions including livestock waste

The two AQCR's that contain counties with high ozone precursor emissions outside of the DM/NFR area are AQCR 4 and 11.

AQCR 4 is made up of El Paso, Park and Teller counties. El Paso County has the 3rd highest NO_x, 5th highest VOC and the 4th highest total precursor emissions in the state. There are two CDPHE monitors (Colorado Springs- Academy and Manitou Springs) and one USFS monitor (USFS- Fairplay) operating in the AQCR and these monitors show compliance with the revised 2015 8-hour standard.

AQCR 11 is made up of Garfield, Mesa, Moffat and Rio Blanco counties. Garfield County has the 5th highest NO_x, 2nd highest VOC and 2nd highest total precursor emissions in the state. There are three CDPHE monitors (Rifle, Palisade and Lay Peak), two BLM monitors (BLM- Meeker, BLM- Rangely), three Garfield County (GarCo) monitors (GarCo-Battlement, GarCo- Vogelaar Park, GarCo- Carbondale) and one USFS monitor (USFS- Sunlight Mtn) operating in the AQCR and these monitors show compliance with the revised 2015 8-hour standard (excluding BLM-Rangely, as detailed in Section 2).

As stated above, monitoring data in the AQCRs with the highest precursor emissions outside of the DM/NFR in AQCR 4 and 11 are showing compliance with the revised standard (excluding Rangely, see Section 2 for discussion). It is therefore reasonable to presume that that if these regions with the greatest amount of emissions are not showing violations of the 2008 ozone standard, counties and AQCRs with less emissions (and without monitoring data) are also likely to be in attainment. Therefore, the State recommends that all counties and AQCRs outside of the DM/NFR nonattainment area be designated as attainment/unclassifiable.

Population

The population data for the state of Colorado by county is shown in the table below.

Table 3-3: Population by County

County	AQCR	Recommended 8-Hour Ozone Designation	July 2010 (Estimate)	July 2015 (Estimate)	2010 to 2015 Total % Change	2010 to 2015 Annual % Change
Logan	1	Attainment/Unclassifiable	22,130	22,036	-0.42%	-0.08%
Morgan	1	Attainment/Unclassifiable	28,172	28,360	0.67%	0.13%
Phillips	1	Attainment/Unclassifiable	4,463	4,349	-2.55%	-0.51%
Sedgwick	1	Attainment/Unclassifiable	2,370	2,399	1.22%	0.24%
Washington	1	Attainment/Unclassifiable	4,801	4,864	1.31%	0.26%
Yuma	1	Attainment/Unclassifiable	10,025	10,146	1.21%	0.24%
Clear Creek	3	Attainment/Unclassifiable	9,083	9,303	2.42%	0.48%
Gilpin	3	Attainment/Unclassifiable	5,461	5,828	6.72%	1.34%
El Paso	4	Attainment/Unclassifiable	626,916	674,471	7.59%	1.52%
Park	4	Attainment/Unclassifiable	16,262	16,510	1.53%	0.31%
Teller	4	Attainment/Unclassifiable	23,450	23,385	-0.28%	-0.06%
Cheyenne	5	Attainment/Unclassifiable	1,831	1,829	-0.11%	-0.02%
Elbert	5	Attainment/Unclassifiable	23,095	24,735	7.10%	1.42%
Kit Carson	5	Attainment/Unclassifiable	8,247	7,758	-5.93%	-1.19%
Lincoln	5	Attainment/Unclassifiable	5,469	5,557	1.61%	0.32%
Baca	6	Attainment/Unclassifiable	3,790	3,615	-4.62%	-0.92%
Bent	6	Attainment/Unclassifiable	6,509	5,830	-10.43%	-2.09%
Crowley	6	Attainment/Unclassifiable	5,853	5,562	-4.97%	-0.99%
Kiowa	6	Attainment/Unclassifiable	1,396	1,423	1.93%	0.39%
Otero	6	Attainment/Unclassifiable	18,883	18,343	-2.86%	-0.57%
Prowers	6	Attainment/Unclassifiable	12,562	11,954	-4.84%	-0.97%
Huerfano	7	Attainment/Unclassifiable	6,668	6,492	-2.64%	-0.53%
Las Animas	7	Attainment/Unclassifiable	15,394	14,058	-8.68%	-1.74%
Pueblo	7	Attainment/Unclassifiable	159,520	163,591	2.55%	0.51%
Alamosa	8	Attainment/Unclassifiable	15,926	16,496	3.58%	0.72%
Conejos	8	Attainment/Unclassifiable	8,292	8,130	-1.95%	-0.39%
Costilla	8	Attainment/Unclassifiable	3,527	3,584	1.62%	0.32%
Mineral	8	Attainment/Unclassifiable	704	726	3.13%	0.63%
Rio Grande	8	Attainment/Unclassifiable	12,018	11,543	-3.95%	-0.79%
Saguache	8	Attainment/Unclassifiable	6,136	6,251	1.87%	0.37%
Archuleta	9	Attainment/Unclassifiable	12,056	12,352	2.46%	0.49%
Dolores	9	Attainment/Unclassifiable	2,065	1,978	-4.21%	-0.84%
La Plata	9	Attainment/Unclassifiable	51,371	54,688	6.46%	1.29%
Montezuma	9	Attainment/Unclassifiable	25,548	26,168	2.43%	0.49%
San Juan	9	Attainment/Unclassifiable	708	701	-0.99%	-0.20%
Delta	10	Attainment/Unclassifiable	30,878	29,979	-2.91%	-0.58%
Gunnison	10	Attainment/Unclassifiable	15,379	16,067	4.47%	0.89%
Hinsdale	10	Attainment/Unclassifiable	844	774	-8.29%	-1.66%
Montrose	10	Attainment/Unclassifiable	41,194	40,946	-0.60%	-0.12%
Ouray	10	Attainment/Unclassifiable	4,466	4,691	5.04%	1.01%
San Miguel	10	Attainment/Unclassifiable	7,359	7,879	7.07%	1.41%
Garfield	11	Attainment/Unclassifiable	56,094	58,095	3.57%	0.71%
Mesa	11	Attainment/Unclassifiable	146,489	148,513	1.38%	0.28%
Moffat	11	Attainment/Unclassifiable	13,812	12,937	-6.34%	-1.27%
Rio Blanco	11	Attainment/Unclassifiable	6,669	6,571	-1.47%	-0.29%
Eagle	12	Attainment/Unclassifiable	52,085	53,605	2.92%	0.58%
Grand	12	Attainment/Unclassifiable	14,783	14,615	-1.14%	-0.23%
Jackson	12	Attainment/Unclassifiable	1,385	1,356	-2.09%	-0.42%
Pitkin	12	Attainment/Unclassifiable	17,156	17,787	3.68%	0.74%
Routt	12	Attainment/Unclassifiable	23,450	24,130	2.90%	0.58%
Summit	12	Attainment/Unclassifiable	28,065	30,257	7.81%	1.56%
Chaffee	13	Attainment/Unclassifiable	17,803	18,658	4.80%	0.96%
Custer	13	Attainment/Unclassifiable	4,275	4,445	3.98%	0.80%
Fremont	13	Attainment/Unclassifiable	46,857	46,692	-0.35%	-0.07%
Lake	13	Attainment/Unclassifiable	7,267	7,485	3.00%	0.60%
Adams	NAA	Non-Attainment	443,680	491,337	10.74%	2.15%
Arapahoe	NAA	Non-Attainment	574,727	631,096	9.81%	1.96%
Boulder	NAA	Non-Attainment	295,986	319,372	7.90%	1.58%
Broomfield	NAA	Non-Attainment	56,271	65,065	15.63%	3.13%
Denver	NAA	Non-Attainment	603,300	682,545	13.14%	2.63%
Douglas	NAA	Non-Attainment	286,964	322,387	12.34%	2.47%
Jefferson	NAA	Non-Attainment	535,625	565,524	5.58%	1.12%
Larimer	NAA	Non-Attainment	300,524	333,577	11.00%	2.20%
Weld	NAA	Non-Attainment	254,166	285,174	12.20%	2.44%

Top 5 Population

Top 5 Annual Growth

As shown in Table 3-3, of the five highest county populations in the state, four are within the DM/NFR. El Paso is represents the 2nd highest county population, however as stated above, all monitoring locations in AQCR 4 show compliance with the revised 8-hour standard. Also, of the five highest growth areas by population from 2010 to 2015, all five are in the current DM/NFR nonattainment area.

Summary Conclusions for Remainder of Colorado

The State recommends that the remainder of the State be designated as attainment/unclassifiable for the revised 2015 8-hour ozone standard. This recommendation is based on (1) monitoring information that indicates compliance with the revised standard (2) precursor emission levels that are presumed to not result in violations of the 2015 8-hour ozone standard, and (3) relatively low population levels.

The Denver Post, LLC

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City and County of Denver)
State of Colorado)
)

The undersigned Jean Birch being first duly sworn under oath, states and affirms as follows:

1. **He/she is the legal Advertising Reviewer of The Denver Post, LLC, publisher of *The Denver Post* and *Your Hub*.**
2. ***The Denver Post* and Your *Hub* are newspapers of general circulation that have been published continuously and without interruption for at least fifty-two weeks in Denver County and meet the legal requisites for a legal newspaper under Colo. Rev. Stat. 24-70-103.**
3. **The notice that is attached hereto is a true copy, published in *The Denver Post* on the following date(s):**

August 22, 2016

Jean Birch

Signature

Subscribed and sworn to before me this 22 day of August, 2016.

Cheryl L Schmid

Notary Public

CHERYL L. SCHMID
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20094029973
MY COMMISSION EXPIRES SEPTEMBER 14, 2017

(SEAL)

Notice of Public and Rulemaking Hearings and Public Comment Hearings

PUBLISH ON: 8/20/2016

The Colorado Air Quality Control Commission will hold the following Public Hearing:

HEARING SCHEDULE:
DATE: September 15, 2016
TIME: 9:00 AM
PLACE: Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South, Sabin Conference Room
Denver, CO 80246

Ozone Designations for 2015 8-Hour NAAQS
The Commission will consider Ozone designations for the Air Quality Control Regions (AQCRs) in Colorado. On October 1, 2015 the EPA promulgated a revised primary and secondary ozone NAAQS. States should submit initial designation recommendations no later than 1 year following the revised NAAQS promulgation.

COLORADO
Air Quality Control Commission
Department of Public Health & Environment

Meeting Minutes

September 15, 2016

Location:	Colorado Department of Public Health & Environment 4300 Cherry Creek Drive South, Sabin Room Denver, CO 80246		
Members Present:	Peter Butler Curtis Rueter	John Clouse	Tony Gerber
Members via Call:	Chuck Grobe Laura Teague	Jana Milford Will Toor	Todd Mitchell
Members Absent:	None		
Commission Staff:	Mike Silverstein	Theresa Martin	
Division Staff:	Will Allison Chris Colclasure	Lisa Devore Patrick Reddy	Janessa Salgado Chris Laplante
Attorney General's Office:		Tom Roan	

CALL TO ORDER AND DETERMINATION OF A QUORUM

Chair Clouse called the meeting to order at 9:00 AM and determined that a quorum of Commissioners was present with nine Commissioners.

PUBLIC COMMENT

Chair Clouse asked if there were any members of the public who wished to make a comment on any air pollution issue not on the agenda. No public comment was offered.

CONSENT AGENDA

APPROVAL OF MINUTES

August 18, 2016 Meeting Minutes

Review and approval of the August 18, 2016 meeting minutes of the Air Quality Control Commission.

Chair Clouse asked if there were any members of the public who wished to make a comment. No public comment on the consent agenda was offered.

Motion:	To adopt the Consent Agenda items without modification
Moved:	Commissioner Rueter
Second:	Commissioner Butler
Discussion:	none
Carried:	9-0

REGULAR AGENDA

REQUEST FOR RULEMAKING HEARING (DECEMBER 15, 2016)

Regional Haze State Implementation Plan and Regulation Number 3

Lisa Devore of the Division requested that the Commission set a hearing to consider revisions to Colorado's Regional Haze State Implementation Plan and Regulation Number 3, Part F, Section VI., related to the regional haze requirements for Tri-State Generation and Transmission Association's Craig Unit 1 and Nucla Station. Commissioner questions were addressed. Chair Clouse asked if there were any members of the public who wished to make a comment. There was none.

Motion:	To adopt the request and set for hearing December 15, 2016
Moved:	Commissioner Toor
Second:	Commissioner Rueter
Discussion:	none
Carried:	9-0

PUBLIC HEARING

Ozone Designations for 2015 8-Hour NAAQS

The Commission considered Ozone designations for the Air Quality Control Regions (AQCRs) in Colorado. Janessa Salgado of the Division presented the designation recommendations and addressed Commissioner questions. Chair Clouse asked if there were any members of the public who wished to make a comment. Tom Bloomfield of Environmental Defense Fund (EDF) and Pam Milmoe of Boulder County Public Health requested that the Front Range nonattainment boundaries be expanded to the Wyoming border (EDF provided written public comments to this affect); Ken Lloyd of the Regional Air Quality Council and Andrew Casper of Colorado Oil and Gas Association supported the Division's recommendations; John Jacus of Davis Graham & Stubbs LLP provided a remark concerning EPA's past consideration of the State's ozone nonattainment boundary recommendations. Division members responded to public comments.

Motion:	To adopt the Division's recommended ozone designations for the Air Quality Control Regions (AQCRs) in Colorado without modification
Moved:	Commissioner Butler
Second:	Commissioner Rueter
Discussion:	None
Carried:	8-1 Toor opposed

BRIEFINGS, DISCUSSIONS AND REPORTS

CSU Oil and Gas Emissions and Dispersion Studies

Jeff Collett and Arsineh Hecobian of Colorado State University presented the findings from the oil and gas emissions and dispersion studies that were performed in Garfield County and the North Front Range. These studies were designed to quantify emissions from specific oil and gas development activities. The results were used to determine downwind dispersion and may also be used in an upcoming risk assessment analysis. Commissioner questions were addressed.

Trends in the Oil and Gas Industry

Director Matthew Lepore and Environmental Manager Greg Deranleau of the Colorado Oil and Gas Conservation Commission presented on Colorado oil and gas development trends, issues and activities and their interactions with the Division. Commissioner questions were addressed.

Infrared Camera Initiative

Chris Laplante of the Division presented the summary findings from its two year infrared camera inspection initiative and the Division's ongoing use of the cameras to assess emissions from the oil and gas industry. Commissioner questions were addressed. Clouse asked if there were any members of the public who wished to make a comment. Patrick Murphy and Pam Milmoe of Boulder County Public Health remarked on their IR camera inspection activities and findings.

Commissioner Informational Items

- Rueter provided information to the Commission on heavy duty diesel truck conversions to natural gas and provided research results for distribution.

Division Director's Report – Will Allison

- Allison described the latest developments of the VW vehicle emissions tampering litigation – the proposed settlement provides provide Colorado with $61 million for transportation NOx reductions, CDPHE would manage the disbursement of funds.
- CDPHE's development of an online information exchange tool is under development with the potential for launching a pilot early in 2017.

Attorney General's Report – Tom Roan

- Roan described the status of Sterling-Yuma's appeal to the District Court and litigation on EPA's SO2 designation decision for Colorado Springs
- It was noted that EPA is re-evaluating the petition process for Title V permit decisions.

Administrator's Report – Mike Silverstein

- Silverstein reviewed the October conference call agenda and the agenda for the October Joint Meeting with the Board of Health.
- Commissioners were reminded to review and comment on the draft Annual Report.
- No meeting action items were noted.

Adjourn at 1:25 p.m.

September 15, 2016

Comments of Environmental Defense Fund on Recommendation for 8-Hour Ozone Designations for the 8-Hour 2015 Ozone Standard for the Denver Metro/Northern Front Range Non-Attainment Area

Dear Air Quality Control Commission Members:

Thank you for the opportunity to provide comments on the staff recommendation for the 8-hour ozone designations for the 2015 ozone standard. These comments are submitted on behalf of Environmental Defense Fund ("EDF"). As set forth below, EDF urges the AQCC to expand the geographic extent of ozone non-attainment area to include, at a minimum, the northern portion of Weld County and Larimer County.

EDF is a national non-profit, non-governmental and non-partisan organization dedicated to protecting human health and the environment by effectively applying science, economics, and the law. EDF has over one million members nationwide, including more than 10,000 members in Colorado. EDF has regional offices throughout the country, including an office in Colorado. For over three decades, EDF's Colorado office has worked to improve and protect the air quality in Colorado and has actively participated in numerous actions before the Commission concerning air quality in Colorado.

Discussion

I. Ground-Level Ozone Poses a Serious Threat to Public Health and the Environment

Colorado has made great strides in improving air quality over the past forty years, but ozone remains a serious threat to the health of our citizens and our quality of life. There is substantial scientific evidence that ozone pollution causes adverse effects including decrease in lung function, increase in respiratory symptoms, and increase in airway inflammation, even at the 2015 8-Hour ozone standard of 70 parts per billion.[1] This risk is particularly acute for adults and children with existing lung conditions, such as asthma. Approximately one in ten Coloradans suffer from asthma, a large percentage of which are members of the most vulnerable populations,

[1] Letter from Christopher Frey PhD to Administrator McCarthy, *CASAC Review of the EPA's Second Draft Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards*, at ii (June 26, 2014), *available at* http://yosemite.epa.gov/sab/sabproduct.nsf/5EFA320CCAD326E885257D030071531C/$File/EPA-CASAC-14-004+unsigned.pdf .

i.e., children and low-income and minority communities.[2] Ozone can also cause acute asthmatic symptoms in healthy adults who work or exercise outdoors. It regularly sends people to the emergency room, and in some cases, can trigger premature death.[3]

In fact, EPA's national independent expert scientific panel advised the agency to reduce the ozone standard from 75 ppb to in between 60 and 70 ppb. EPA's revised standard of 70 ppb represents the least protective end of that recommendation, though the standard is more rigorous than the 2008 standard, which Colorado has not yet met.

Coloradans have a long history of working together to address important air pollution problems. One recent example includes the amendments to Regulation 7 adopted by the Air Quality Control Commission in 2014, which represented the first state-wide measures to reduce methane from the oil and gas sector. These efforts to continually improve Colorado's air quality have made Colorado one of the best places to live and work in the country.

While we have made tremendous progress, more work needs to be done to protect the air we breathe, as demonstrated by, among other things, the recent nonattainment designation for ozone in the Denver Front Range Area and the increasing ozone concentrations that occurred at various ozone monitors in the nonattainment area. For example, the monitor at NREL this summer recorded ozone values of 88, 86, 83 and 83 ppb, well above the new standard of 70 ppb.

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[2] ALA 2016 State of the Air, Page 61, *available at* http://www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2016-full.pdf

[3] As EPA has concluded:

- Scientific evidence shows that ozone can cause a number of harmful effects on the respiratory system, including difficulty breathing and inflammation of the airways. For people with lung diseases such as asthma and COPD (chronic obstructive pulmonary disease), these effects can aggravate their diseases, leading to increased medication use, emergency room visits and hospital admissions.
- Evidence also indicates that long-term exposure to ozone is likely to be one of many causes of asthma development. In addition, studies show that ozone exposure is likely to cause premature death.
- An estimated 23 million people have asthma in the U.S., including an estimated 6.1 million children. Asthma disproportionately affects children, families with lower incomes, and minorities, including Puerto Ricans, Native Americans/Alaska Natives and African-Americans.
- Children -- including teenagers -- are among those most at risk from ozone exposure for several reasons:
  - Their lungs are still developing (this occurs until adulthood);
  - They breathe more air per pound of body weight than adults. That means if the air contains ozone, children get a higher "dose" of ozone for their weight than adults;
  - They are active outside more than adults; and
  - They also are more likely to have asthma.

U.S. Environmental Protection Agency, Fact Sheet, *Overview of EPA's Updates to the Air Quality Standards for Ground-Level Ozone*, *available at* https://www.epa.gov/sites/production/files/2015-10/documents/overview_of_2015_rule.pdf; *see also* U.S. Environmental Protection Agency, Integrated Science Assessment for Ozone and Related Photochemical Oxidants, Final Report (Feb. 2013), *available at* http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247492#Download.

II. Non-Attainment Areas Include Areas that Contribute to Ambient Air Pollution in Nearby Areas that Exceed that Applicable Air Quality Standard

The Federal Clean Air Act defines nonattainment areas to include not only areas that fail to meet the National Ambient Air Quality Standards ("NAAQS"), but also any area that "contributes to ambient air quality in a nearby area that does not meet" the NAAQS.[4] Any area that "exacerbates" nonattainment in a nearby area can be included, a flexible standard of contribution that the federal Courts have recognized as central to the "very purpose" of Section 107(d) area designations.[5] Areas that are designated nonattainment are subject to a number of health-protective requirements intended to ensure expeditious improvements in air quality. *See, e.g.*, 42 U.S.C. § 7511a (requiring deployment of all reasonably available control technologies in nonattainment areas, nonattainment new source review, and other plan provisions). Thus, the area designations, including areas that contribute to nonattainment, are a critical step to protecting public health and the environment.

III. The AQCC Should Expand the Northern Front Range Non-Attainment Area

The Air Pollution Control District ("APCD") staff is recommending that the non-attainment area stay the same as the current Denver Metro/North Front Range non-attainment area as defined for the 2008 ozone standard.[6] EDF urges the AQCC to expand that area, to at least include northern Weld County and northern Larimer County. The current proposal arbitrarily excludes the northern portion of those counties. Not only should the AQCC maximize the options available to it to achieve the new, health based ozone standards, but also must recognize that sources in Northern Weld and Larimer Counties emit significant amounts of ozone precursors, such emissions are likely understated in the inventory, and contribute to air quality challenges in the non-attainment area and are likely to grow in the future.[7]

The reasons to expand the area are compelling. First, recent data, demonstrates that Colorado will need to use all the tools at its disposal to improve the air quality in Colorado to meet the 2015 standard. For example, the 2014 to 2016 design value will be at least[8] 80 parts per billion, which is 10 ppb over the standard. The state will therefore need to reduce ozone concentrations significantly over the next few years, a task made more difficult by the impacts of climate change. The state should put itself in the best position to secure reductions to meet the standard and protect public health and the environment. This means that the state should expand the non-

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[4] 42 U.S.C. § 7407(d)(1)(A); *see* S. Rep. No. 101-228, 1990 CAA Legis. Hist. 8338, 8354-55 (1993) (Section 107(d) amendments "explicitly provide that EPA may include within the boundary an area that may cause or contribute to nonattainment in another area, regardless of whether pollutant concentrations in the first area exceed the standard").

[5] *See Catawba Cnty.,N.C. v. EPA*, 571 F.3d 20, 40 (D.C. Cir. 2009) (concluding EPA "has no obligation to give any quantum of deference to a designation that it 'deems necessary' to change").

[6] http://www.colorado.gov/airquality/html_resources/ozone_summary_table.pdf

[7] The analysis presented in this letter is consistent with the five factor analysis identified by EPA in its guidance for designating nonattainment areas for the 2015 8-hour ozone standard. These five factors include: 1. Air Quality Data ; 2. Emission and emission related data; 3. Meteorological data; 4. Geography/topography; and 5. Jurisdictional boundaries. Area Designations for the 2015 Ozone National Ambient Air Quality Standards (2/25/2016) ("EPA 2015 Guidance at 13. https://www.epa.gov/sites/production/files/2016-02/documents/ozone-designations-guidance-2015.pdf

[8] This value is based on partial data for 2016, so there is a chance (but a very low one) that the value could be even higher.

attainment area that is contributing to elevated ozone levels so that sources within that larger area can be required to apply controls to reduce ozone. This will enhance the ability of the AQCC to secure additional reductions since more emissions will be subject to controls.

Second, emissions in northern Weld County and Larimer County are significant and growing. For example, in 2011 sources in northern Weld and Larimer Counties emitted more than 30,000 tons a year of ozone precursors[9]. To put this into perspective, those emissions are greater than precursor emissions from many of the counties contained in the nonattainment area proposed by the APCD.[10] Expanding the non-attainment area to include these areas will enable the AQCC to impose additional controls in these areas to secure additional needed reductions. Indeed, the arbitrary line across these counties contradicts the presumptive nonattainment area from EPA guidance.[11] While EPA does allow for the use of area-specific analysis to support designations, as explained herein, such information supports inclusion of these areas in the nonattainment area. Moreover, EPA "generally believes it is appropriate to include the entire violating or contributing county in an ozone nonattainment area…."[12]

Third, many of these emissions are from oil and gas production operations, which are notoriously understated in emission inventories. Thus, the actual emissions are likely even higher than estimated in the inventory and modeled for in the APCD recommendation. Up until recently, regulators have relied nearly exclusively on emission inventories in order to understand the magnitude of a particular pollution problem as well as the potential reductions associated with a proposed solution. Now however, recent advances in science have added to our knowledge and understanding of emissions from oil and gas facilities. These studies demonstrate that emissions are systematically significant and, at a select number of facilities, actual emissions are magnitudes higher than emission inventories suggest.

The first of these studies, conducted by an independent team of scientists at the University of Texas, found that emissions from equipment leaks, pneumatic controllers and chemical injection pumps were each 38%, 63% and 100% higher, respectively, than as estimated in national inventories.[13] This study also found that 5% of the facilities were responsible for 27% of the emissions.[14]

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[9] State of Colorado DRAFT Technical Support Document For Recommended 8-hour Ozone Designations (July 28, 2016) ("TSD") available at https://www.colorado.gov/pacific/cdphe/aqcc-meeting-materials-september-15-2016

[10] *See* TSD at 88. For example, the VOC emissions in northern Weld County are greater than 3 of the counties in the nonattainment area. Larimer County also exceeds emissions of a county in the non-attainment area. Taken together, the VOC emissions from these two northern areas are greater than five of counties in the nonattainment area.

[11] *See* TSD at 21.

[12] EPA 2015 Guidance at 7.

[13] Allen, D.T., et al, (2013) "Measurements of methane emissions at natural gas production sites in the United States," *Proc. Natl. Acad.* 2013, 110 (44), available at http://www.pnas.org/content/110/44/17768.full

[14] *See* Allen, D.T., et al, (2014), "Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers," *Environ. Sci. Technol*., 2015, 49 (1), pp. 633–640 (referencing 2013 Allen study), available at http://pubs.acs.org/doi/abs/10.1021/es5040156.

Two follow-up studies focused specifically on emissions from pneumatic controllers and liquids unloading activities at wells found similar results.[15] Specifically, the studies found that 19 percent of the pneumatic devices accounted for 95 percent of the emissions from the devices tested, and about 20 percent of the wells with unloading emissions accounted for 65 to 83 percent of those emissions. The average methane emissions per pneumatic controller were 17 percent higher than the average emissions per pneumatic controller in EPA's national greenhouse gas inventory.[16]

These findings were reiterated again in a series of direct measurement studies focusing on emissions from compressor stations in the gathering and processing segment and in the transmission and storage segment. The gathering and processing study found substantial venting from liquids storage tanks at approximately 20 percent of the sampled gathering facilities.[17] Emission rates at these facilities were on average four times higher than rates observed at other facilities.

In the study on transmission and storage emissions, the two sites with very significant emissions were both due to leaks or venting at isolation valves.[18] The study also found that leaks were a major source of emissions across sources, concluding that measured emissions are larger than would be estimated by the emission factors used in EPA's reporting program. Other studies resulted in similar findings. In a 2013 study measuring emissions from 200 well pads in the Barnett Shale researchers found that approximately 20% of the well pads were responsible for 80% of the emissions detected. [19]

A more recent series of studies in the Barnett—incorporating both top-down and bottom-up measurement—found that emissions were 50 percent greater than estimates based on the applicable EPA inventory.[20] The studies partially attributed these large emissions to high emission sites not reflected in inventories, which focus on average emission factors. One study in particular found that a small number of sources are responsible for a disproportionate amount of

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[15] Allen, D.T. et al., "Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Liquid Unloadings," *Environ. Sci. Technol*., 2015, 49 (1), pp 641–648, available at http://pubs.acs.org/doi/abs/10.1021/es504016r.

[16] Allen, D.T., et al, (2014), "Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers," *Environ. Sci. Technol*., 2015, 49 (1), pp 633–640, available at http://pubs.acs.org/doi/abs/10.1021/es5040156.

[17] Mitchell, A.L., et al, (2015) "Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants," *Environ. Sci. Technol*, 2015, 49 (5), pp 3219–3227, available at http://pubs.acs.org/doi/abs/10.1021/es5052809.

[18] R. Subramanian, et al, (2015) "Methane Emissions from Natural Gas Compressor Stations in the Transmission and Storage Sector: Measurements and Comparisons with the EPA Greenhouse Gas Reporting Program Protocol," *Environ. Sci. Technol*, available at http://pubs.acs.org/doi/abs/10.1021/es5060258.

[19] Rella, Chris W., et al, (2015), "Measuring Emissions from Oil and Natural Gas Well Pads Using the Mobile Flux Plane Technique," *Environ. Sci. Technol*., 2015, 49 (7), available at http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00099.

[20] Harriss, *et al.*, (2015) "Using Multi-Scale Measurements to Improve Methane Emissions Estimates from Oil and Gas Operations in the Barnett Shale, Texas: Campaign Summary," *Environ. Sci. Technol.*, 49, ("Harriss (2015)"), *available at* http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305 (providing a summary of the 12 studies that were part of the coordinated campaign).

emissions, noting specifically that "sites with high proportional loss rates have excess emissions resulting from abnormal or otherwise avoidable operating conditions, such as improperly functioning equipment."[21]

Given the overwhelming scientific evidence that emissions from oil and gas facilities are significantly underestimated in inventories, it is critical that Colorado's efforts to reduce ozone precursors from the industry cast a wide net to capture as many facilities as possible.

Fourth, modeling by APCD confirms that the meteorology and topography enable sources from northern Weld County and northern Larimer County to contribute to high ozone levels in the non-attainment area. Figures 1-22, 1-23, 1-26, 1-27, and 1-28 from the APCD TSD all demonstrate that sources in northern Weld County and/or Larimer County contribute to ozone at the four highest monitors in the current non-attainment area. As discussed above, the oil and gas component of this inventory is likely understated. Thus the meteorology and topography support including these areas in the non-attainment area.

Fifth, the APCD analysis does not even consider the air quality at the Greeley monitor, which is the closest monitor to northern Weld County. The design value for that monitor exceeds the 2015 ozone standard (TSD at 10) and should have been evaluated in the modeling. If that monitor were considered, it would almost certainly provide additional evidence that sources in northern Weld County contribute to the unhealthy ozone levels at that monitor and in that geographic area more generally. This provides even more support for including the northern county areas in the non-attainment area.

Sixth, future growth of oil and gas in the area will only exacerbate the ozone contributions from these areas. The Denver Julesburg Basin is the locus of the most intense and growing oil and gas activity in the state. The DJ Basin encompasses all of Weld County and the eastern portion of Larimer County, all the way to the Wyoming border. As the price of oil recovers, intense growth in these areas is likely to continue.[22] As a result, ozone precursor emissions from the northern portion of the DJ will exacerbate the region's ozone problems. This factor further supports inclusion of these areas in the non-attainment area.

Seventh, part of each county is already included in the nonattainment area, so including the balance of each county would not create difficult jurisdictional issues. Thus, the jurisdictional boundaries factor (one of the five EPA factors) supports inclusion of these areas in the nonattainment area.

[21] Zavala-Araiza, *et al.*, (2015) "Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites," *Environ. Sci. Technol.*, 49, at 8167−8174 ("Zavala-Araiza (2015)"), *available at* http://pubs.acs.org/doi/pdfplus/10.1021/acs.est.5b00133.

[22] http://dnrwebmapgdev.state.co.us/mg2012app/ (clicking on permits and pending permits shows current and likely future activity).

IV. Conclusion

Thank you for the opportunity to provide comments on the recommendation for the 8-hour ozone designations for the 2015 8-hour ozone standard for Colorado. For the reasons set forth above, we respectfully request the state recommend to EPA that the non-attainment area be expanded to include, at minimum, northern Larimer County and northern Weld County.

Respectfully Submitted,

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