COLORADO
Area Designations for the
2008 Ozone National Ambient Air Quality Standards

The Governor of Colorado provided his 2008 8-hour ozone recommendation in a letter to EPA dated March 11, 2009. This letter included a recommendation of nonattainment for the same boundary as the 1997 8-hour ozone nonattainment boundary known as the Denver-Boulder-Greeley-Ft. Collins-Loveland, CO (Denver/North Front Range) area, and recommended attainment/unclassifiable for the rest of the state.

The table below identifies the areas and associated counties or parts of counties in Colorado that EPA is designating as nonattainment for the 2008 ozone national ambient air quality standards (2008 NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area (county or part of a county) "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the individual nonattainment areas are provided below.

Table 1. State Recommended and EPA Designated Nonattainment Counties in Colorado

Area	Colorado's Recommended Nonattainment Counties	EPA's Nonattainment Counties
Denver-Boulder-Greeley-Ft. Collins-Loveland, CO	Adams County Arapahoe County Boulder County (including portions of Rocky Mountain National Park therein) Broomfield County Denver County Douglas County Jefferson County Larimer County (partial, including the portion of Rocky Mountain National Park therein) Weld County (partial)	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 (partial, including the portion of Rocky Mountain National Park therein) Weld County (partial)

EPA is designating the remaining counties and/or portions of counties in Colorado that are not listed in the table above as "unclassifiable/attainment" for the 2008 ozone NAAQS. Areas of Indian country of the Ute Mountain Tribe of the Ute Mountain Reservation are located in southwestern Colorado (as well as in Utah and New Mexico). The counties of La Plata and Montezuma have portions of this area of Indian country within their borders. The Tribe submitted a designation recommendation of "attainment," but no air quality monitoring data are available to justify a designation of "attainment." Although there is no data available, there is no indication of an ozone violation or a contribution to an ozone violation. For the purposes of ozone designations, areas where this is the case are being designated as "unclassifiable/attainment." Therefore, EPA is designating La Plata and Montezuma counties as "unclassifiable/attainment." This "unclassifiable/attainment" designation also applies to the portions of the Indian country of the Ute Mountain Tribe of the Ute Mountain Reservation that are within these counties.

The Southern Ute Reservation is also located in southwestern Colorado. The Southern Ute Indian Tribe of the Southern Ute Reservation submitted a designation recommendation of "unclassifiable/attainment" and requested that its reservation be designated as a separate area from the surrounding counties. EPA concurs with this request and is designating Indian country of the Southern Ute Indian Tribe of the Southern Ute Reservation as a separate "unclassifiable/attainment" area. More information about EPA's decision-making with respect to the Indian County associated with the Southern Ute Indian Tribe can be found in "Appendix to the Colorado Technical Support Document –
Southern Ute Indian Tribe of the Southern Ute Reservation."

The analysis below provides the basis for the nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.[1]

1. Air quality data (including the design value calculated for each FRM or FEM monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).[2] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

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[1] The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in 5 categories of factors.

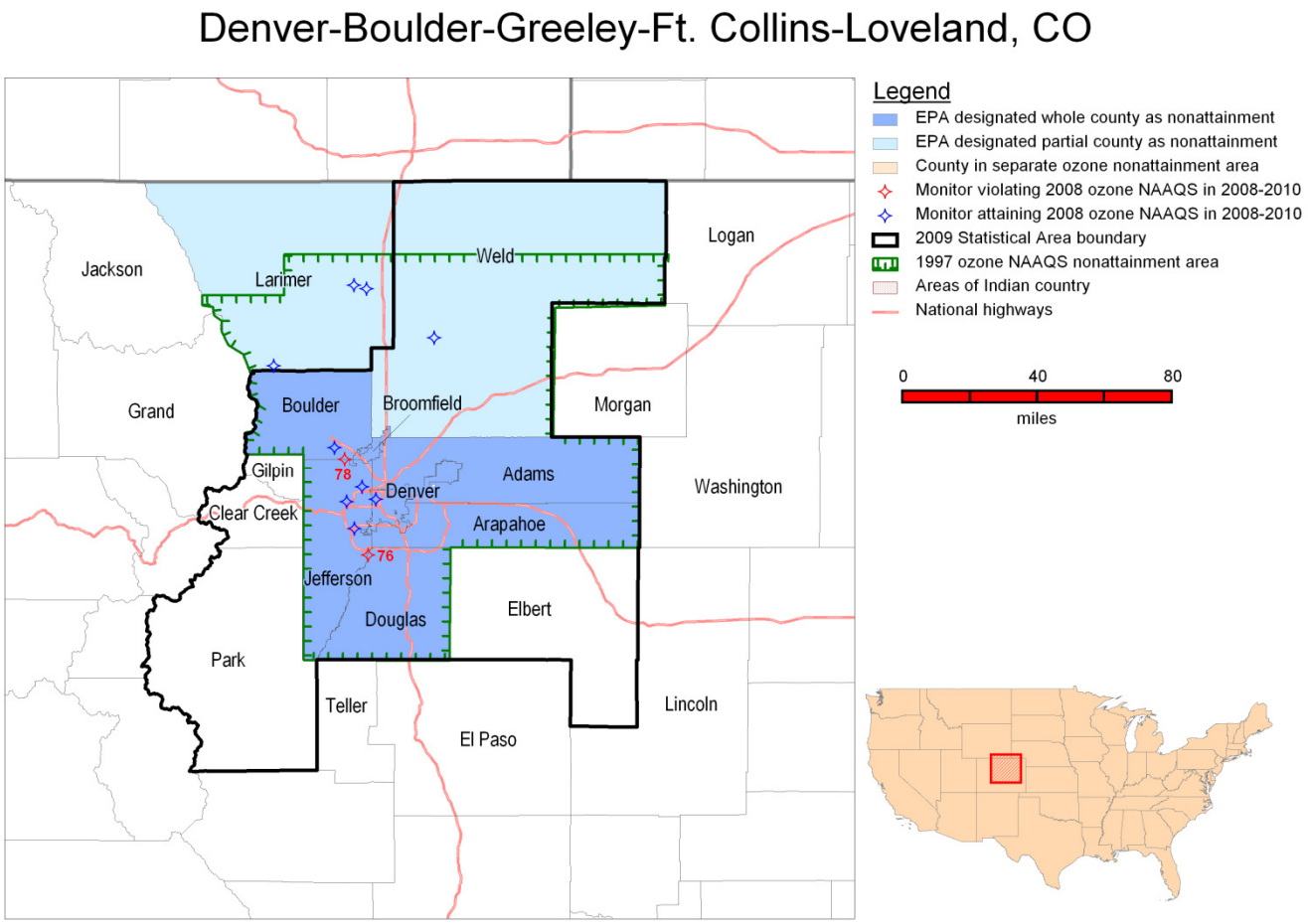
[2] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html . The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

The Denver CSA used throughout this document includes the Denver CBSA, Boulder CBSA and Greeley CBSA. Therefore we used the Denver CSA when examining the 5 factors.

Technical Analysis for Denver/North Front Range

Figure 1 is a map of the Denver/North Front Range nonattainment area. The map provides other relevant information including the locations of air quality monitors, the value of the maximum design value for the area, county and other jurisdictional boundaries, CSA boundary and the existing nonattainment boundary for the 1997 ozone NAAQS. In addition, the major transportation arteries of Interstate 70, Interstate 76 and Interstate 25 are shown.

Figure 1. Denver/North Front Range



For purposes of the 1997 8-hour ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and parts of Larimer and Weld counties. Note that the effective date for this area's "nonattainment" designation was initially deferred because the area participated in EPA's Early Action Compact Program, however, the official boundary for the area included the listed counties.

In March 2009, Colorado recommended that the same counties be designated as "nonattainment" for the 2008 ozone NAAQS based on air quality data from 2006-2008. These data are from Federal Equivalent Method (FEM) monitors sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating nine counties in Colorado (identified in Table 1 above) as "nonattainment" for the 2008 ozone NAAQS as part of the Denver/North Front Range nonattainment area.

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in parts per billion (ppb)) for air quality monitors in counties in the Denver/North Front Range area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm (75 ppb) or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

Note: Monitors that are eligible for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are sited in accordance with 40 CFR Part 58, Appendix D (Section 4.1) and operating with a federal reference method (FRM) or federal equivalent method (FEM) monitor that meets the requirements of 40 CFR part 58, appendix A. All data from a special purpose monitor (SPM) using an FRM or FEM which has operated for more than 24 months is eligible for comparison to the NAAQS unless the monitoring agency demonstrates that the data came from a particular period during which the requirements of appendix A (quality assurance requirements) or appendix E (probe and monitoring path siting criteria) were not met.

The 2010 DVs for the ozone NAAQS for counties in the Denver/North Front Range area and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data

County	State Recommended Nonattainment?	2008-2010 8-hour Ozone DV (ppb)
Adams, CO	Yes	*
Arapahoe, CO	Yes	*
Boulder, CO	Yes	73
Broomfield, CO	Yes	*
Clear Creek, CO	No	*
Denver, CO	Yes	68
Douglas, CO	Yes	76
Elbert, CO	No	*
Gilpin, CO	No	*
Jefferson, CO	Yes	78
Larimer, CO	Yes (partial)	74
Park, CO	No	*
Weld, CO	Yes (partial)	71

*County either does not have an ozone monitor or available data is incomplete.

Douglas and Jefferson counties show a violation of the 2008 ozone NAAQS, therefore these counties are included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated based on the weight of evidence of the five factors and other relevant information to determine whether it contributes to the nearby violation. EPA has evaluated information, through this 5-factor analysis, for the nearby counties without a violating monitor (Adams, Arapahoe, Boulder, Broomfield, Denver, Larimer and Weld).

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Emissions levels in a nearby area indicate the potential for the area to contribute to observed violations.

Table 3 shows emissions of NO_x and VOC (given in tons per year) for violating and potentially contributing counties in the Denver/North Front Range area.

Table 3. Total 2008 NO_x and VOC Emissions

County	State Recommended Nonattainment?	NO_x (tpy)	VOC (tpy)
Adams, CO	Yes	24,158	15,395
Denver, CO	Yes	18,984	17,293
Weld, CO	Yes (partial)	16,081	32,111
Jefferson, CO	Yes	12,983	15,932
Arapahoe, CO	Yes	10,605	14,940
Boulder, CO	Yes	9,763	8,470
Larimer, CO	Yes (partial)	8,217	10,081
Douglas, CO	Yes	6,552	7,509
Broomfield, CO	Yes	1,170	1,613
Clear Creek, CO	No	1,347	1,355
Elbert, CO	No	1,007	947
Park, CO	No	471	1,147
Gilpin, CO	No	446	297
	Areawide:	111,784	127,091

The emission data for Larimer and Weld counties includes the whole county and does not apportion emissions originating from the nonattainment area portions of these counties. According to 2006 emissions data provided by the State of Colorado in the Technical Support Document (TSD) that accompanied their 2009 recommendation, the northern portion of Larimer County (not in the nonattainment area) NOx and VOC emissions are estimated at 2,936 tpy (~27% of the County total) and 2,968 tpy (~27% of the County total), respectively. The northern portion of Weld County (not in the nonattainment area) 2006 NOx and VOC emissions are estimated at 279 tpy (~1% of the County total) and 864 tpy (~1% of the County total), respectively. While oil and gas drilling and exploration activities have increased in Weld County since 2006, EPA considers the bulk of emissions to still be originating from the portion of the county included in the nonattainment area. Similar, for Larimer County, there are no indications that the northern portion emits a greater fraction of the county total today than it did in 2006. EPA considers the bulk of emissions contributing to the counties with violating monitors to be originating from sources within the nonattainment area (i.e. southern portions of Larimer County).

Precursor emissions of NOx and VOC in counties outside of the 8-hour ozone nonattainment area (Clear Creek, Elbert, Gilpin, and Park) are substantially less than the emissions within the nonattainment boundary. While these counties are within the CSA for the Denver/North Front Range area, their emissions of both NOx and VOC are considerably lower than the counties within the CSA that are being designated as nonattainment. The one exception to this is Broomfield County where its emissions appear small when compared to the other counties in the nonattainment area. Broomfield County covers a much smaller area and therefore its emissions relative to its size are considered an important contributor to the violating monitors in the area. See the map above in Figure 1 for a depiction of the county's size and proximity to the counties with a violating monitor. The maximum design value site in Jefferson County is only 1.2 miles from the nearest point in Broomfield County.

The emissions information supports the EPA's final designation and shows that the counties with the highest amount of ozone precursor emissions are included in the nonattainment boundary.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to ozone formation. Rapid population or VMT growth (see below) in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Adams, CO	Yes	441,603	0.37	90,658	+26%
Arapahoe, CO	Yes	572,003	0.71	80,341	+16%
Boulder, CO	Yes	294,567	0.40	22,916	+8%
Broomfield, CO	Yes	55,889	1.66	16,331	+41%
Clear Creek, CO	No	9,088	0.02	(222)	-2%
Denver, CO	Yes	600,158	3.87	44,091	+8%
Douglas, CO	Yes	285,465	0.34	105,175	+58%
Elbert, CO	No	23,086	0.01	2,988	+15%
Gilpin, CO	No	5,441	0.04	626	+13%
Jefferson, CO	Yes	534,543	0.69	8,103	+2%
Larimer, CO	Yes (partial)	299,630	0.11	46,499	+18%
Park, CO	No	16,206	0.01	1,509	+10%
Weld, CO	Yes (partial)	252,825	0.06	69,789	+38%
	Areawide:	3,390,504	0.21	488,804	+17%

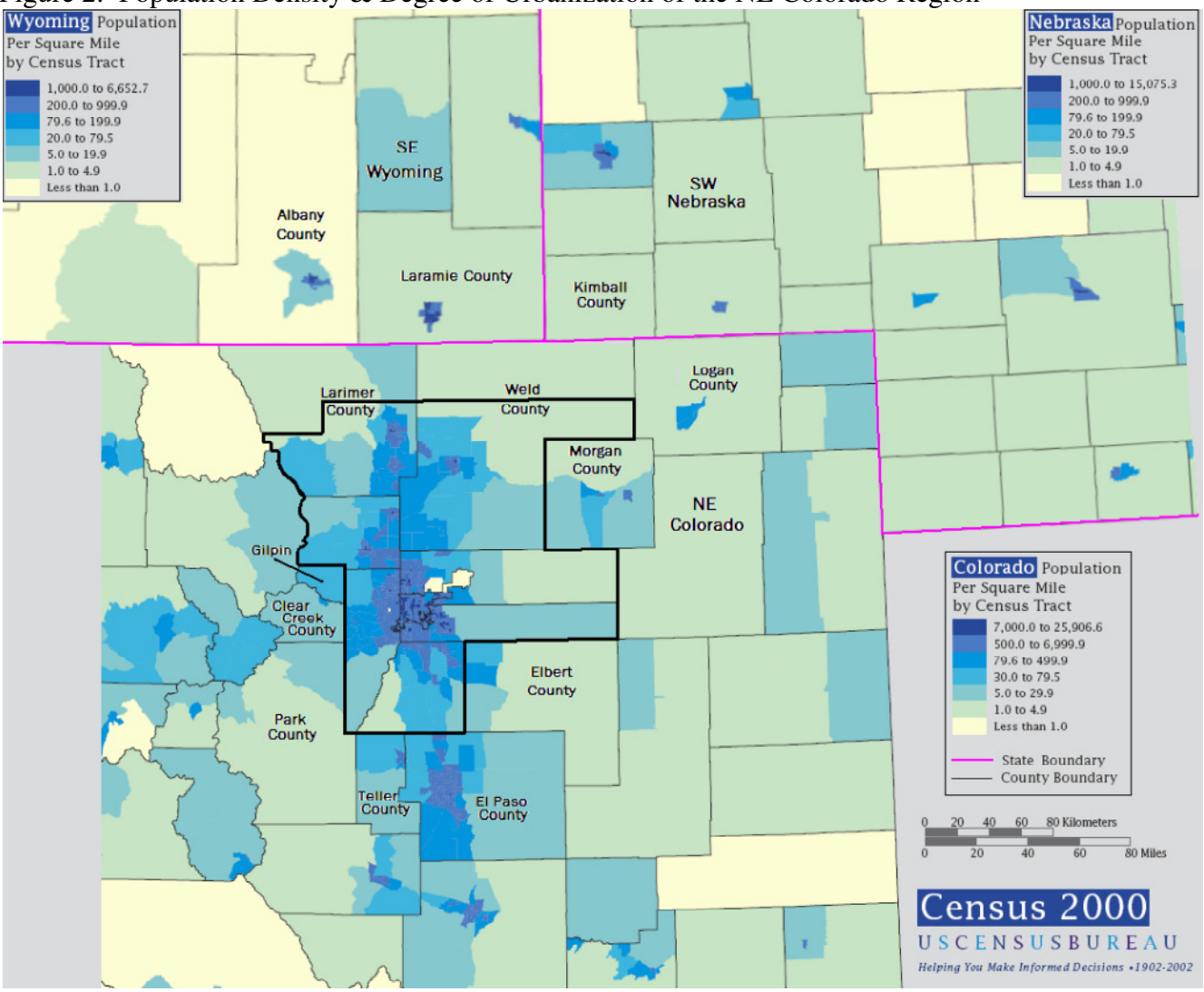
Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table).

Population data from Larimer and Weld Counties includes the whole county and does not apportion persons residing in the nonattainment area portion of these counties. According to the State of Colorado, the 2007 population for the northern portion of Larimer County (outside the nonattainment area) is estimated at 13,836 persons (~5% of the County total). The 2007 population for the northern portion of Weld County (outside the nonattainment area) is estimated at 2,934 persons (~1% of the County total). The smaller population totals for those areas in northern Larimer and Weld counties further supports our nonattainment boundary that covers the southern halves of those counties.

The State of Colorado provided Figure 2 below which shows the population density and the degree of urbanization for NE Colorado, SE Wyoming and SW Nebraska based on the 2000 US Census. The nonattainment area is highlighted in black and some peripheral counties are labeled.

The northern portions of Larimer and Weld Counties generally have population densities that are under 5-persons per square mile.

Figure 2: Population Density & Degree of Urbanization of the NE Colorado Region



The Denver/North Front Range population density/degree of urbanization illustrates that the urbanization is concentrated within the nonattainment boundary. Urbanization rapidly diminishes beyond the central portion of the nonattainment boundary. Because populations in the surrounding counties are low by comparison, and the human landscape is rural with small pockets of development, the population/urbanization information supports the nonattainment designation for the current 8-hour ozone nonattainment area.

Traffic and commuting patterns

EPA evaluated the commuting patterns of residents in the area, as well as the total VMT for each county. In combination with the population/population density data and the location of main transportation arteries (see Figure 1 above), this information helps identify the probable location of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows each county's VMT as well as the total 2008 VMT for all counties

Table 5. Traffic and Commuting Patterns

County	State Recommended Nonattainment?	2008 VMT (million miles)
Adams, CO	Yes	4,013
Arapahoe, CO	Yes	4,355
Boulder, CO	Yes	2,331
Broomfield, CO	Yes	567
Clear Creek, CO	No	675
Denver, CO	Yes	5,738
Douglas, CO	Yes	2,416
Elbert, CO	No	233
Gilpin, CO	No	77
Jefferson, CO	Yes	4,913
Larimer, CO	No	2,519
Park, CO	No	195
Weld, CO	Yes	2,523
	Areawide:	30,555

The 2008 VMT illustrates that the vast majority of vehicle trips occur within the nonattainment boundary; VMT in the counties included in the nonattainment area totals 29,375 million miles, while

VMT in the four counties excluded from the nonattainment area is only 1,180 million miles. Average daily traffic rapidly diminishes beyond the core area of the nonattainment boundary, as shown by the low VMT values in the four excluded counties. 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 nonattainment area boundary.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation.

The State's analysis in their TSD provided with their boundary recommendation provides a thorough examination of these unique conditions and is therefore included in italicized text below: The figure numbers have been changed by EPA to match the numbering pattern within the larger document.

> *Meteorology is the single most important factor affecting mid-summer ozone in the DMA/NFR, and Front Range and Platte Valley meteorology are significantly affected by the terrain. As reported in a number of papers on the mesoscale meteorology of the area[1,2,3,4,5,6,7] 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 3). Here 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.*
>
> *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 4). The mountain valley circulation consists of thermally-driven surface upslope flow (toward the southwest, west, and northwest) to mountain top level during the afternoon, mixing and transport vertically, and weak transport to*
>
> *the east at higher altitudes. Vertical mixing over 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.

Figure 3. Nighttime drainage flow shown by red arrows

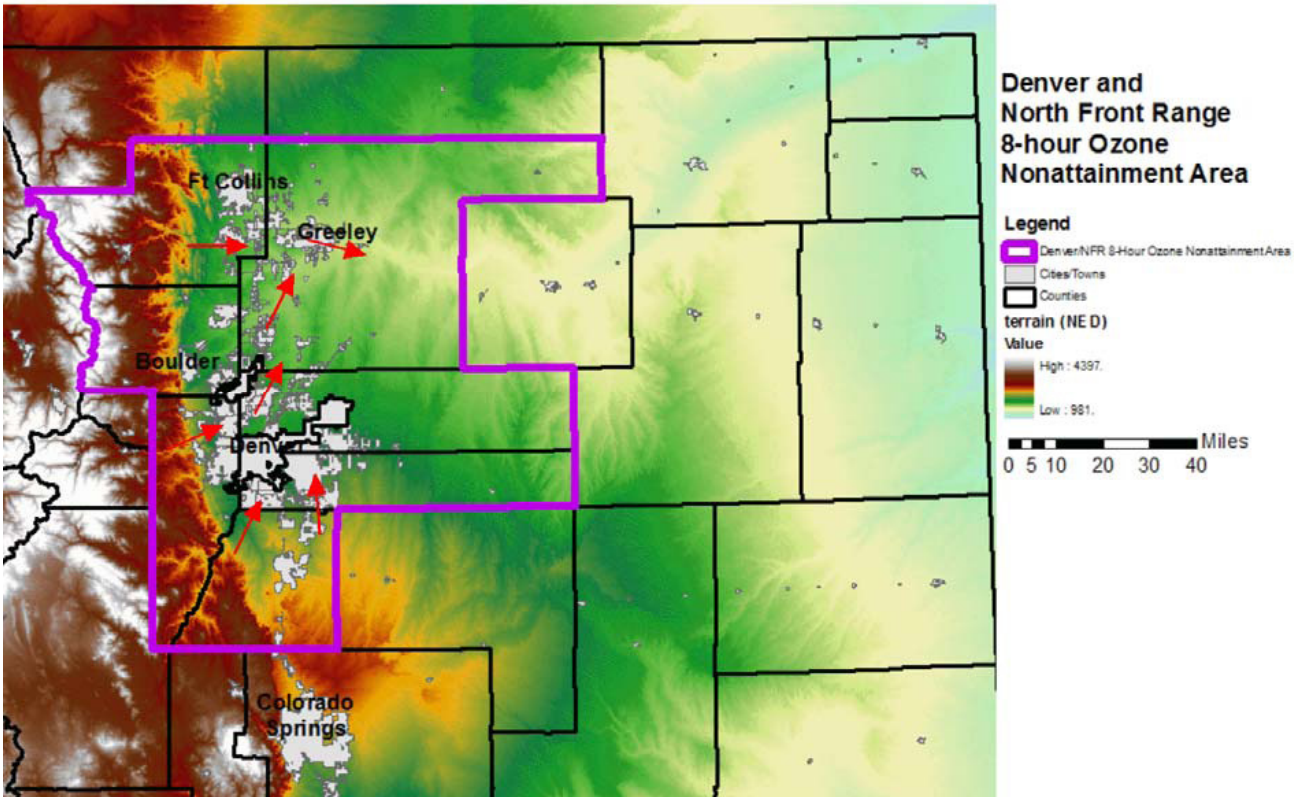
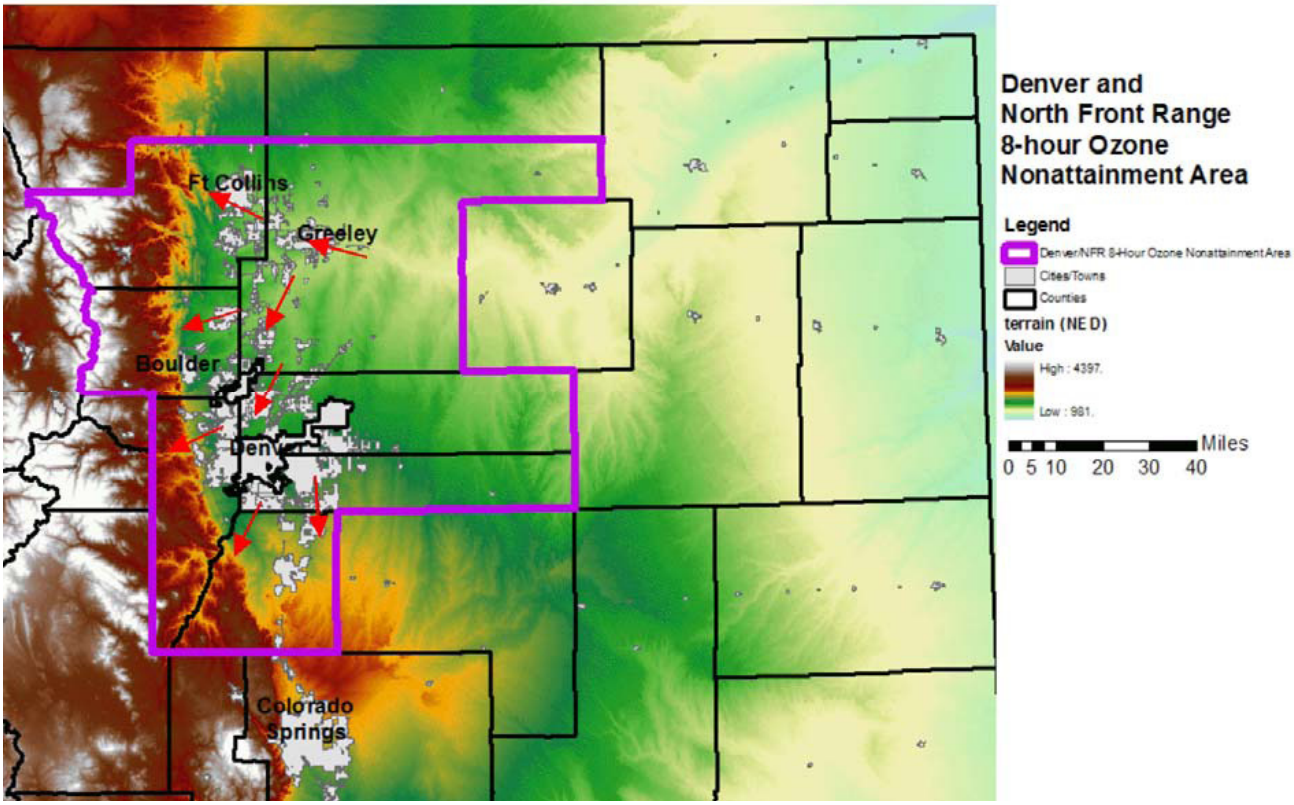
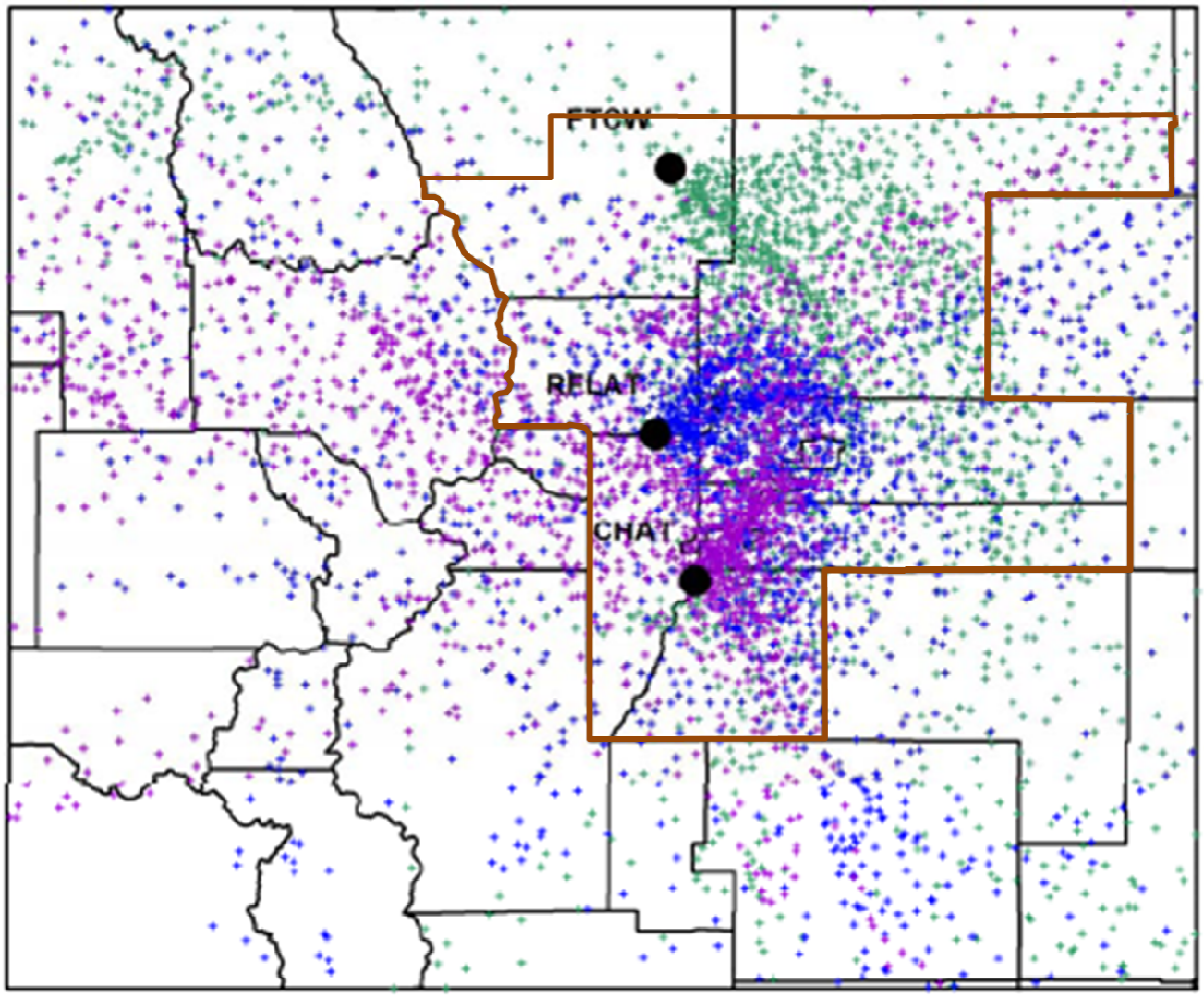


Figure 4. Upslope flows (red arrows) toward higher terrain)



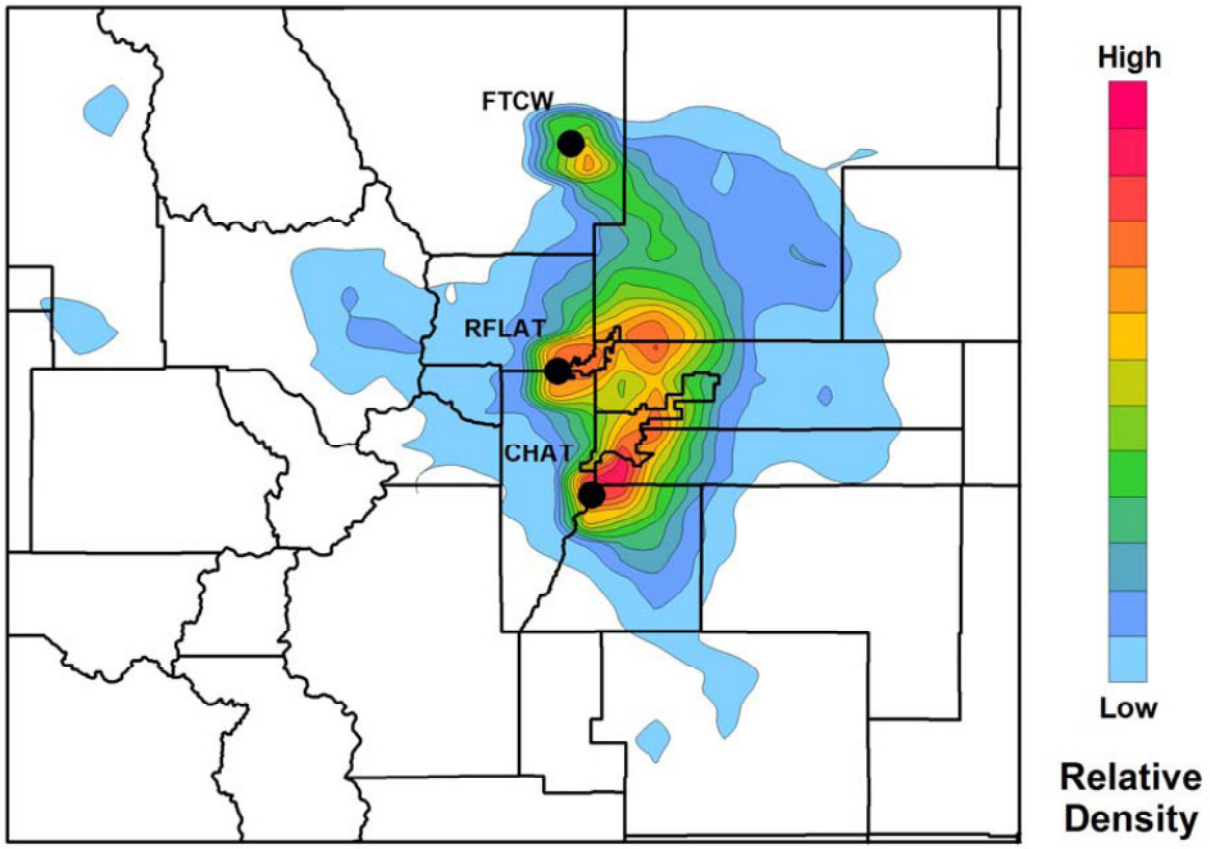
HYSPLIT back-trajectory analyses on the four highest days for each year in 2006 to 2008 for Fort Collins West, Rocky Flats, and Chatfield show that the highest densities of the backtrajectory points for the prior 24-hours are within the airshed, overlap with the highest emissions source areas, and are in the Non-Attainment area (see Figures 5 and 6). Figure 6 shows the relative densities for these back trajectories showing a prevalence of short-travel trajectory points upwind of each site.

Figure 5. Hourly Back Trajectory Points at FTCW, RFLAT, and CHAT Monitoring Sites



The above plot depicts the 24-hour back trajectory points for each hour in each 8-hour period for the 12 highest ozone concentration days at Fort Collins-West (FTCW - green), Rocky Flats (RFLAT - in blue), and Chatfield (CHAT - purple) for the period 2006-2008.

Figure 6. Relative Densities of Hourly Back Trajectory Points at FTCW, RFLAT and CHAT Monitors



The above density plot depicts the relative densities of 24-hour back trajectory points for each hour in each 8-hour period for the 12 max O3 Concentration days at Chatfield, Rocky Flats, and Fort Collins West (2006-2008), showing a prevalence of short-range transport from upwind (down-valley) of each site.

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) 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.
*2) Szoke, E. J., 1991. Eye of the Denver Cyclone, **Monthly Weather Review 119**, 1283-1292.*
*3) Schreibner-Abshire, W. and A. R. Rodi, 1991. Mesoscale convergence zone development in northeastern Colorado under southwest flow, **Monthly Weather Review 119**.*

4) 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.*
5) 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.*
6) 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.*
7) Toth, J. J., and R. H. Johnson, 1985. Summer surface flow characteristics over northeast Colorado, ***Monthly Weather Review 113****, No. 9, 1458-1469*

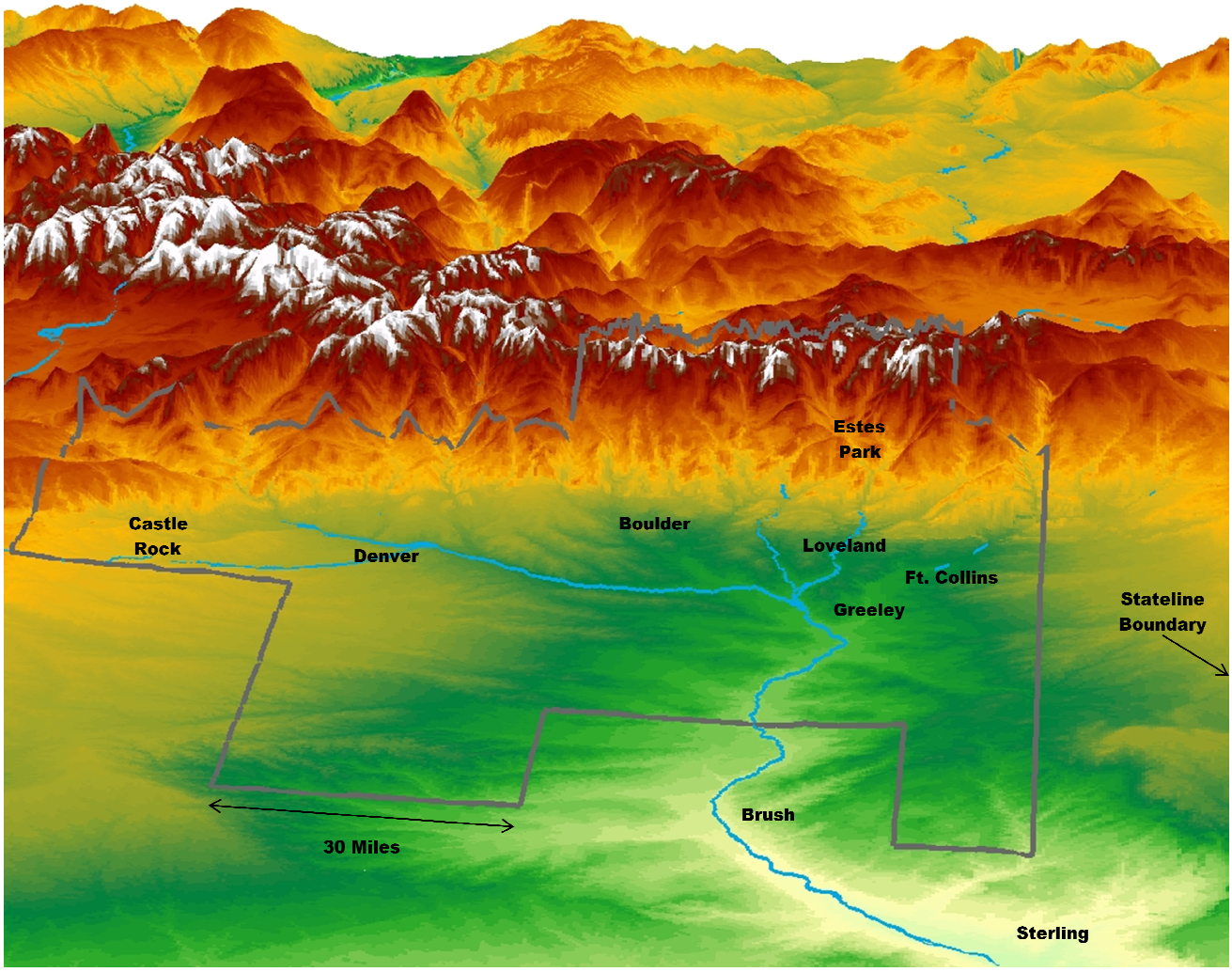
Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. As mentioned above in the Meteorology section, the Denver/North Front Range has a unique topography that plays an important role in determining which counties to include within the nonattainment boundary.

Again, the State's description in their TSD of the topography of the area provides a good illustration of the unique features and is included here:

> *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 7. Topographic illustration of physical barriers that define the Denver Basin



Geography/Topography Conclusion:
The region's east-facing open bowl topography indicates that the current 8-hour ozone NAA boundary is appropriate for the recommended ozone NAA.

Factor 5: Jurisdictional boundaries

Once the general areas to be included in the nonattainment area were determined, EPA considered existing jurisdictional boundaries 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 existing/prior nonattainment areas for ozone or other urban-scale pollutants, counties, air districts, townships, metropolitan planning organizations, state lines, areas of Indian country, urban growth boundary, etc. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Denver/North Front Range has previously established nonattainment boundaries associated with the 1997 8-hour ozone NAAQS. The state recommended the same boundary for the 2008 ozone NAAQS. EPA agrees with this recommendation and considers the existing nonattainment area an appropriate legal boundary for carrying out the air quality planning and enforcement functions for the 2008 ozone NAAQS.

Conclusion

Based on the assessment of factors described above, EPA has concluded that the following counties meet the CAA criteria for inclusion in the Denver/North Front Range nonattainment area: Adams, Arapahoe, Boulder (including the portion of Rocky Mountain National Park therein), Broomfield, Denver, Douglas, Jefferson, Larimer (partial, including the portion of Rocky Mountain National Park therein) and Weld (partial). These are the same counties that are included in the Denver/North Front Range nonattainment area for the 1997 ozone NAAQS.

The air quality monitors in Douglas and Jefferson Counties indicate violations of the 2008 ozone NAAQS based on the 2010 DVs, and therefore these counties are included in the nonattainment area. Adams, Arapahoe, Boulder, Broomfield, Denver, Larimer (partial) and Weld (partial) are nearby counties that do not have violating monitors, but EPA has concluded that these areas contribute to the ozone concentrations in violation of the 2008 ozone NAAQS through emissions from point sources and other non-point sources (e.g., vehicles and other small area sources). In addition, population density and meteorological patterns combined with the unique topography of the Denver/North Front Range support inclusion of these counties in the nonattainment area. Only a portion of Larimer and Weld counties are included because these are large counties and the bulk of emissions come from the southern half of these counties.

The State of Colorado performed a factor analysis as well that formed the basis of the state's recommendation that this area be designated for nonattainment and EPA supports the state's recommendation. EPA concludes that this nonattainment area boundary will support Colorado's ability to focus resources on the emission sources and areas that most strongly contribute to the ozone problem in the Denver/North Front Range nonattainment area.

Appendix to the Colorado Technical Support Document – Southern Ute Indian Tribe of the Southern Ute Reservation

The Southern Ute Indian Tribe, whose Reservation is located in southwestern Colorado, submitted a recommendation letter on March 9, 2009 requesting that the exterior boundaries of the Southern Ute Reservation be designated as "attainment/unclassifiable." A Technical Support Document (TSD) attached to the letter utilized the EPA's 9-factor analysis to support their recommendation. Subsequently, the Tribe submitted a letter on November 22, 2011 that clarified its intent to be designated separately from surrounding areas. The letter cites EPA's Policy for Establishing Separate Air Quality Designations for Areas of Indian Country (the "Policy") as primary justification for the request. As mentioned in the EPA's TSD for the state of Colorado, EPA concurs with this request and is designating the Southern Ute Reservation as a separate unclassifiable/attainment area.

Among the nine factors described in the Policy, in this matter we have primarily considered the jurisdictional boundaries factor. (This approach is supported by the Policy, which provides that in the case of a tribe seeking designation of a separate attainment area from an adjacent attainment area, "it is possible that only the air quality data factor and/or the jurisdictional boundaries factor would be applicable to the given situation." *Id.* at 5.) Applying the jurisdictional factor, we consider "what are the existing jurisdictional boundaries for purposes of providing a clearly defined legal boundary of the area pertaining to the designation request," and we "recognize that tribes maintain important sovereign authority over their members and territories." *Id.* at 5, 7.
In addition to the jurisdictional boundaries factor, we have also considered the air quality data factor in our analysis of the Tribe's request. The Southern Ute Tribe operates 2 ozone monitoring stations. These stations have recorded 4th maximum 8-hour ozone values below the National Ambient Air Quality Standard for ozone in all years operated (1990 through 2012). The monitors in the Southern Ute unclassifiable/attainment area, like those in surrounding counties, do not show violations of the 8-hour ozone standard. [3]

The Tribe's TSD provided EPA with sufficient information pertaining to the jurisdictional boundaries and air quality data factors to warrant EPA's concurrence with their request. The Reservation is in the Four Corners region, which encompasses four states, three EPA regions, and several other Indian reservations. By statute (P.L. 98-290, May 1984), Congress has clearly defined the boundaries of the Reservation within which the Tribe exercises its sovereign authority. Further, the Southern Ute Indian Tribe has proven to be a leader in building capacity and expertise in air quality management. For example, the Tribe was recently approved by EPA for treatment in a similar manner as a state in connection with the Clean Air Act's title V operating permit program.
For these reasons, EPA concurs with the Tribe's request to be designated as a separate unclassifiable/attainment area.

[3] There has been no violation of the 0.075 ppm ozone standard in the Four Corners region since 2002.