

Technical Support Document for 2008 Ozone NAAQS Designations

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

Technical Analysis for Sacramento Metro

Figure 1 is a map of the Sacramento Metro, CA nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, county names and boundaries, and indicates EPA's "nonattainment" designation. Also shown is the boundary of the existing area that is designated nonattainment for the 1997 ozone NAAQS.

Sacramento Metro, CA

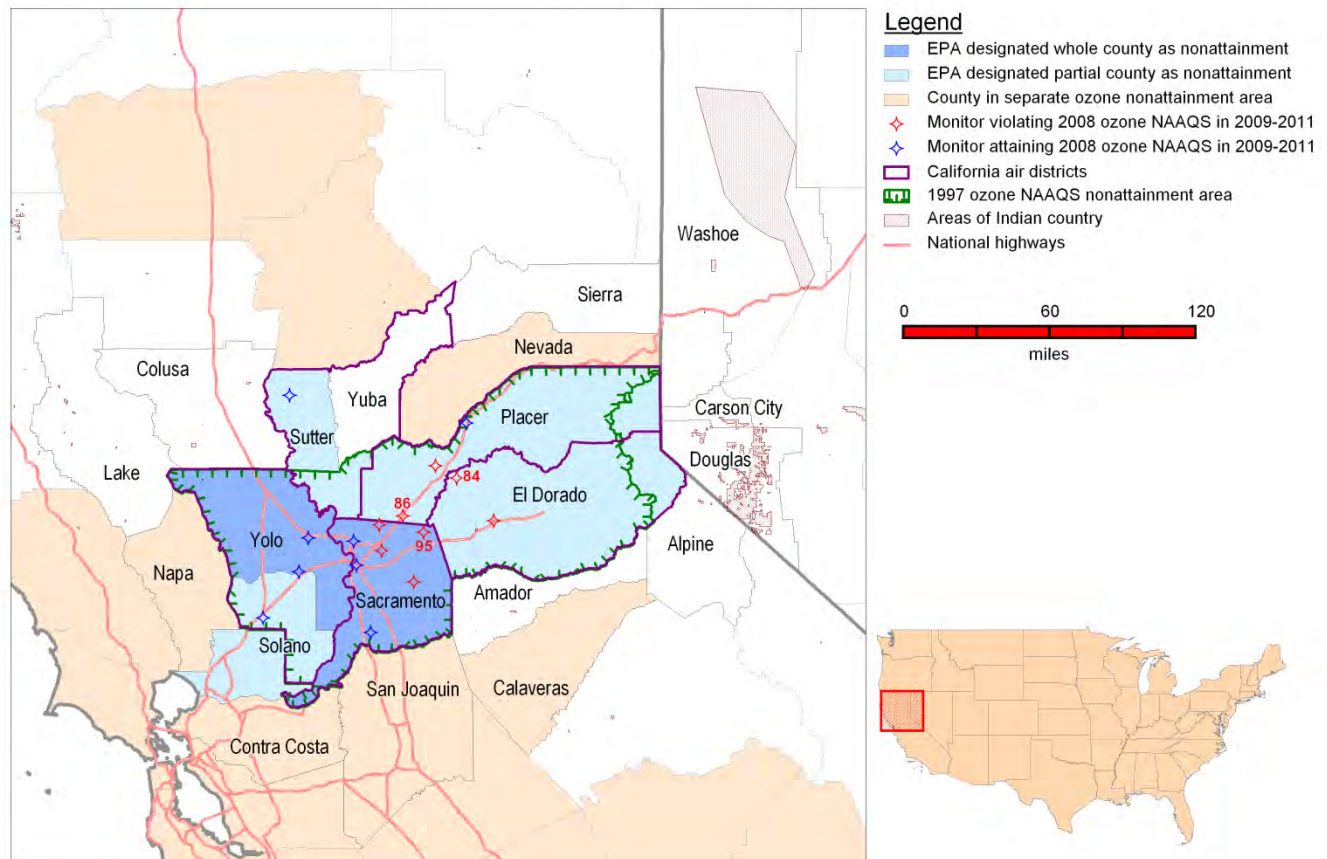


Figure 1

Note: The map shown in Figure 1 provides 8-hour ozone design values in parts per billion (ppb) based on data from 2009-2011 (i.e., the 2011 design value, or DV), which are the most recent years with fully-certified air quality data. For each particular area, Factor 1 and Appendix 3 describe the air quality data relevant for our nonattainment decisions.

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 entirety of Sacramento and Yolo counties and parts of Solano, Sutter, Placer and El Dorado counties. Areas of Indian country of three federally recognized tribes are included in the nonattainment area. These are the same tribes that are listed in Table 1, below.

In March 2009, California recommended that the same counties or parts of counties be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008 (letter from James Goldstene, Executive Officer, California Air Resources Board, to Laura Yoshii, Acting Regional Administrator, U.S. EPA Region IX, dated March 11, 2009). California provided an update to the original recommendation in October 2011 based on air quality data from 2008-2010 and preliminary 2009-2011 data and indicating to EPA that it intended to early-certify data for 2011 so that it could be used for the final designations, but did not revise its recommendation for the Sacramento Metro area. These 2009 and 2011 recommendations are based on data from Federal Equivalent Method (FEM) monitors sited and operated in accordance with 40 CFR Part 58 (letter from Lynn Terry, Deputy Executive Officer, California Air Resources Board, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated October 12, 2011). Because of the State's timely submittal of the certified air quality data, we are basing our final designation decision on 2009-2011 data for this area.

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating two counties and four partial counties in California and areas of Indian country (identified in Table 1 below) as nonattainment for the 2008 ozone NAAQS as part of the Sacramento Metro multi-jurisdictional nonattainment area.

Table 1. State and Tribe's Recommended and EPA's 2008 ozone NAAQS Nonattainment Counties or Areas of Indian Country for Sacramento Metro.

Sacramento Metro, CA	State and Tribe-Recommended Nonattainment Counties or Areas of Indian Country	EPA's Nonattainment Counties or Areas of Indian Country
Sacramento County	Sacramento County	Sacramento County
Yolo County	Yolo County	Yolo County
Solano County	Solano County	Solano County
Sutter County	Sutter County (p)	Sutter County (p)
El Dorado County	El Dorado County (p)	El Dorado County (p)
Placer County	Placer County (p)	Placer County (p)
Shingle Springs Band of Miwok Indians, Shingle Springs Rancheria (Verona Tract)	N/A	Shingle Springs Band of Miwok Indians, Shingle Springs Rancheria (Verona Tract)
United Auburn Indian Community of the Auburn Rancheria of California	N/A	United Auburn Indian Community of the Auburn Rancheria of California
Yocha Dehe Wintun Nation	N/A	Yocha Dehe Wintun Nation

p = partial

N/A = Tribe did not submit a recommendation.

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values for air quality monitors in counties in the existing Sacramento Metro nonattainment area, based on data from the most recent three-year period for which we had timely submitted certified air quality data. The state of California submitted certified air quality data for 2011 before February 29, 2012 for this area; thus, for purposes of the final designations, we are considering air quality from the 2009-2011 period (i.e., the 2011 DV) for this area. 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 at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years, is 0.075 parts per million (ppm) (75 parts per billion (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.]

Certified, quality assured air quality data are available in EPA's Air Quality System (AQS) for all areas through calendar year 2010. California's ozone season encompasses the entire year, but some ozone monitors in the Sacramento Metro nonattainment area have been approved to operate on a seasonal schedule per 40 CFR part 58, Appendix D, section 4.1(i). Preliminary non-certified data from calendar year 2011 are available in AQS for most areas. States are required to certify and quality assure data by May 1st of the following year. The California Air Resources Board (ARB) certified data by February 29, 2012 for the counties in the existing Sacramento Metro nonattainment area. EPA's designation for this area is therefore based on 2009-2011 data. As shown in Table 2, air quality data from 2009-2011 data indicate the counties in the existing Sacramento Metro nonattainment area are violating the 2008 ozone NAAQS. The Sacramento Metro 2010 DV was 102 ppb. The existing Sacramento Metro nonattainment area comprises Sacramento and Yolo counties, the eastern portion of Solano County, the southern portion of Sutter County and the western portions of Placer and El Dorado counties (see Map 10a in Appendix 2). The 2011 DVs for the ozone NAAQS for counties in the existing Sacramento Metro nonattainment area are shown in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2009-2011 Design Value (ppb)
El Dorado, CA	Yes (partial)	84
Placer, CA	Yes (partial)	86
Sacramento, CA	Yes	95
Solano, CA	Yes	68
Sutter, CA	Yes (partial)	71
Yolo, CA	Yes	70

Monitors in Sacramento, Placer, and El Dorado counties show a violation of the 2008 8-hour ozone standard based on 2009-2011 data. Therefore, these areas are included in the Sacramento Metro nonattainment area. As shown on Map 10 in Appendix 1, the Sacramento Metro area shows violations using 2011 data.

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 to determine whether it contributes to the nearby violation.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors, nitrogen oxides (NO_x) and volatile organic compounds (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 in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources.

Table 3 shows emissions of NO_x and VOC (given in tons per year) for violating and nearby counties that we considered for inclusion in the Sacramento Metro area.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment?	NO _x (tpy)	VOC (tpy)
El Dorado, CA	Yes (partial)	3,501	6,238
Placer, CA	Yes (partial)	11,191	9,920
Sacramento, CA	Yes	27,118	21,536
Solano, CA	Yes	15,361	11,339
Sutter, CA	Yes (partial)	6,273	3,338
Yolo, CA	Yes	7,135	4,448
Areawide:		70,578	56,819

Sacramento County represents 38% of the NO_x emissions and 38% of VOC emissions from the area. However, all counties in the Sacramento Metro nonattainment area contribute to emissions of ozone precursors in the area.

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, which contribute to ozone formation. Rapid population growth or growth in vehicle miles traveled (VMT) (see below) in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with area source and mobile source emissions as part of 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)
El Dorado, CA	Yes (partial)	181,058	0.10	23,930	+15%
Placer, CA	Yes (partial)	348,432	0.23	97,177	+39%
Sacramento, CA	Yes	1,418,788	1.43	188,541	+15%
Solano, CA	Yes	413,344	0.47	16,373	+4%
Sutter, CA	Yes (partial)	94,737	0.16	15,610	+20%
Yolo, CA	Yes	200,849	0.20	30,979	+18%
Areawide:		2,657,208	0.39	372,610	+16%

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)

Maps 10 and 10a in Appendices 1 and 2, respectively, show population for the area. Population growth has been strong throughout the area. Population in this area represents a large source of emissions for the area, as it is linked to traffic and commuting patterns (see next section). Sacramento County has the largest population in the area, the highest population density and has experienced the largest absolute change in population, although Placer County had higher population growth on a percentage basis.

Traffic (VMT) data

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 above), this information helps identify the probable location of non-point source emissions. A county with high VMT indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. 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 total 2008 VMT for violating and nearby counties that we considered for inclusion in the Sacramento Metro area.

Table 5. Traffic (VMT) data.

County	State Recommended Nonattainment?	2008 VMT* (million miles)
El Dorado, CA	Yes (partial)	2,299
Placer, CA	Yes (partial)	2,939
Sacramento, CA	Yes	9,578
Solano, CA	Yes	3,280
Sutter, CA	Yes (partial)	701
Yolo, CA	Yes	1,621
Areawide:		20,417

*MOBILE model VMTs are those inputs into the NEI version 1.5.

Traffic data in Table 5 show that VMT is highest in Sacramento County, and Map 10 in Appendix 1 shows that El Dorado, Placer, Solano, Sutter, and Yolo counties all contain major roadways that lead to the major urban area in Sacramento County.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available 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.

Conditions in the Sacramento Metro area are generally hot and dry in the summer, with conditions conducive to ozone formation. This is mitigated somewhat by periodic flow of marine air from the Pacific Ocean (via the Golden Gate at the mouth of San Francisco Bay). This sea breeze may occur daily and lead to cooler and more turbulent conditions and lower ozone, but there can also be extended periods where this pattern breaks down and hot, stagnant conditions occur. Even then the flow tends to be toward the northeast, and together with upslope results in high ozone concentrations being transported up the valleys in the foothills to the east, such as to Auburn.

The air flow in the Sacramento Metro area counties is most frequently from the south-southwest according to the 30-year average direction frequencies computed by EPA, as shown in the “radar”-style wind rose diagram below (Figure 2). This is consistent with the position of the area with respect to the Golden Gate, the key route for air flow between the Pacific Ocean and the Central Valley of California (the northern half of which is the Sacramento Valley, which includes the Sacramento Metro area and areas farther north). It is also consistent with the orientation of the river valleys extending northeast of Sacramento into the foothills and ranges of the Sierra Nevada mountain range.

Sacramento Counties Wind Direction Frequency

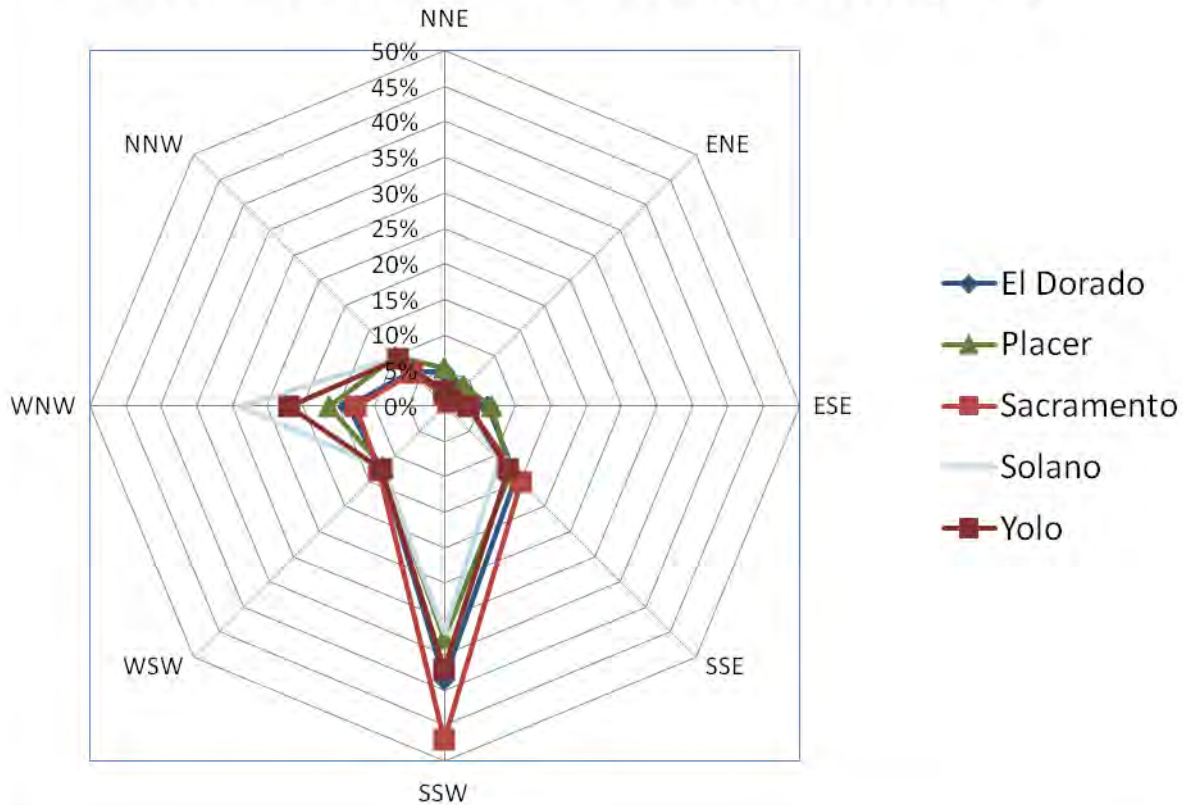


Figure 2

The California Coast Range topographically separates the Sacramento Metro area from the San Francisco Bay area, despite the important gap leading to the Golden Gate. The two areas have different meteorology, with the Sacramento Metro area being part of the hot and dry Central Valley, though with significant marine influence at times, and the San Francisco Bay area being dominated by interaction with air masses over the Pacific Ocean.

There is no topographic barrier between the Sacramento Valley and the San Joaquin Valley to the south, but generally the air flow from the Pacific Ocean through the Golden Gate toward the east tends to bifurcate where the two valleys meet, providing some degree of separation between the two valleys much of the time.

Consideration of the meteorology factor supports the state's recommendation for the nonattainment area boundary. At the juncture of influences of the Central Valley and the Golden Gate, the meteorology of the Sacramento Metro area is distinct from both the San Joaquin Valley and the San Francisco Bay Area. While transport between adjacent areas can occur, the most important flow during ozone episodes within the Sacramento Metro area is toward the northeast and the foothills within the Sacramento Metro area itself.

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.

The Sacramento Metro area is at the southern end of the Sacramento Valley, the name for the northern half of California's broad, flat, Central Valley. Two-thirds of the area is flat, while the eastern third, comprising El Dorado County and the eastern portion of Placer County, is in the foothills and mountains of the Sierra Nevada range. These two counties extend to and beyond the range crest at over 2,500 meters (8,000 feet) elevation, and bound the Sacramento Metro area on the east.

The area is bounded on the west by California's Coast Range, except for the gap leading to the Golden Gate. Rivers drain to the Pacific Ocean through that gap, which is also important for air flow. There is no topographic barrier to the north or south. To the north, the area is distinguished by the greater distance from the influence of the Golden Gate, and the exclusively north-south orientation of the walls of the Central Valley, as compared to the gap west of the Sacramento Metro area.

The California Coast Range topographically separates the Sacramento Metro area from the San Francisco Bay area, despite the important gap leading to the Golden Gate. The two areas have different topography, with the Sacramento Metro area being mainly flat, and a part of the Central Valley, and the San Francisco Bay area being more hilly, and a part of the Pacific coast.

In addition, while there is no topographic barrier between the Sacramento Valley and the San Joaquin Valley to the south, generally the air flow from the Pacific Ocean through the Golden Gate toward the east tends to bifurcate where the two valleys meet, providing some degree of separation between the two valleys much of the time.

Factor 5: Jurisdictional boundaries

For each potential nonattainment area, we considered existing jurisdictional boundaries to provide a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, county lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, areas of Indian country, and urban growth boundary. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Sacramento Metro nonattainment area has previously established nonattainment boundaries associated with both the 1-hour and the 1997 8-hour ozone NAAQS. The state recommended the same boundary for the 2008 ozone NAAQS. This area encompasses the entirety of the developed center of the metropolitan area in Sacramento County. To the south, San Joaquin County is part of the San Joaquin Valley nonattainment area. To the west, Solano County is bisected diagonally, with the southwest half in the San Francisco Bay Area nonattainment area and the northeast portion in the Sacramento Metro nonattainment area. Northwest of Sacramento County, the entirety of Yolo County is included in the Sacramento Metro nonattainment area. The southern portion of Sutter County, to the north of Sacramento County, is included in the Sacramento Metro nonattainment area. Placer County is northeast of the urban center and is included in the nonattainment area up to the crest of the Sierra Nevada mountain range, as is El Dorado County to the east of Sacramento County.

The Sacramento Metro nonattainment area overlaps with the Office of Management and Budget's definition of the Sacramento–Arden-Arcade–Yuba City combined statistical area (CSA). The CSA includes two metropolitan statistical areas (Sacramento–Arden-Arcade–Roseville and Yuba City) and one micropolitan statistical area (Truckee-Grass Valley). This CSA is larger than the Sacramento Metro nonattainment area. The CSA includes Sacramento and Yolo counties, both of which are in the Sacramento Metro nonattainment area. The CSA also includes the entirety of Sutter, Placer, and El Dorado counties, all of which are partial counties for the Sacramento Metro nonattainment area. The CSA also includes Nevada County, which is a partial county that EPA is designating, per the state's recommendation, as a separate nonattainment area. One last county in the CSA, Yuba County, is not part of the nonattainment area. EPA is designating Yuba County as “unclassifiable/attainment”.

The Sacramento Metro nonattainment area includes one partial county (Solano) that is not part of the CSA. Solano County is part of the San Jose-San Francisco-Oakland CSA. For ozone designations, Solano County has been split along air district boundaries between the Sacramento Metro and San Francisco Bay Area nonattainment areas. Most of the Sacramento–Arden-Arcade–Yuba City CSA is part of the Sacramento Metro nonattainment area. Portions of Placer and El Dorado counties are excluded because they are beyond the crest of the Sierra Nevada, in the Lake Tahoe hydrologic basin. Of the two counties (Sutter and Yuba) in the Yuba City MSA portion of the CSA, only southern Sutter County is part of the Sacramento Metro nonattainment area.

The Sacramento Metro nonattainment area includes most of the transportation planning agency in the area, which is the metropolitan planning organization (MPO) known as the Sacramento Area Council of Governments (SACOG). Air quality planning is led by the largest air pollution control district in the area, the Sacramento Metro Air Quality Management District. Four other air districts participate in air planning and management in the area. The Yolo-Solano Air Quality Management District (AQMD) has jurisdiction over Yolo County and the Sacramento Metro portion of Solano County. Feather River AQMD has jurisdiction over Sutter and Yuba counties, including the south Sutter County portion of the Sacramento Metro area. Placer County Air Pollution Control District has jurisdiction over Placer County, as El Dorado County AQMD does over its county.

The Sacramento Metro nonattainment area also includes areas of Indian country. As defined at 18 U.S.C. 1151, “Indian country” refers to: “(a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.” EPA recognizes the sovereignty of tribal governments, and has attempted to take the desires of the tribes into account in establishing appropriate nonattainment area boundaries.

Conclusion

Based on the assessment of factors described above, EPA is including the following counties as part of the Sacramento Metro, CA nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Sacramento County, Yolo County, Solano County (partial), Sutter County (partial), El Dorado County (partial), and Placer County (partial). This area also includes the areas of Indian country of three tribes: the Shingle Springs Band of Miwok Indians, Shingle Springs Rancheria; the United Auburn Indian Community of the Auburn Rancheria of California; and the Yocha Dehe Wintun Nation.

The Clean Air Act requires EPA to designate any area as “nonattainment” if it violates a NAAQS or if it contributes to a violation in a nearby area. Air quality data (Factor 1) show that monitors in El Dorado, Placer, and Sacramento counties are violating the 2008 8-hour ozone standard based on 2009-2011 data. Therefore, Factor 1 supports designating all or part of these counties as “nonattainment.”

EPA’s review of emissions and emission related data (Factor 2), as well as meteorology and weather or transport patterns (Factor 3), geography and topography (Factor 4), and jurisdictional boundaries (Factor 5) support the proposed nonattainment boundaries recommended by the state. The geographic boundaries to the west and east are clear; while the boundaries to the north and south are not defined by definite barriers, they include the locations with comparable topography and meteorology that are distinct from those northern and southern areas.

Based on our consideration of all five factors, EPA is designating two whole counties and four partial counties in California and three areas of Indian country (identified in Table 1 above) as “nonattainment” for the 2008 ozone NAAQS as part of the Sacramento Metro, CA multi-jurisdictional nonattainment area.