

Technical Support Document for 2008 Ozone NAAQS Designations

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

Technical Analysis for Los Angeles-South Coast Air Basin

Figure 1 is a map of the Los Angeles-South Coast Air Basin, 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.

Los Angeles - South Coast Air Basin, CA

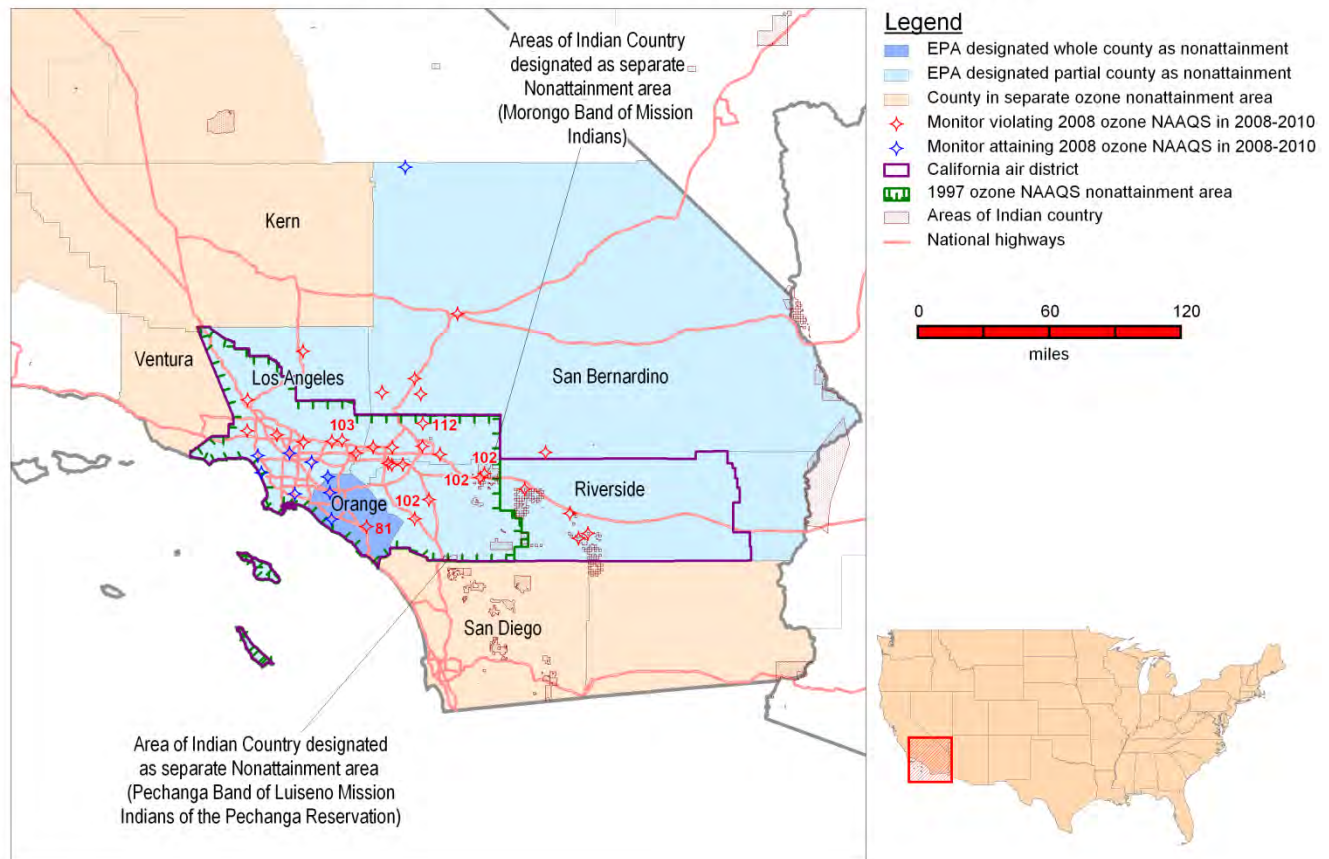


Figure 1

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 Orange County, parts of Los Angeles, San Bernardino and Riverside counties, and areas of Indian country of federally recognized tribes.

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, but did not revise its recommendation for the Los Angeles-South Coast Air Basin. The 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.)

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating one county, three partial counties, and four areas of Indian country (identified in Table 1 below) as “nonattainment” for the 2008 ozone NAAQS as part of the Los Angeles-South Coast Air Basin multi-jurisdictional nonattainment area.

Table 1. State or Tribe’s Recommended and EPA’s 2008 ozone NAAQS Nonattainment Counties or Areas of Indian country for Los Angeles-South Coast Air Basin

Los Angeles-South Coast Air Basin, CA	State or Tribe-Recommended Nonattainment Counties or Areas of Indian country ¹	EPA’s Nonattainment Counties or Areas of Indian country
Los Angeles County	Los Angeles County	Los Angeles County
Orange County	Orange County	Orange County
San Bernardino County	San Bernardino County (p)	San Bernardino County (p)
Riverside County	Riverside County (p)	Riverside County (p)
Cahuilla Band of Mission Indians of the Cahuilla Reservation	N/A	Cahuilla Band of Mission Indians of the Cahuilla Reservation
Ramona Band of Cahuilla	N/A	Ramona Band of Cahuilla
San Manuel Band of Mission Indians	N/A	San Manuel Band of Mission Indians
Soboba Band of Luiseno Indians	N/A	Soboba Band of Luiseno Indians

p = partial

N/A = Tribe did not submit a recommendation.

¹ While the nonattainment area boundary for the 2008 ozone NAAQS is very similar to the existing 1997 ozone NAAQS nonattainment boundary for the Los Angeles-South Coast Air Basin, the 2008 ozone NAAQS boundary differs in the following ways: EPA is designating the Morongo Band of Mission Indians (Morongo) and the Pechanga Band of Luiseño Mission Indians of the Pechanga Reservation (Pechanga) as separate nonattainment areas, the Morongo Band of Mission Indians nonattainment area (Morongo Tribe nonattainment area) and the Pechanga Band of Luiseño Mission Indians of the Pechanga Reservation nonattainment area (Pechanga Tribe nonattainment area); and the Santa Rosa Band of Cahuilla Indians (Santa Rosa Cahuilla) is included only in the Riverside County (Coachella Valley) nonattainment area. For more information, see the Technical Analysis sections for the Morongo Tribe nonattainment area, Pechanga Tribe nonattainment area, and Riverside County (Coachella Valley) in the Technical Support Document for California.

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 Los Angeles-South Coast Air Basin nonattainment area, based on data from 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 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.]

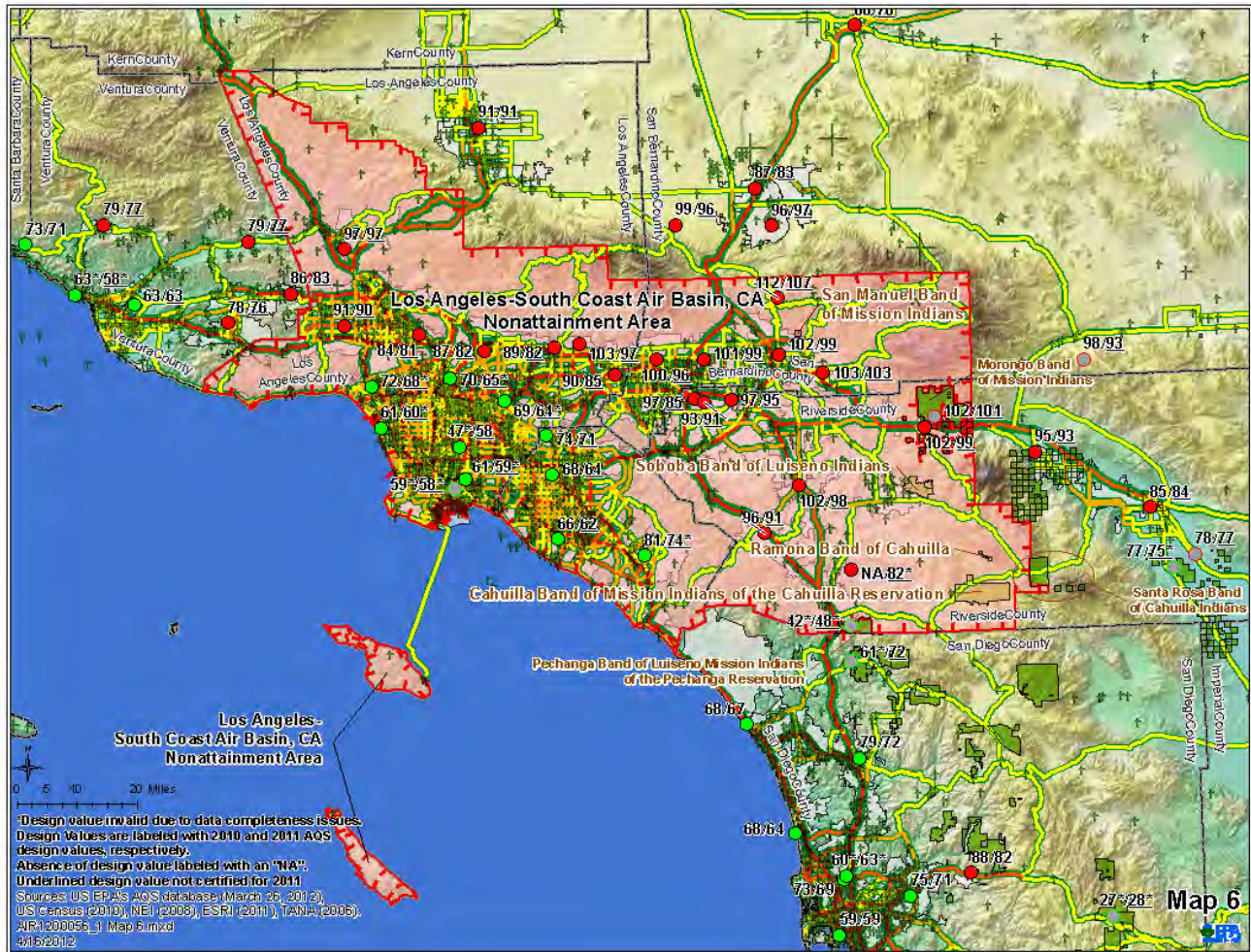
The existing Los Angeles-South Coast Air Basin nonattainment area comprises the entirety of Orange County, the southwestern portion of Los Angeles County, the southwest portion of San Bernardino County, and the western portion of Riverside County (see Map 6a in Appendix 2). The 2010 DVs for the ozone NAAQS for counties in the existing Los Angeles-South Coast Air Basin nonattainment area are shown in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Los Angeles, CA	Yes	103
Orange, CA	Yes	81
Riverside, CA	Yes (partial)	102
San Bernardino, CA	Yes (partial)	112

Ozone monitors relevant for comparison to the NAAQS and information from additional data sources within the existing Los Angeles-South Coast Air Basin nonattainment area are shown in Appendix 1, Map 6. California's ozone season encompasses the entire year. Certified, quality assured data are available in EPA's Air Quality System (AQS) for all areas through calendar year 2010. Map 6 in Appendix 1 includes preliminary 2011 DVs for the existing Los Angeles-South Coast Air Basin nonattainment area for informational purposes only. For each monitor, Appendix 1 lists the monitor, the 2008-2010 DV (certified and quality assured in AQS) and the 2009-2011 DV (data that are not yet certified and quality assured in AQS are denoted with an underline). Absence of a DV is symbolized with an "x".

Appendix 3 lists the DVs for monitors in the existing Los Angeles-South Coast Air Basin nonattainment area. Monitors shown in bold are the DV monitors (i.e., the monitor with the highest DV) for each individual county. Monitors shown in red font are the DV monitor for the nonattainment area. Values with an asterisk do not meet data completeness, and therefore those DVs are not relevant for comparison to the NAAQS and are solely provided for informational purposes.



From Appendix 1, Map 6: For map legend describing monitors, emissions, traffic, population, and boundaries, see Appendix 1.

Monitors in the existing Los Angeles-South Coast Air Basin nonattainment area (which includes the counties listed in Table 1 above) show violations of the 2008 8-hour ozone standard based on 2008-2010 data. Based on 2008-2010 data, each of the counties or partial counties included in the existing Los Angeles-South Coast Air Basin nonattainment area has one or more violating monitors. Therefore, these areas are included in the 2008 ozone NAAQS Los Angeles-South Coast Air Basin 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 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. Table 3 shows emissions of NO_x and VOC (given in tons per year) from stationary sources for violating and nearby counties that we considered for inclusion in the Los Angeles-South Coast Air Basin area.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment?	NO _x (tpy)	VOC (tpy)
Los Angeles, CA	Yes	219,340	124,133
Orange, CA	Yes	50,397	45,390
Riverside, CA	Yes (partial)	54,727	28,934
San Bernardino, CA	Yes (partial)	99,779	43,359
	Areawide:	424,243	241,815

The ozone precursor emissions listed for the four counties that EPA is designating nonattainment (either in whole or in part) are clearly at elevated levels and are contributing to monitored violations in the South Coast Air Basin.

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)
Los Angeles	Yes	9,818,605	2.40	274,493	+3%
Orange	Yes	3,010,232	3.76	153,314	+5%
Riverside	Yes (partial)	2,189,641	0.30	630,364	+40%
San Bernardino	Yes (partial)	2,035,210	0.10	316,535	+18%
Areawide:		17,053,688	0.53	1,374,706	+9%

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_GCTP_L2.STO5&prodType=table)

All four counties are highly populated, among the highest populated counties in the nation. In addition, the populations of all four counties are growing. Riverside and San Bernardino counties are among the fastest growing counties in the nation.

Maps 6 and 6a in Appendices 1 and 2, respectively, show the population in the nonattainment area. The largest population centers are included within the nonattainment area. The area is part of a larger combined statistical area (CSA) (see Factor 5). Other portions of the CSA are largely nonattainment and a discussion of each individual area can be found in this California TSD, under the technical analyses sections for the Ventura County, Los Angeles-San Bernardino Counties (West Mojave Desert) and Riverside County (Coachella Valley) nonattainment areas.

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 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 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.

Table 5. Traffic and Commuting Patterns.

County	State Recommended Nonattainment?	2008 VMT* (million miles)
Los Angeles	Yes	78,315
Orange	Yes	22,681
Riverside	Yes (partial)	21,704
San Bernardino	Yes (partial)	20,229
Areawide:		142,929

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

As shown in Table 5, Los Angeles County has the highest levels of VMT, while VMT levels from Orange, Riverside, and San Bernardino Counties are similar.

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. EPA reviewed the “Final 2007 Air Quality Management Plan” for the South Coast Air Basin, the modeling protocol for that plan, and the wind frequency distribution of wind direction data based on an average of 30 years of National Weather Service information for the months of June, July, and August.

The “Final 2007 Air Quality Management Plan” provides a general discussion of how meteorological conditions would affect the fate and transport of precursor emissions contributing to ozone formation. This discussion is included below:²

“The topography and climate of Southern California combine to make the Basin an area of high air pollution potential. During the summer months, a warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean’s surface and the lowest layer of the atmosphere. The warm upper layer forms a cap over the cool marine layer and inhibits the pollutants in the marine layer from dispersing upward. In addition, light winds during the summer further limit ventilation. Furthermore, sunlight triggers the photochemical reactions which produce ozone. The region experiences more days of sunlight than any other major urban area in the nation except Phoenix.

The Basin’s severe air pollution problem is a consequence of the combination of emissions from the nation’s second largest urban area and meteorological conditions which are adverse to the dispersion of those emissions.³ The average wind speed for Los Angeles is the lowest of the nation’s ten largest urban areas. In addition, the summertime maximum mixing height (an index of how well pollutants can be dispersed vertically in the atmosphere) in Southern California averages the lowest in the U.S. The Southern California area is also an area with abundant sunshine, which drives the photochemical reactions which form pollutants such as ozone. In the Basin, high concentrations of ozone are normally recorded during the spring and summer months.”

² P. 1-3 “Final 2007 Air Quality Management Plan.” South Coast Air Quality Management District, June 2007. http://www.aqmd.gov/aqmp/07aqmp/aqmp/Chapter_1.pdf

³ P. 2-3, Final 2007 Air Quality Management Plan. South Coast Air Quality Management District. <http://www.aqmd.gov/aqmp/07aqmp/index.html>

The meteorological conditions that would affect the fate and transport of precursor emissions contributing to ozone formation are discussed in greater detail in the “Final 2007 Air Quality Management Plan,” Appendix V, Modeling and Attainment Demonstrations, which provides a conceptual model of an eight-hour ozone episode.⁴

“Conceptual Model of an 8-Hour Ozone Episode

In general, elevated concentrations of ozone (both 1- and 8-hour average) occur under a west coast or Four Corners ridge of high pressure aloft. Typically, the 500 mb [millibars] pressure surface heights above mean sea level (msl) exceed 5880 m and generate a strong low level subsidence inversion (10° C in strength or higher). The surface pressure gradient (i.e. wind forcing) typically is less than 5 mb between the coast and the desert (approximately 200 km in distance) and days often begin with a deck of morning coastal stratus that extends into the near valleys then burns off in the late morning hours. The more severe episodes tend to have neutral to slightly off shore pressure gradient forcing and clear skies.

Figure V-4-3 illustrates the 500 mb upper air structure over the west coast during the July 2005 meteorological episode. Figure V-4-4 provides the 1200 UTC (4:00 am PST) temperature profile for July 16, 2005.

⁴ V-4-12-14, Final 2007 Air Quality Management Plan, Appendix V: Modeling And Attainment Demonstrations. South Coast Air Quality Management District. <http://www.aqmd.gov/aqmp/07aqmp/index.html>

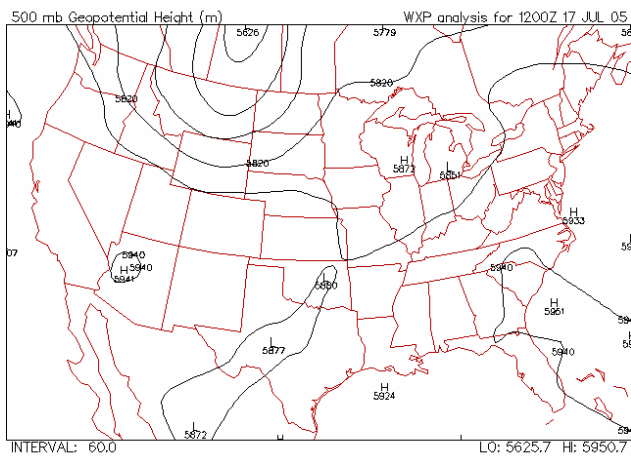
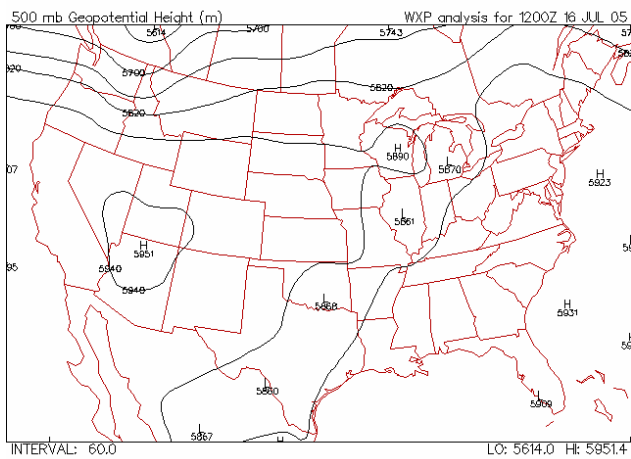
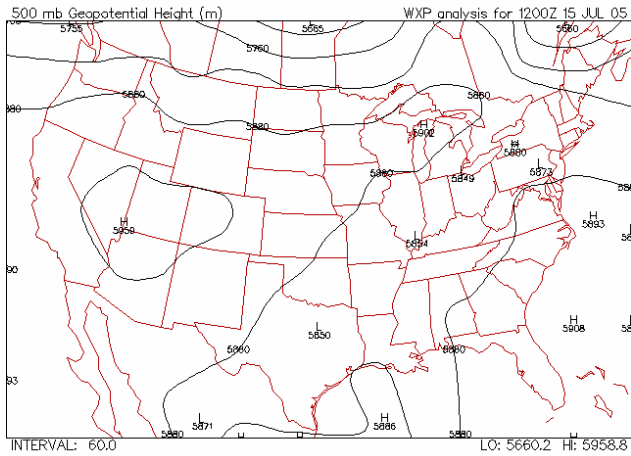


Figure 2: From FIGURE V-4-3⁵ : 500 mb Upper Air Structure: July 2005 Meteorological Episode

⁵ P. V-4-13 Final 2007 Air Quality Management Plan, Appendix V: Modeling And Attainment Demonstrations. South Coast Air Quality Management District. <http://www.aqmd.gov/aqmp/07aqmp/index.html>

Synoptic forcing and mesoscale flow characteristics can sometimes result in eddy circulations. In the SCOS97 domain two key eddy features are prevalent: the Catalina Eddy (named since its center is often near Santa Catalina Island), and the Gaviota Eddy in the Santa Barbara Channel (Smith, et. al., 1984).⁷ Both eddy circulations are important transport mechanisms; they are capable of transporting precursors and aged ozone concentrations onshore and northward to Santa Clarita and sometimes Ventura and Santa Barbara Counties. Exceedances of the ozone standards are often observed with the presence of an eddy circulation and the deep [sic] of the marine layer that accompanies a mature coastal eddy can end an ozone episode. The timing of the onset, persistence, and spatial extent of eddy circulations, are a critical part of the windfield validation.

Land/sea breeze circulations are another important flow feature. The sea breeze is one method whereby pollutants generated in the Los Angeles Basin are transported eastward. That is, the strength of the sea breeze will determine how far precursors and ozone generated near the coast will be transported inland.”

In addition, EPA reviewed the wind frequency distribution of wind direction data in Figure 4, below. The figure is based on an average of 30 years of National Weather Service information for the months of June, July, and August. The prevailing winds during the ozone season have a strong westerly component.

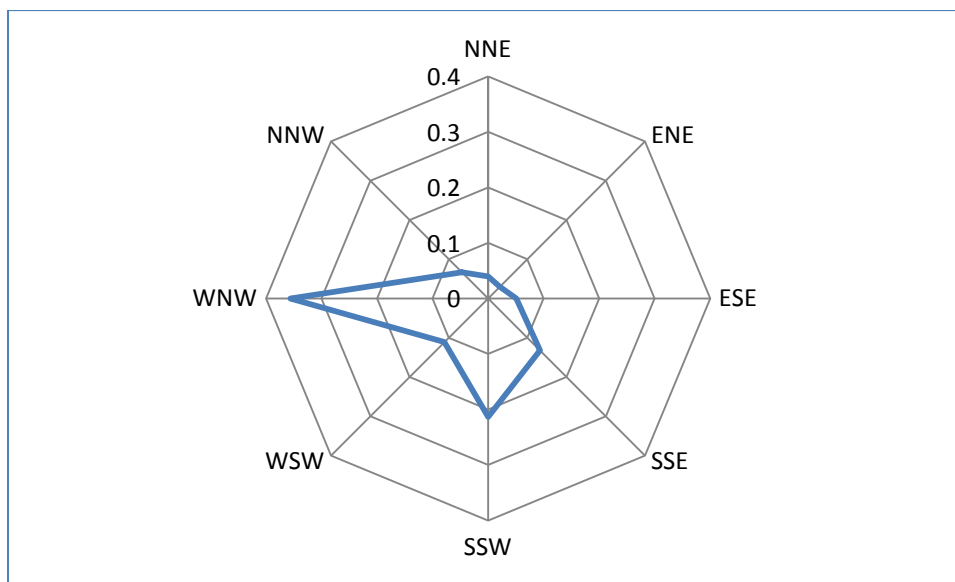


Figure 4: South Coast - Summer Wind Frequency Distribution

⁷ P. 53, *Draft Modeling Protocol For Ozone And Particulate Matter Modeling In Support Of The South Coast Air Quality Management District 2007 Air Quality Management Plan Update, Draft Report*, May 9, 2006.

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 Los Angeles County, South Coast Air Basin Area is shown in Appendix 1, Map 6a.

South Coast Air Quality Management District's (SCAQMD's) "Final 2007 Air Quality Management Plan" provides a description of the South Coast Air Basin.⁸

"The Basin, which is a subregion of the SCAQMD's jurisdiction, is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. It includes all of Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino counties."

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, Reservation boundaries, 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 Los Angeles-South Coast Air Basin area ("South Coast") has previously established nonattainment boundaries associated with both the 1-hour and 1997 8-hour ozone NAAQS. The state recommended the same boundary for the 2008 ozone NAAQS. For the 1-hour ozone NAAQS, South Coast was nonattainment. For the 1997 ozone NAAQS, South Coast was designated nonattainment in 2004. For the 2008 ozone NAAQS, EPA is designating the same area as the Los Angeles-South Coast nonattainment area.

South Coast comprises a large western portion of the larger Los Angeles-Long Beach-Riverside combined statistical area (CSA). The CSA includes the entirety of Los Angeles, Orange, San Bernardino and Riverside counties, while the South Coast nonattainment area includes only portions of these counties. However, the adjacent portions of these counties are also being designated as separate nonattainment areas for the 2008 ozone NAAQS (Riverside County (Coachella Valley) and Los Angeles-San Bernardino (West Mojave Desert)). Ventura County is also part of the CSA. EPA is designating Ventura County (continental portion) as a separate nonattainment.

The South Coast Air Quality Management District has jurisdiction over air quality planning in the Los Angeles-South Coast Air Basin nonattainment area. The district also has jurisdiction over the adjacent Coachella Valley (the Riverside County portion of the Salton Sea Air Basin). Transportation planning is performed by the South Coast Association of Governments (SCAG), whose jurisdictional coverage is equal to the CSA.

⁸ P. 1-2 Final 2007 Air Quality Management Plan.

The Los Angeles-South Coast Air Basin nonattainment area also includes portions 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 designating the following counties and partial counties as part of the Los Angeles-South Coast Air Basin, CA nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Orange County, San Bernardino County (partial), Riverside County (partial), and Los Angeles County (partial). This nonattainment area also includes areas of Indian country of four federally recognized tribes.

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 the Los Angeles-South Coast Air Basin nonattainment area (which includes the counties listed in Table 1 above) show a violation of the 2008 8-hour ozone standard based on 2008-2010 data. Therefore, Factor 1 supports designating these counties or partial 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 nonattainment boundaries recommended by the state. EPA concurs with the state’s recommendation and notes that these boundaries are consistent with the boundaries from the existing 1997 8-hour ozone nonattainment area. Neighboring areas that may receive pollutant transport from the Los Angeles-South Coast Air Basin are also being designated separate nonattainment areas.

EPA is including areas of Indian country of the following tribes as part of the Los Angeles-South Coast Air Basin, CA nonattainment area for the 2008 ozone NAAQS: Cahuilla Band of Mission Indians of the Cahuilla Reservation, Ramona Band of Cahuilla, San Manuel Band of Mission Indians, and Soboba Band of Luiseno Indians. This nonattainment area previously included all or part of the Morongo Band of Mission Indians (Morongo), the Pechanga Band of Luiseño Mission Indians (Pechanga), and the Santa Rosa Band of Cahuilla Indians (Santa Rosa Cahuilla). For the 2008 ozone NAAQS, EPA is designating Morongo and Pechanga as separate nonattainment areas, the Morongo Band of Mission Indians nonattainment area (Morongo Tribe nonattainment area) and the Pechanga Band of Luiseño Mission Indians nonattainment area (Pechanga Tribe nonattainment area); Santa Rosa Cahuilla is included only in the Riverside County (Coachella Valley) nonattainment area. For more information, see the Technical Analysis sections for Morongo, Pechanga, and Riverside County (Coachella Valley) within the Technical Support Document for California.