UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

August 21, 2008

Jessica Tavares
Chairperson
United Auburn Indian Community
575 Menlo Drive Suite 2
Rocklin, CA 95765

Dear Chairperson Tavares:

This letter provides information on the status of fine particle ($PM_{2.5}$) air pollution in the area where your reservation is located. $PM_{2.5}$ pollution represents one of the most significant barriers to clean air facing us today. Health studies link these tiny particles – about $1/30^{th}$ the diameter of a human hair – to serious human health problems including aggravated asthma, increased respiratory symptoms such as coughing and difficult or painful breathing, chronic bronchitis, decreased lung function, and even premature death in people with heart and lung disease. $PM_{2.5}$ pollution can remain suspended in the air for long periods of time and create public health problems far away from emission sources. Reducing levels of $PM_{2.5}$ pollution is an important part of our commitment to clean, healthy air.

Your reservation is located in an area that EPA is proposing to designate as nonattainment for the 2006 $PM_{2.5}$ air quality standard. Consistent with section 107(d) (1) of the Clean Air Act, this letter is to inform you that EPA intends to designate your reservation as nonattainment for the 2006 $PM_{2.5}$ health standard. We also intend to provide copies of this letter to Tribal Environmental Directors along with a copy of our supporting analysis for your reference. This analysis describes EPA's review of the air quality data, emissions data, and other related information for the area surrounding your reservation. If you would like to provide additional information about the $PM_{2.5}$ status of your reservation or adjoining areas for our consideration, please send it to us by October 20, 2008.

EPA has taken steps to reduce fine particle pollution across the country, such as implementing the Clean Diesel Program, which has reduced emissions from highway, non-road and stationary diesel engines. In addition, implementation plans developed by the state to attain the 1997 $PM_{2.5}$ standards will also help reduce unhealthy levels of fine particle pollution.

We intend to make final designation decisions for the 2006 24-hour $PM_{2.5}$ standards by December 18, 2008. If you have any questions, please do not hesitate to have your staff contact Colleen McKaughan at 520-498-0118. We look forward to a continued dialogue with you as we work together to implement the $PM_{2.5}$ standards.

Sincerely,

Wayne Nastri
Regional Administrator

Enclosure

cc: Shelley McGuinnes, Environmental Director

Attachment 1

CALIFORNIA
Area Designations For the
24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in California that EPA intends to designate as not attaining the 2006 24-hour fine particle ($PM_{2.5}$) standard.[1] A county will be designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	California Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Butte County	Butte County - Partial	Butte County
Imperial County	Imperial County - Partial	Imperial County
Sacramento County	Sacramento County	Sacramento County Yolo County Placer County – Partial El Dorado County – Partial Solano County - Partial
San Francisco Bay Area	Sonoma County – Partial Napa County Marin County San Francisco County Contra Costa County Alameda County Santa Clara County San Mateo County Solano County - Partial	Sonoma County – Partial Napa County Marin County San Francisco County Contra Costa County Alameda County Santa Clara County San Mateo County Solano County - Partial
San Joaquin Valley Air Basin	San Joaquin County Stanislaus County Merced County Madera County Fresno County Kings County Tulare County Kern County - Partial	San Joaquin County Stanislaus County Merced County Madera County Fresno County Kings County Tulare County Kern County - Partial
South Coast Air Basin	Los Angeles County – Partial San Bernardino County Partial Riverside County – Partial Orange County	Los Angeles County – Partial San Bernardino County Partial Riverside County – Partial Orange County
Yuba County Sutter County	Yuba County – Partial Sutter County - Partial	Yuba County Sutter County

EPA intends to designate the remaining counties in the state as attainment/unclassifiable.

[1] EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour $PM_{2.5}$ standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for PM2.5 remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

EPA Technical Analysis for Sacramento

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Sacramento area identifies the counties with monitors that violate the 24-hour $PM_{2.5}$ standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1 is a map of the counties in the area and other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State.

Sacramento and five surrounding counties comprise an existing 8-hour ozone nonattainment area. The State of California did not recommend that the boundaries of the $PM_{2.5}$ nonattainment area coincide with the existing nonattainment boundaries. Rather, the State of California recommended that only Sacramento County be designated as nonattainment for PM 2.5 (see Figure 1.)

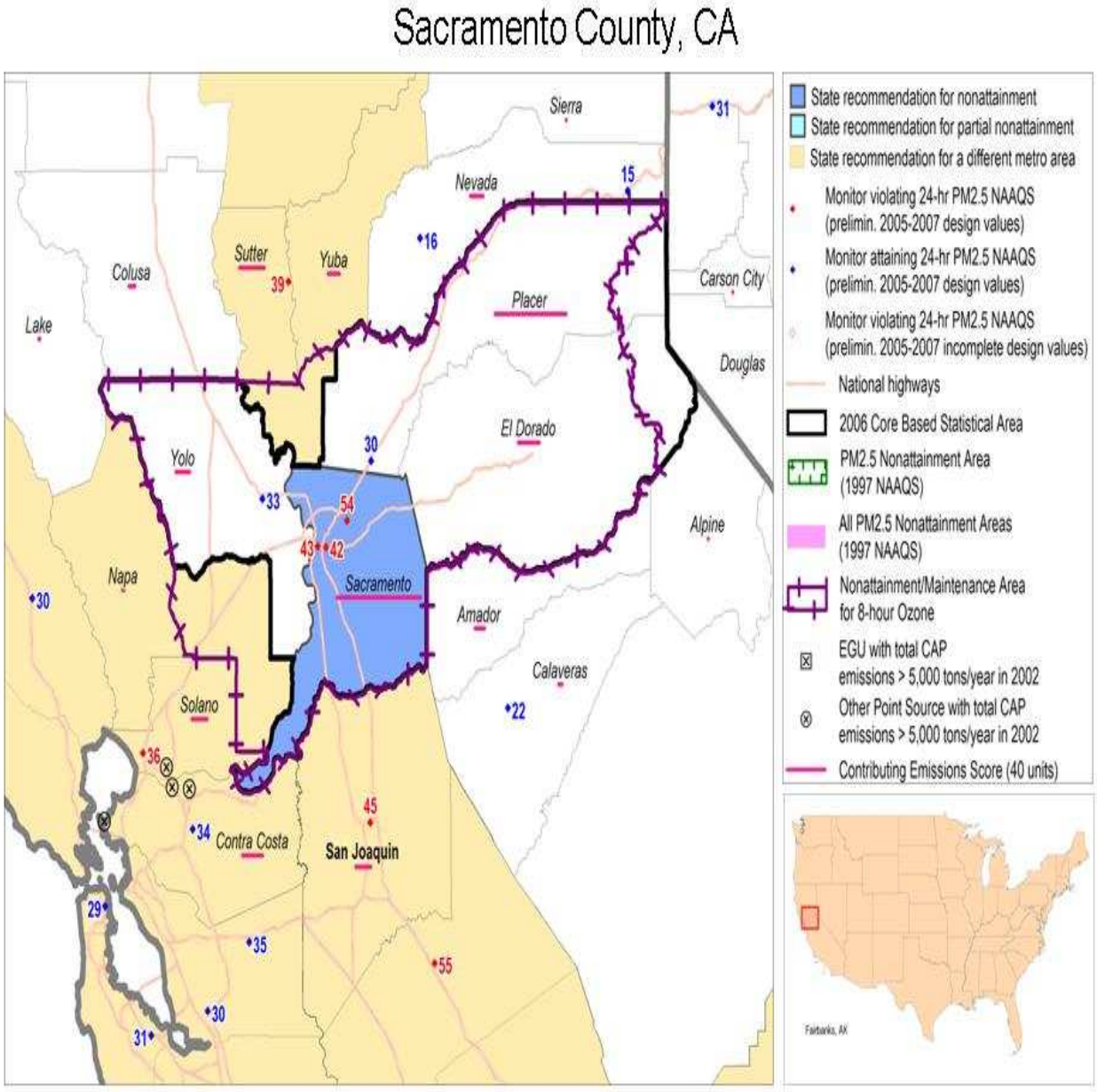


Figure 1

Counties labeled in bold reflect NAAs under 1997 NAAQS

The California Air Resources Board (CARB) sent a letter to EPA, dated December 17, 2007, recommending that Sacramento County be designated as "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard based on the most recent three years of air quality data that were available in December 2007, for 2004 – 2006. These data are from Federal Reference Method (FRM) and Federal Equivalent (FEM) monitors within the State.

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network, as well as from monitoring sites in Sacramento County. Analysis of the Sacramento data indicates that the days with the highest fine particle concentrations occur predominantly in the winter, and the average chemical composition of the highest days is typically characterized by high levels of organic carbon (48% to 57%) nitrate (23% to 42%), and sulfate (3%).

Based on EPA's 9-factor analysis described below, EPA recommends that all of Sacramento and Yolo Counties and parts of Placer, El Dorado and Solano Counties should be designated nonattainment for the 24-hour $PM_{2.5}$ air-quality standard as part of the Sacramento nonattainment area, based upon currently available information. These counties are listed in the table below.

Area	**State-Recommended Nonattainment Counties**	**EPA-Proposed Nonattainment Counties**
Sacramento County	Sacramento County	Sacramento, Yolo, El Dorado (P), Placer(P), and Solano (P) Counties
P = Partial		

The following is a summary of the 9-factor analysis for the Sacramento Nonattainment Area.

Several factors led EPA to recommend a significantly larger $PM_{2.5}$ nonattainment area than recommended by California. The most important consideration was that the recommended boundary does not include the population that would be exposed to high levels of $PM_{2.5}$ represented by the Sacramento design value, nor does it address transport that can occur from traffic and other sources within the relatively flat, valley floor of the Sacramento Valley. In addition, the State relied on future mobile source controls at a statewide level to address NOx emissions and, therefore, discounted mobile sources as an important consideration in their analysis. EPA believes that there is a significant contribution from mobile sources, both commuting and commercial truck traffic, in the Sacramento area.

The 24-hour $PM_{2.5}$ nonattainment area EPA recommends for Sacramento is largely consistent with the existing 8-hour ozone nonattainment area which encompasses all of Sacramento and Yolo Counties, and parts of El Dorado, Placer, and Solano Counties, as well as part of Sutter County (see Figure 1). Sutter and Yuba Counties were not recommended as part of the Sacramento nonattainment area since they are part of a separate and distinct $PM_{2.5}$ nonattainment area associated with the State's recommendation to designate Yuba City and Marysville as a nonattainment area. All of Solano County is proposed as a nonattainment area but the county is split between two different nonattainment areas, the San Francisco Bay Area and Sacramento. The western half of Solano County was included in the State's recommendation for the San

Francisco Bay Area's 9-county nonattainment area and, therefore, only the eastern half of Solano County is included in the Sacramento nonattainment area.

EPA recommends that parts of El Dorado and Placer Counties be included in the Sacramento $PM_{2.5}$ nonattainment area. The suggested partial boundaries are consistent with the existing 8-houe ozone boundary and reflect the existing mountain ridgeline to the east, as explained in Factors 2 and 7.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other", "primary sulfate (SO_4)", and "primary nitrate". (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_x, are part of "$PM_{2.5}$ emissions total," they are not shown on Table 1 as separate items). "$PM_{2.5}$ emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "$PM_{2.5}$ emissions other" represents other inorganic particles (crustal). Emissions of SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) are also potential $PM_{2.5}$ precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Sacramento area.

Table 1. $PM_{2.5}$ Related Emissions (tpy) and Contributing Emission Score									
County	**State Recommended Nonattainment?**	**CES**	**$PM_{2.5}$ emission Total**	**$PM_{2.5}$ Emission Carbon**	**$PM_{2.5}$ emission Other**	**SO_2**	**NOx**	**VOCs**	**NH_3**
Sacramento	Yes	100	4,240	2,255	1,985	3,307	33,183	26,828	5,786
Placer	No	85	2,310	1,329	982	915	11,595	10,528	862
El Dorado	No	25	2,784	1,668	1,116	513	4,831	8,369	430
Yolo	No	16	2,014	818	1,196	585	11,101	6,537	2,099
Solano	No	73[a]	1,750	834	915	8,335	15,009	12,093	1,579
Source: 2005 National Emissions Inventory Note: CES is based on Solano County contributing to PM2.5 levels in the Bay Area and not Sacramento.									

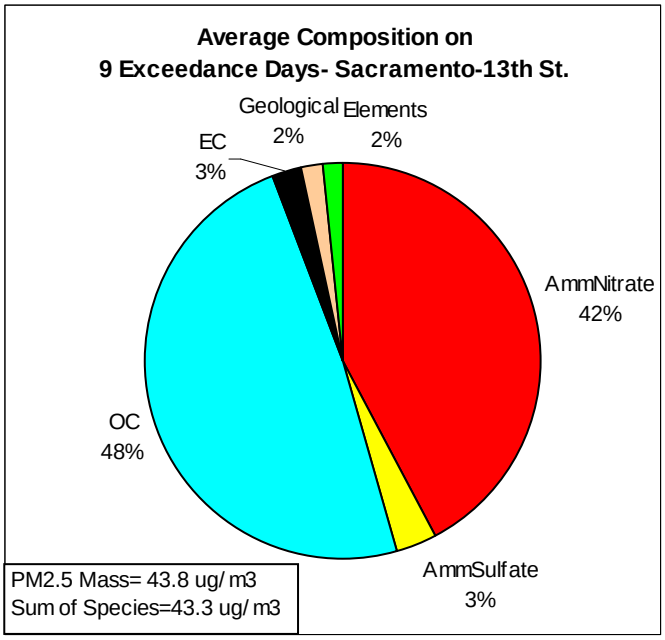
Additional data considered in EPA's analysis of this factor are summarized in the following table derived from the California Air Resources Board Almanac of Emissions and Air Quality Data (http://www.arb.ca.gov/Aqd/almanac/almanac.htm). Table 2 further defines, in tons per day, the type of area sources contributing to $PM_{2.5}$ emissions in Sacramento and the surrounding counties. Area sources include residential fuel combustion, farming operations, construction/demolition, paved road dust, unpaved road dust, fugitive windblown dust, fires, managed burning and disposal and cooking. In each of the counties, area sources represent the largest percentage of primary $PM_{2.5}$ emissions (e.g., > 70%) and the balance is divided between stationary and mobile sources.

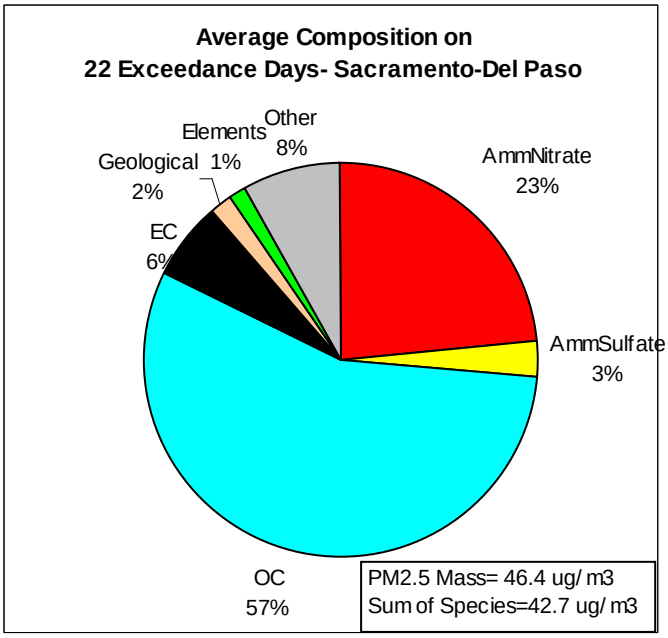
Table 2. Area Source $PM_{2.5}$ Emissions (Tons per day)					
Area Sources	**Sacramento**	**Placer**	**El Dorado**	**Yolo**	**Solano**
Residential Fuel Combustion	4.86	3.64	5.34	0.55	1.26
Farming Operations	0.32	0.08	0	0.92	0.64
Construction/Demolition	0.75	0.45	0.11	0.96	0.29
Paved Road Dust	2.31	0.86	0.68	0.41	0.85
Unpaved Road Dust	0.74	0.61	0.87	0.22	0.22
Fugitive Windblown Dust	0.07	0.02	0.02	0.58	0.48
Fires	0.05	0	0	0.01	0.01
Managed Burning & Disposal	0.33	1.37	0.23	0.34	0.33
Cooking	0.58	0.06	0.05	0.04	0.11
Total Area Wide	10.02	7.11	7.29	4.01	4.22
Grand Total of All PM2.5	13.94	9.33	8.10	6.41	7.18
% Area Wide to Total $PM_{2.5}$	**72%**	**76%**	**90%**	**63%**	**59%**
Source: ARB Almanac website (2006) http://www.arb.ca.gov/ei/maps/statemap/cntymap.htm					

Given the significance of NOx emissions in the formation of the $PM_{2.5}$, EPA also considered emissions provided in the CARB Recommendation letter under this factor, along with the NOx data from NEI summarized in Table 1. Table 3 summarizes NOx emissions from stationary, area, and mobile source categories for 2006, 2010, and 2020.

Table 3. NOx Winter Emissions for Sacramento and Surrounding Counties (tons per day)			
Sacramento County	**2006**	**2010**	**2020**
Stationary Sources	3.9	3.9	4.3
Area Sources	4.0	4.0	4.1
Mobile Sources	75.1	62.5	34.5
Placer County			
Stationary Sources	4.5	4.7	5.1
Area Sources	1.6	1.6	1.6
Mobile Sources	28.2	23.4	13.7
El Dorado County			
Stationary Sources	0.4	0.4	0.4
Area Sources	1.3	1.3	1.4
Mobile Sources	8.8	7.4	4.3
Yolo County			
Stationary Sources	3.0	2.9	2.8
Area Sources	0.7	0.7	0.7
Mobile Sources	21.3	17.3	9.9
Solano County			
Stationary Sources	6.3	6.5	7.1
Area Sources	1.6	1.7	1.7
Mobile Sources	42.4	36.0	21.8
Source: California Air Resources Board in their letter of December 17, 2007 Note: Although provided by CARB, the 2010 and 2020 data was not relied on for this analysis.			

Finally, speciation data from the Sacramento air monitoring stations (i.e., Del Paso and 13th Street) were considered in evaluating this factor as a way to link emission sources to high $PM_{2.5}$ levels. As shown in the pie charts below, the chemical makeup of PM2.5 in Sacramento is dominated by organic carbon and ammonium nitrate when the highest concentrations occur, which is during the winter months (i.e., November through February).





Source: California Air Resources Board, 2007. Figure 2

The CES shown in Table 1 describe the relative contribution of emissions from surrounding counties to the high emission days based on a broad analysis of NOAA HYSPLIT trajectories linking county-wide emissions from Sacramento and the surrounding counties and speciated air monitoring data on high days. With respect to this factor, the CES clearly demonstrates a connection between pollution levels in Sacramento County and sources in Placer County. The CES shows less of a link between Sacramento County and sources located in El Dorado, Solano and Yolo Counties. However, the scores are high enough to further consider including these counties based on emissions data and other factors.

With respect to primary $PM_{2.5}$ emissions, area sources represent the dominant source category in Sacramento and the surrounding counties. Based on Table 2, within the area source category, residential wood burning is the dominant source of $PM_{2.5}$ emissions in Sacramento, Placer, El Dorado and Solano Counties. This corresponds with the speciation data summarized in Figure 2 which shows that more than 50% of the $PM_{2.5}$ makeup is carbon which can be attributed to residential wood burning during the winter months. In Yolo County, emissions data indicates that "Construction/Demolition" and "Farming Operations" are the most significant area sources, which are not obviously linked to speciation data shown in Figure 2.

Finally, NOx emissions were considered. According to the speciation data in Figure 2, as much as 42% of the $PM_{2.5}$ composition can be nitrates and thereby related to NOx sources. Both Table 1 and 3 describe NOx emissions data for Sacramento and the surrounding counties. As shown in Table 1, Sacramento is the dominant source of NOx emissions followed by Solano, Placer, Yolo and El Dorado County. As shown in Table 3, mobile sources are the dominant source of NOx emissions in all of the counties. In light of the commuting patterns discussed under Factor 4 and illustrated in Figure 3, there appears to be a clear link between mobile source emissions in Sacramento and the surrounding counties and $PM_{2.5}$ exceedances measured in Sacramento.

In summary, $PM_{2.5}$ exceedances most often occur in Sacramento during the winter months and speciation data suggest that residential wood burning and mobile source emissions are the most important sources. Area source data for Sacramento and the surrounding counties, with exception for Yolo County, show that residential wood burning is the dominant source of $PM_{2.5}$ and thereby, could be linked to $PM_{2.5}$ exceedances measured in Sacramento. With respect to mobile sources, Sacramento and the surrounding counties have significant mobile source emissions which, combined with the commuting patterns, suggest a link between exceedances in Sacramento and mobile source emissions from the surrounding counties.

Factor 2: Air quality data

This factor considers the 24-hour $PM_{2.5}$ design values in micrograms per cubic meter ($\mu g/m^3$) derived from air-quality monitors in Sacramento and the surrounding counties for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air-quality standard. The 24-hour $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile values are $35\mu g/m^3$ or less. A design value is only valid if minimum data completeness criteria are met. The 24-hour $PM_{2.5}$ design values for Sacramento County and the other counties are shown in Table 4.

Table 4. Air Quality Data			
County	**State Recommended Nonattainment?**	**24-hour PM2.5 Design Values 2004-06 ($\mu g/m^3$)**	**24-hour PM 2.5 Design Values 2005-07 ($\mu g/m^3$)**
Sacramento County	Yes	49	54
Placer County	No	38	30
El Dorado County	No	No data	No data
Yolo County	No	30	33
Solano County (1)	No	36	36

1. The western portion of Solano County is included in the State's recommendation for the San Francisco Bay Area's nonattainment area, and is within the Bay Area Air Quality Management District. EPA is recommending that the eastern portion of Solano County be included in the Sacramento nonattainment area.

There are three monitoring sites throughout Sacramento County for $PM_{2.5}$; however, only two sites, Del Paso Manor and Stockton Boulevard, have complete data to support designations. The design value monitor in Sacramento County is based on measurements at the Del Paso Manor site.

Placer County showed a violation based on 2004 – 2006 data, but meets the standard based on 2005–2007 data. Yolo County was in attainment for both the 2004–2006 and 2005–2007 periods, although it is noted that levels appear to be increasing based on the 2005-2007 design value. Air quality data was not available for El Dorado and Solano Counties; therefore, these counties can only be assessed according to the data from surrounding counties. Based on design values, Sacramento appears to be a candidate for nonattainment area designation.

However, in addition to considering design values, EPA also considered information supplied in the CARB recommendation letter regarding the area represented by $PM_{2.5}$ air monitoring data. Two studies cited by CARB support nonattainment area boundaries that are larger than recommended. The studies were both based on data collected during the 2000 California Regional $PM_{10}/PM_{2.5}$ Air Quality Study (CRPAQS). These studies focused on the San Joaquin Valley which, together with the Sacramento Valley to the north, comprises California's Central Valley situated between the Sierra Nevada and the coastal mountain ranges. CARB cited these studies as showing that the organic carbon portion of $PM_{2.5}$ is largely urban rather than rural, because of the limited range of influence of $PM_{2.5}$ monitors (which are in urban areas). While it is likely true that organic carbon concentrations are higher in urban than in rural areas, this does not in itself support limiting nonattainment areas to city boundaries.

Range of influence (or zone or radius of representation) can be defined in various ways. In the 2006 Chow study cited by CARB, zone of representation is defined as the area over which the average concentration differs less than 10% from the monitored value and this area was estimated based on concentration differences between monitors. A rapid concentration drop from one monitor to another nearby monitor would show a small zone of representation while a slow concentration drop between distant monitors would show a large zone. The study found the radius of representation to range from 3 to 21 kilometers (km) or 2 to 13 miles and averaging 13 km (8 mi). This study included monitoring locations in the Sacramento Valley locations which were intended to describe the spatial distribution of concentrations and not to set boundaries for

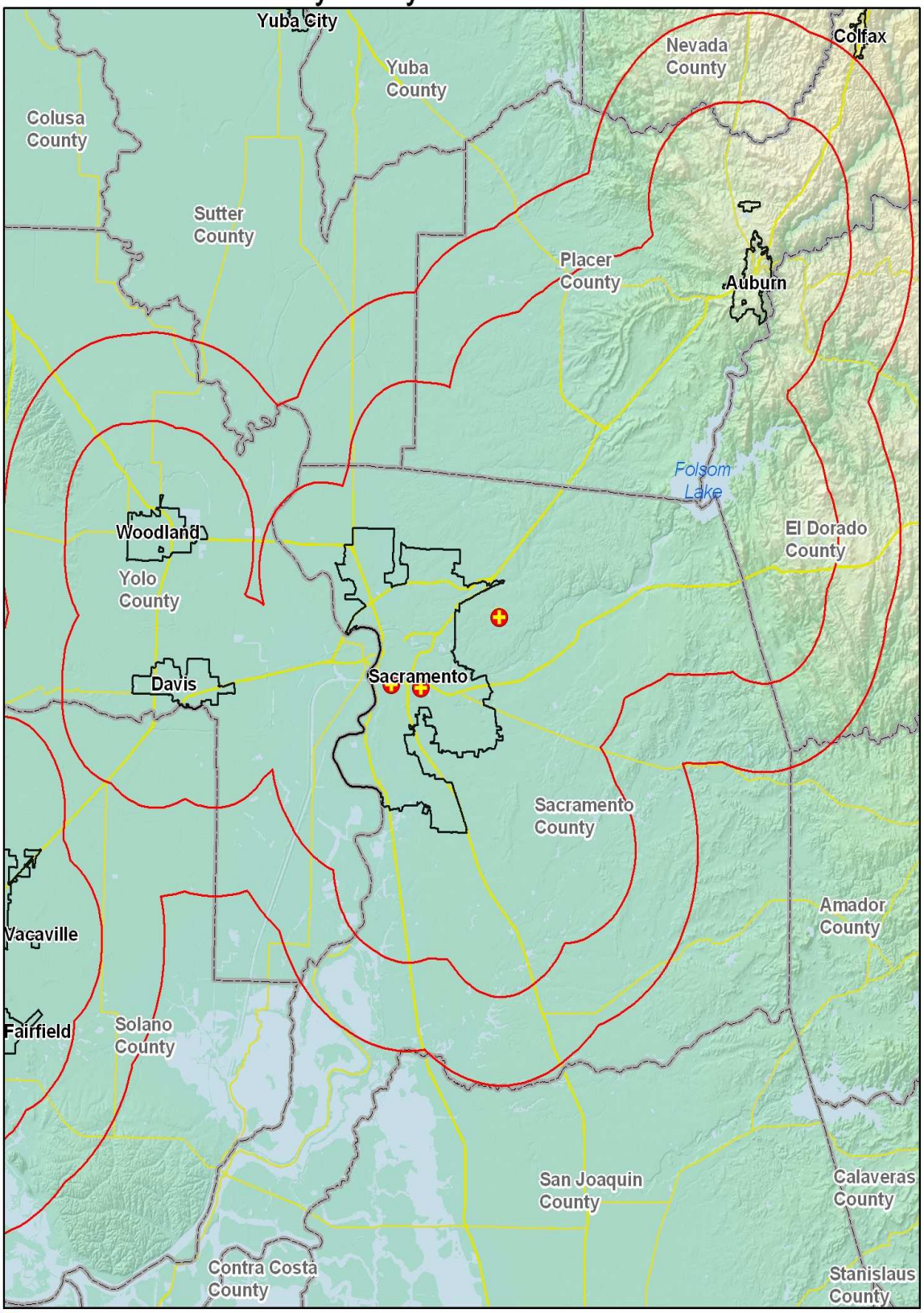
planning purposes. However, they do suggest a sense of the size of the area that is represented by a $PM_{2.5}$ air monitor.

In a second study using CRPAQS data, MacDonald et al. defined "zone of influence" as the distance at which CALPUFF-modeled concentrations fell to 1/10 of the urban maximum. This analysis showed larger regions of influence in the Sacramento area, 15-100 km (9-60 mi), than in the San Joaquin Valley, 15-50 km (9-30 mi).

Considering the results from these studies, EPA used buffer zones of 5 and 10 miles around city boundaries to approximate the area which could be influenced by $PM_{2.5}$ measurements in Sacramento, Placer and Yolo County. These boundaries are shown in Figure 3. These buffer zones support a nonattainment area designation that is larger than Sacramento County.

Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM2.5 NAAQS for designation purposes.

Sacramento Valley - City Boundaries and Buffer Zones



Violating PM 2.5 monitor
City Boundary
County Boundary
Five- and Ten- Mile Buffer

Figure 3

N

0 5 10 15 20
Miles

Sources: FHWA (2000), USGS (2000), US Census (2000), EPA (2008), Dynamap (2000)

EPA REGION 9 - AIR

AIR0801602.42 August 11, 2008

Factor 3: Population density and degree of urbanization (including commercial development)

Table 5 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 24-hour $PM_{2.5}$ standards. Population density and distribution is also illustrated in Figure 4.

Table 5. Population

County	State Recommended nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Sacramento County	Yes	1,363,423	1,370
Placer County	No	316,868	211
El Dorado County	No	176,319	99
Yolo County	No	185,091	181
Solano County (1)	No	410,786	463

Source: 2005 National Emissions Inventory

1. The western portion of Solano County is included in the State's recommendation for the San Francisco Bay Area's nonattainment area, and is within the Bay Area Air Quality Management District. EPA is recommending that eastern portion of Solano County be included in the Sacramento nonattainment area.

Sacramento County has the highest population density, followed by Placer, Yolo and El Dorado Counties. Population data are relevant in defining the boundaries of the $PM_{2.5}$ nonattainment area given the correlation between population and the emission sources contributing to $PM_{2.5}$ exceedances (i.e., residential wood burning and mobile sources), as well as the population exposed to high $PM_{2.5}$ levels. Based on this factor, EPA recommends expanding the boundaries of the nonattainment area recommended by California to capture the population associated with the Sacramento metropolitan area, which extends beyond the boundaries of Sacramento County.

Sacramento Valley

Population Density, Truck and Commuting Traffic

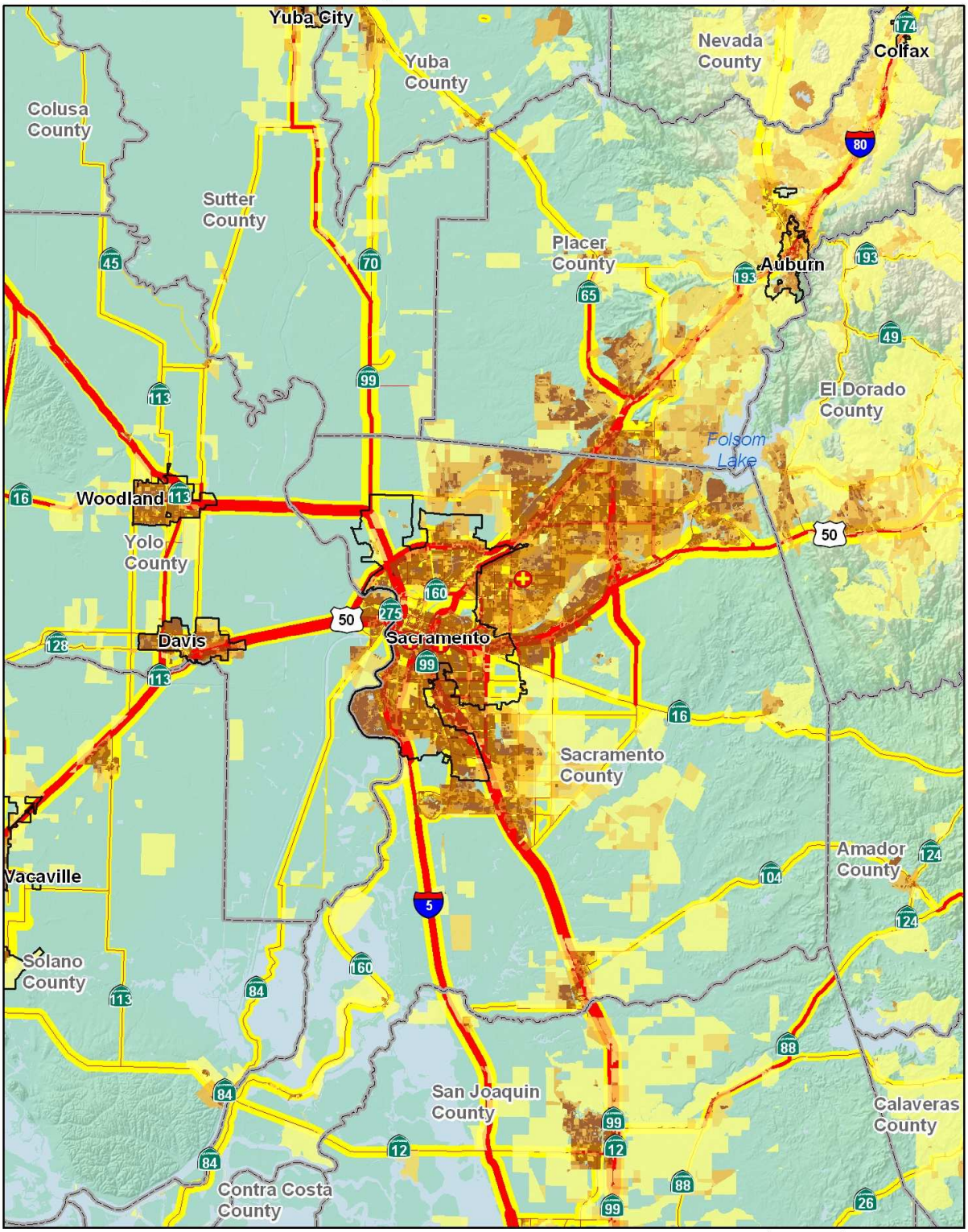


Figure 4

As illustrated in Figure 4, "Sacramento Valley – Population Density, Truck and Commuting Traffic", the populations associated with the City of Sacramento clearly extend into Placer, El Dorado, Solano, and Yolo Counties and; therefore, this factor supports expanding the nonattainment boundary to capture these surrounding populations

Factor 4: Traffic and commuting patterns

This factor considers the number of commuters in each county who drive to another county within the Sacramento County area, the percent of total commuters in each county who commute to other counties within the Sacramento area, as well as the total Vehicle Miles Traveled (VMT) for each county in thousands of miles (see Table 6). A county with numerous commuters is generally an integral part of an urban area and could be an appropriate county for implementing mobile-source emission control strategies, thus warranting inclusion in the nonattainment area. Figure 3 further illustrates the traffic and commuting patterns associated with the Sacramento metropolitan area and the surrounding counties.

Table 6

County	State Recommended Nonattainment?	2005 VMT (1000s mi)	Number Commuting to any violating counties	Percent Commuting to any violating counties
Sacramento	Yes	11,821	464,260	87%
Placer	No	3,406	36,310	37%
El Dorado	No	1,695	19,760	27%
Yolo	No	2,350	20,800	28%
Solano (1)	No	4,173	105,850	61%

1. The western portion of Solano County is included in the State's recommendation for the San Francisco Bay Area's nonattainment area, and is within the Bay Area Air Quality Management District. EPA is recommending that eastern portion of Solano County be included in the Sacramento nonattainment area.

The number of commuters into Sacramento County from Yolo, Placer, Solano, and El Dorado counties is significant. In addition to the commuter traffic, Sacramento County has a large number of highways traversing the area which carry high levels of daily truck traffic. For example, Highway 99 extends through Sacramento and Placer County. Based on 2002 transportation data, the average daily truck traffic for Highway 99 ranges from approximately 10,000 to 25,000 trucks per day. Highway 80 and Interstate 5 from the cities of Davis and Woodland in Yolo County each carry 10,001 to 25,000 trucks per day. The significance of commuting and truck traffic is illustrated in Figure 4.

Based on the number of commuters and the significant truck traffic, Sacramento, Placer, El Dorado, Solano, and Yolo Counties are considered to be contributing to $PM_{2.5}$ exceedances measured in Sacramento County.

The 2005 VMT data used for table 5 and 6 of the 9-factor analysis has been derived using methodology similar to that described in "Documentation for the final 2002 Mobile National

Emissions Inventory, Version 3, September 2007, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: atftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002_mobile_nei_version_3_report_092807.pdf. The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008.

Factor 5: Growth rates and patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled (VMT) for 1996-2005 for counties in the Sacramento area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and likely to be contributing to fine particle concentrations in the area. In addition such a county could be appropriate for implementing mobile-source and other emission-control strategies, thus warranting inclusion in the nonattainment area.
Table 7 below shows population, population growth, VMT and VMT growth for Sacramento County and counties that are adjacent to Sacramento County. Counties are listed in descending order based on VMT growth between 1996 and 2005.

Table 7. Population and VMT Values and Percent Change

County	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT	VMT % change from 1996 to 2005)
Sacramento	1,363,423	1,370	11%	11,821	22%
Placer	316,868	211	26%	3,406	20%
El Dorado	176,319	99	12%	757	23%
Yolo	185,091	181	9%	2,350	37%
Solano (1)		463	?	4,173	?

1. The western portion of Solano County is included in the State's recommendation for the San Francisco Bay Area's nonattainment area, and is within the Bay Area Air Quality Management District. EPA is recommending that eastern portion of Solano County be included in the Sacramento nonattainment area

According to Table 7, Sacramento has the highest population and population density. It is followed by Solano, then Placer, Yolo, and El Dorado. All these counties have populations that are growing with increases between 9% and 26%. According to Factor 3, most of these counties have high population densities as well. The exception is El Dorado County which has the smallest population and population density; however, El Dorado's population increased at a rate of 12% in the period between 2000-2005. Looking at VMT, all five counties had substantial increases in VMT between 1996 and 2005. Even El Dorado had an increase of 23%. The largest increase was in Yolo County with 37%.

Based on the analysis under Factor 5, the pattern indicates substantial growth in Sacramento County and the surrounding counties as the Sacramento metropolitan area expands. It appears that all five counties are part of the Sacramento metropolitan area and should be included as part of the Sacramento nonattainment area.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high days are defined as days where any FRM or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values, or where 24-hr values exceeded 35 $\mu g/m^3$.

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figure 5 identifies 24-hour $PM_{2.5}$ values by color with days exceeding 35 $\mu g/m^3$ denoted with a red or black icon. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

The pollution rose for the Sacramento County area, Figure 5, shows that the 24-hour $PM_{2.5}$ concentrations above 35 micrograms per cubic meter ($\mu g/m^{3)}$ are more likely when the prevailing wind directions are from the northwest and southeast. Additional pollution roses for the Sacramento urban area are included in Attachment 3.The pollution roses indicate the $PM_{2.5}$ level above 35 $\mu g/m^3$ generally occurred during time periods with a wind speed of 4 miles per hour or less. The pollution roses also indicate that the majority of days with high $PM_{2.5}$ in the Sacramento area are in the "cold" season.

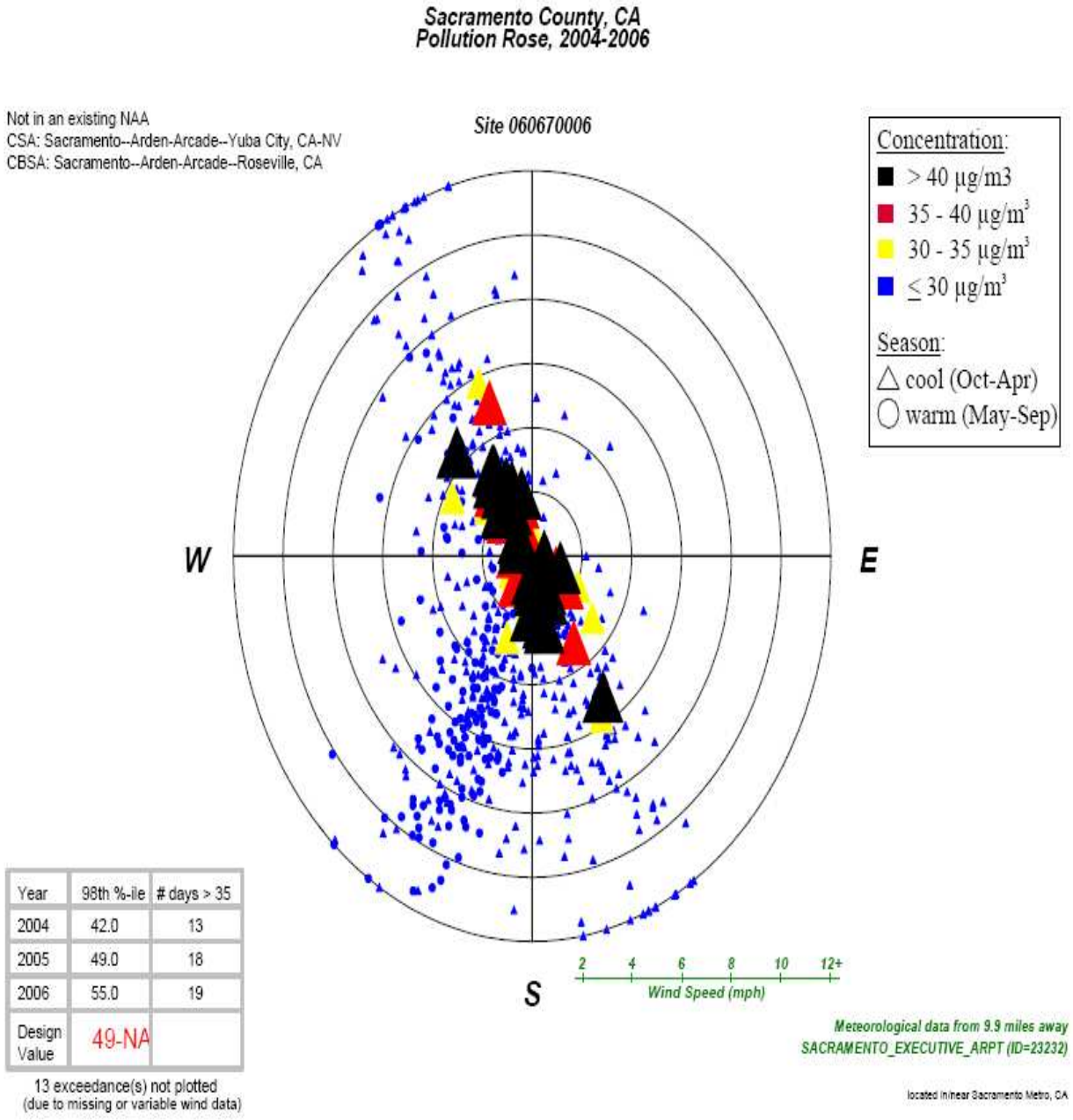


Figure 5

California's recommendation letter indicates that, "High $PM_{2.5}$ concentrations in the Sacramento area appear to be dependent upon calm-to-light winds and not as dependent on wind direction. This suggests that there is enough activity within the Sacramento area to generate high $PM_{2.5}$ concentrations under many conditions, and that high concentrations are not being caused by adjacent areas such as Placer, Sutter and Yolo Counties."

EPA concurs with California that high $PM_{2.5}$ concentrations in the Sacramento area appear to be dependent upon calm-to-light winds and are not as dependent on wind direction. While activity

in the Sacramento area may be sufficient to generate high $PM_{2.5}$ concentrations under many conditions, EPA does not agree that this indicates that adjacent areas do not contribute to high concentrations in the Sacramento area.

The meteorology factor is also considered in each county's Contributing Emissions Score because the method for deriving this metric included an analysis of trajectories of air masses for high $PM_{2.5}$ days. The Contributing Emissions Scores CES (Table 1) indicate that during days with high levels of $PM_{2.5}$ (winter days with calm-to-light winds), back trajectories show that nearby counties have the potential to contribute to high concentrations in the Sacramento area.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the airshed and, therefore, on the distribution of $PM_{2.5}$ within Sacramento County, and the surrounding area.

Sacramento County is bounded by the Sierra Nevada foothills to the northeast and the Sacramento-San Joaquin River Delta to the southwest. The lower Sacramento Valley extends through the western and central portions of the County. Elevations range from sea level in the southwest to approximately 400 feet above sea level in the eastern areas of the County. There are no distinguishing topographic features that would exclude any part of the Yolo or Solano counties. However, the eastern portions of Placer and El Dorado County counties extend beyond the ridge of the Sierra Nevada Mountains.

Because the Sacramento area has topographical features higher than the typical daytime height of the inversion layer, EPA considered the inversion height, as well as using the top of the mountain or ridgeline, to estimate the size of the area likely to have similar pollution conditions, and to determine an appropriate eastern boundary.

For the areas under consideration, high $PM_{2.5}$ concentrations mostly occur during stagnant conditions during winter, with radiant inversions. The cooling of the ground, as heat is radiated away creates an inversion, since air near the ground is cooler than that above. This inhibits mixing and confines pollutants to a relatively shallow layer near the ground. Ferreria and Shipp examined the meteorology of San Joaquin Valley $PM_{2.5}$ and PM10 episodes, including inversion heights, typically based on aircraft temperature soundings. (During CRPAQS, radio acoustic sounding system (RASS) data were also available.) A typical value for maximum mixing height during high $PM_{2.5}$ conditions is 500 meters. Minimum mixing height can be 100 meters or less. To get a sense of the eastern edge of the area in which pollution could be confined by winter inversions, EPA examined the Sierra Foothills elevation contour that is 1500 feet above the Sacramento City center. This contour is represented in Figure 6.

EPA recognizes that an inversion height is not a rigid boundary extending through a fixed elevation. In reality the inversion would be partly terrain-following, and the degree of stagnation would be subject to additional influences at the foothill edges, such as strong diurnal slope flows. In any case, the mixing heights vary substantially by site and date, so any single height can provide only a scale for comparison, not a definitive value. Nevertheless, this contour gives a

rough sense of the area over which inversions may be enhancing pollution concentrations. The crest of the Sierra Nevada range is a more substantial barrier to pollution flow out of Sacramento Valley than any specific contour height, which only roughly gives the edge of the valley inversion.

In summary, topography is considered to be an important factor given that inversion layers during the winter when $PM_{2.5}$ exceedances typically occur, can contribute to higher pollution levels in the Sacramento Valley. In addition to affecting Sacramento County, these inversions also affect Yolo, Solano, Placer and El Dorado County. With respect to Yolo and Solano County, the entire area is within the Sacramento Valley and thereby influenced by winter-time inversion layers. Placer and El Dorado County are partly within the Sacramento Valley and, as shown in Figure 6, partly influenced by the inversion layer. In order to fully capture the extent to which Placer and El Dorado County could be affected by the inversion layer, EPA is proposing the crest of the Sierra Nevada Mountains as the eastern boundary of the nonattainment area.

Factor 8: Jurisdictional boundaries (e.g., existing PM and ozone areas)

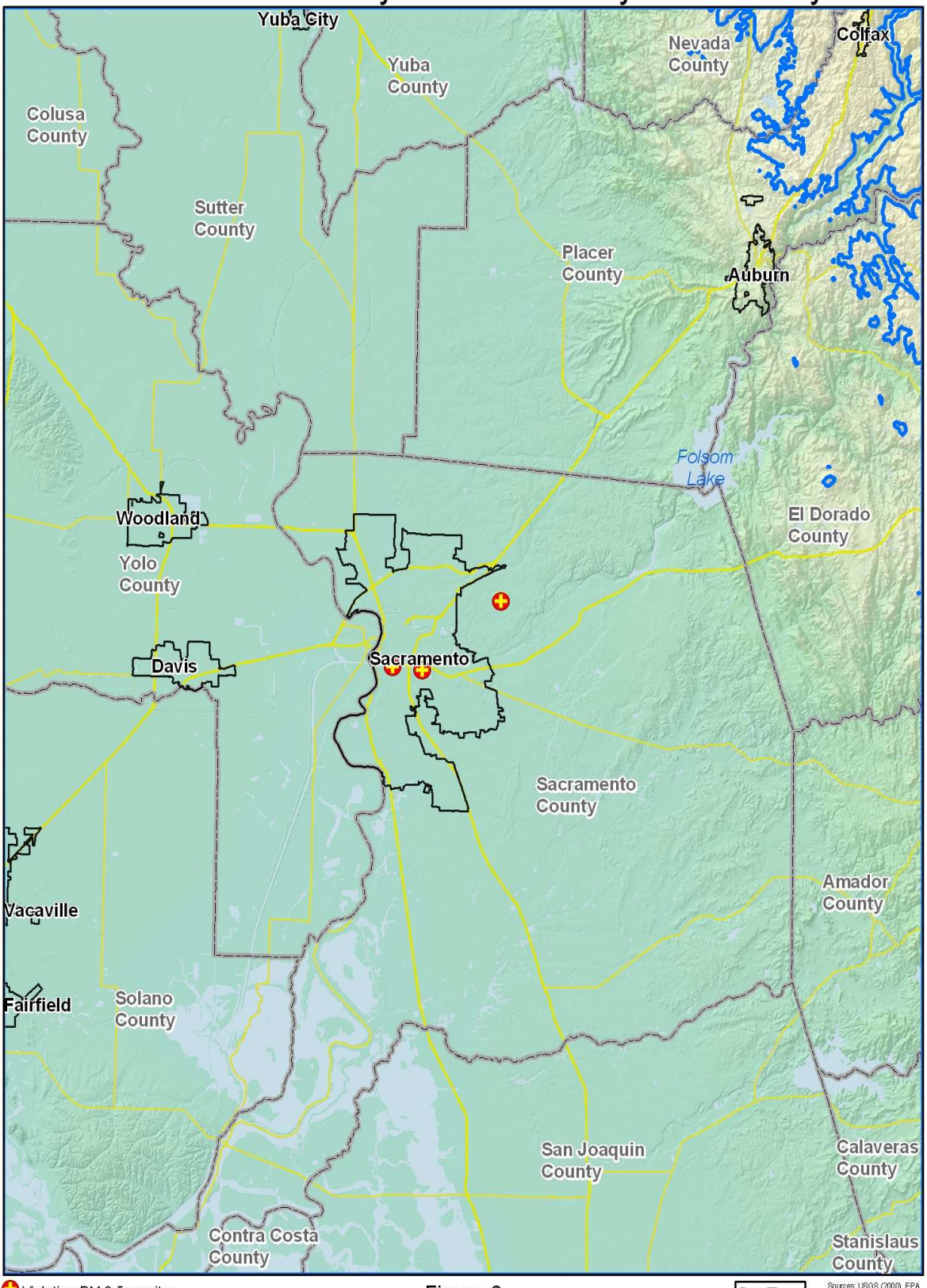
In evaluating the jurisdictional boundary factor, consideration should be given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

The analysis of jurisdictional boundaries considered the planning and organizational structure of the Sacramento area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner.

The jurisdictional boundaries that exist for the counties under consideration (see Figure 7) for the Sacramento nonattainment area are:

- Sacramento County – the Sacramento Metro Air Quality Management District
- Placer County – the Placer County Air Pollution Control District
- El Dorado – El Dorado County Air Quality Management District
- Yolo County – the Yolo Solano Air Quality Management District
- Solano County (western portion) – the Yolo Solano Air Quality Management District

Sacramento Valley - Inversion Layer Boundary



Violating PM 2.5 monitor
1,500-foot Inversion Layer
City Boundary
County Boundary

Figure 6

0 5 10 15 20
Miles

Sources: USGS (2000), EPA (2008), Dynamap (2000)

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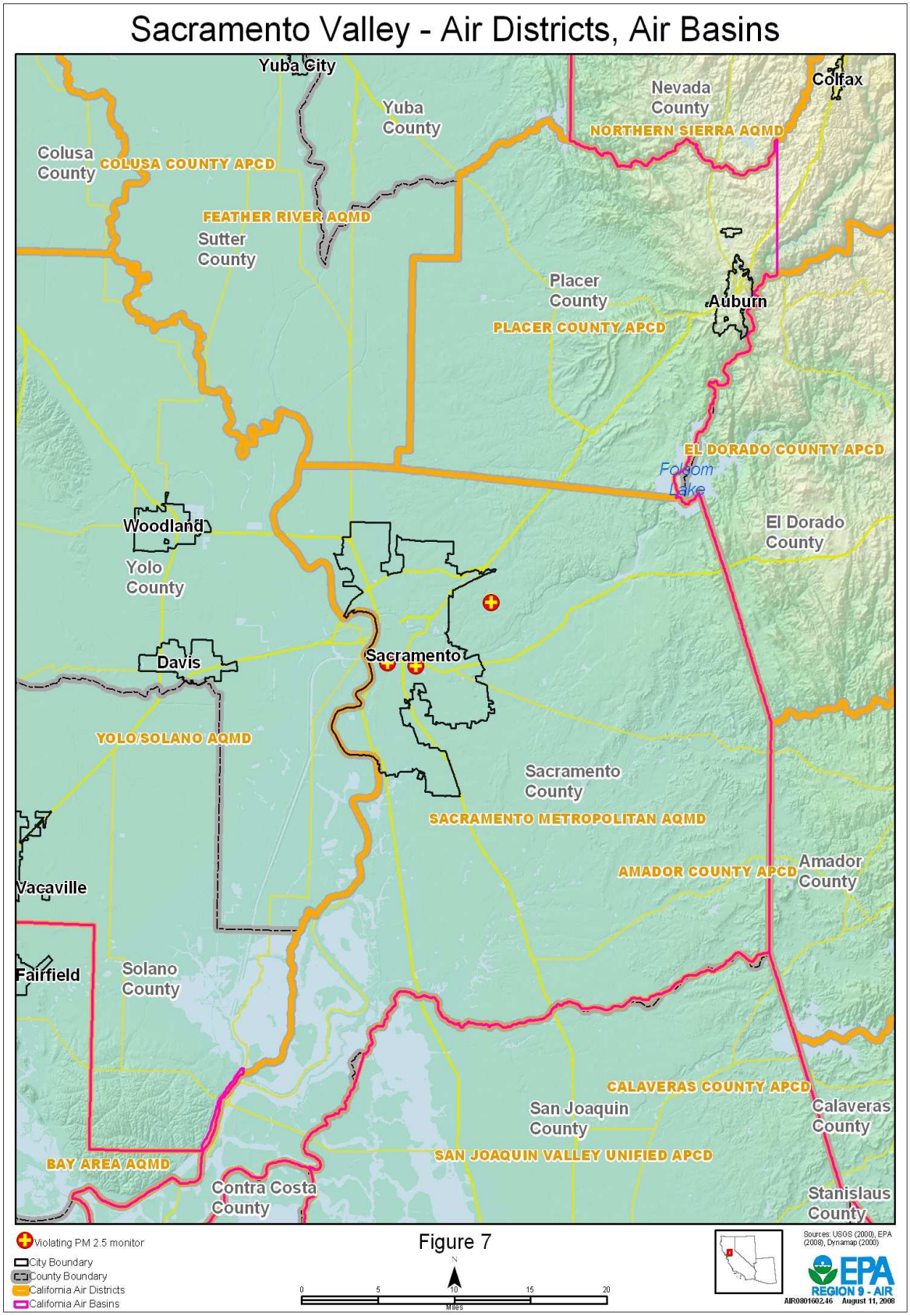
AIR0801602.45 August 11, 2008


Sacramento Valley - Air Districts, Air Basins
Yuba City
Yuba County
Nevada County
Colfax
NORTHERN SIERRA AQMD
Colusa County
COLUSA COUNTY APCD
FEATHER RIVER AQMD
Sutter County
Placer County
Auburn
PLACER COUNTY APCD
EL DORADO COUNTY APCD
Folsom Lake
El Dorado County
Woodland
Yolo County
Davis
Sacramento
YOLO/SOLANO AQMD
Sacramento County
SACRAMENTO METROPOLITAN AQMD
AMADOR COUNTY APCD
Amador County
Vacaville
Fairfield
Solano County
CALAVERAS COUNTY APCD
San Joaquin County
Calaveras County
BAY AREA AQMD
SAN JOAQUIN VALLEY UNIFIED APCD
Contra Costa County
Stanislaus County
Violating PM 2.5 monitor
City Boundary
County Boundary
California Air Districts
California Air Basins
Figure 7
N
0 5 10 15 20
Miles
Sources: USGS (2000), EPA (2008), Dynamap (2000)
EPA
REGION 9 - AIR
AIR080160246 August 11, 2008

We also considered the existing Sacramento 8-hour ozone nonattainment area which includes all of the above counties, plus part of Sutter County. A goal in designating $PM_{2.5}$ nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas.

Given the numerous jurisdictions involved and the goal of considering existing nonattainment area boundaries, EPA recommends that the $PM_{2.5}$ nonattainment area for the Sacramento area include all of Sacramento and Yolo Counties, and parts of Placer, El Dorado, and Solano Counties. EPA recommends including that part of Placer and El Dorado up to the Sierra Nevada mountain ridge line, which is the same as the boundary for the 8-hour ozone nonattainment area. EPA recommends including the eastern part of Solano County, which is also part of the existing Sacramento 8-hour ozone nonattainment area. The western part of Solano County is being recommended for a nonattainment designation for $PM_{2.5}$ as part of the Bay Area Air Quality Management District. Sutter County is being recommended for a $PM_{2.5}$ nonattainment designation as part of the Feather River Air Quality Management District.

Factor 9: Level of control of emission sources

This factor considers emission controls currently implemented for major sources in the Sacramento $PM_{2.5}$ nonattainment area.

The emission estimates in Table 1 (under Factor 1) include any control strategies implemented in the Sacramento area before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NOx, and crustal $PM_{2.5}$).

Attachment 2

Description of the Contributing Emissions Score

The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

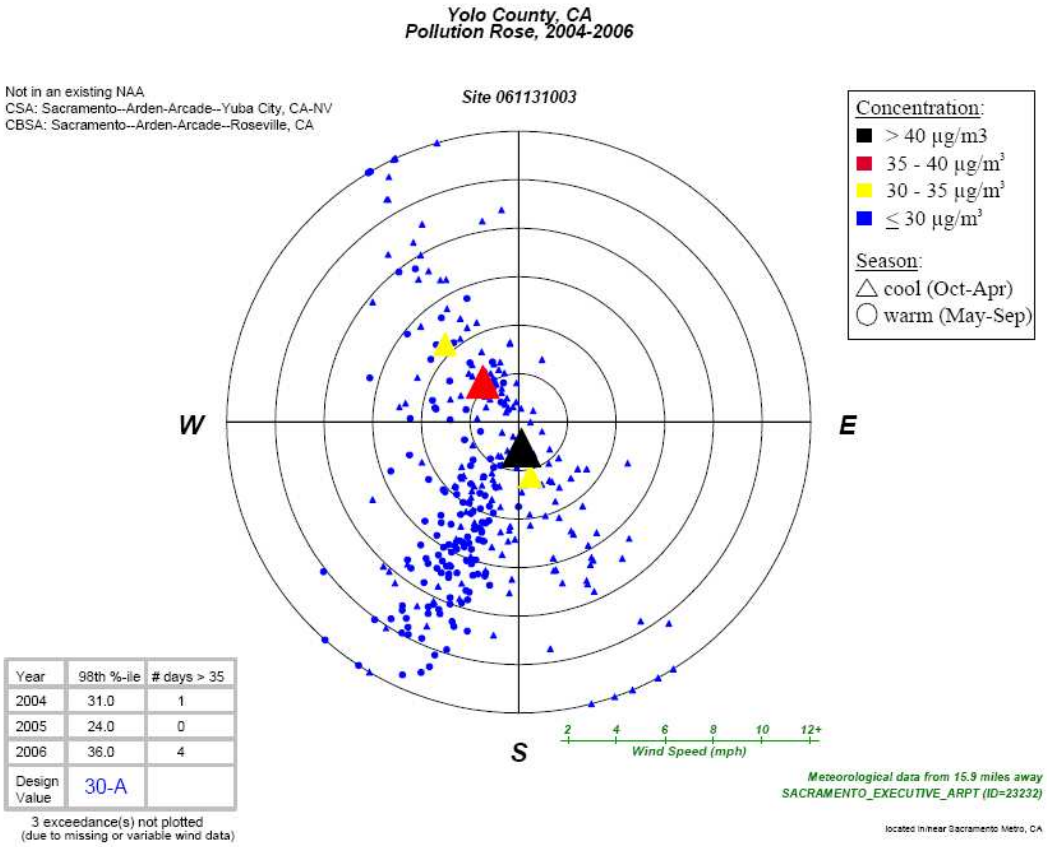
The CES for each county was derived by incorporating the following significant information and variables that impact $PM_{2.5}$ transport:

- Major $PM_{2.5}$ components: total carbon (organic carbon (OC) and elemental carbon (EC)), SO_2, NO_x, and inorganic particles (crustal).
- $PM_{2.5}$ emissions for the highest (generally top 5%) $PM_{2.5}$ emission days (herein called "high days") for each of two seasons, cold (Oct-Apr) and warm (May-Sept)
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days
- The "urban increment" of a violating monitor, which is the urban $PM_{2.5}$ concentration that is in addition to a regional background $PM_{2.5}$ concentration, determined for each $PM_{2.5}$ component
- Distance from each potentially contributing county to a violating county or counties

A more detailed description of the CES can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

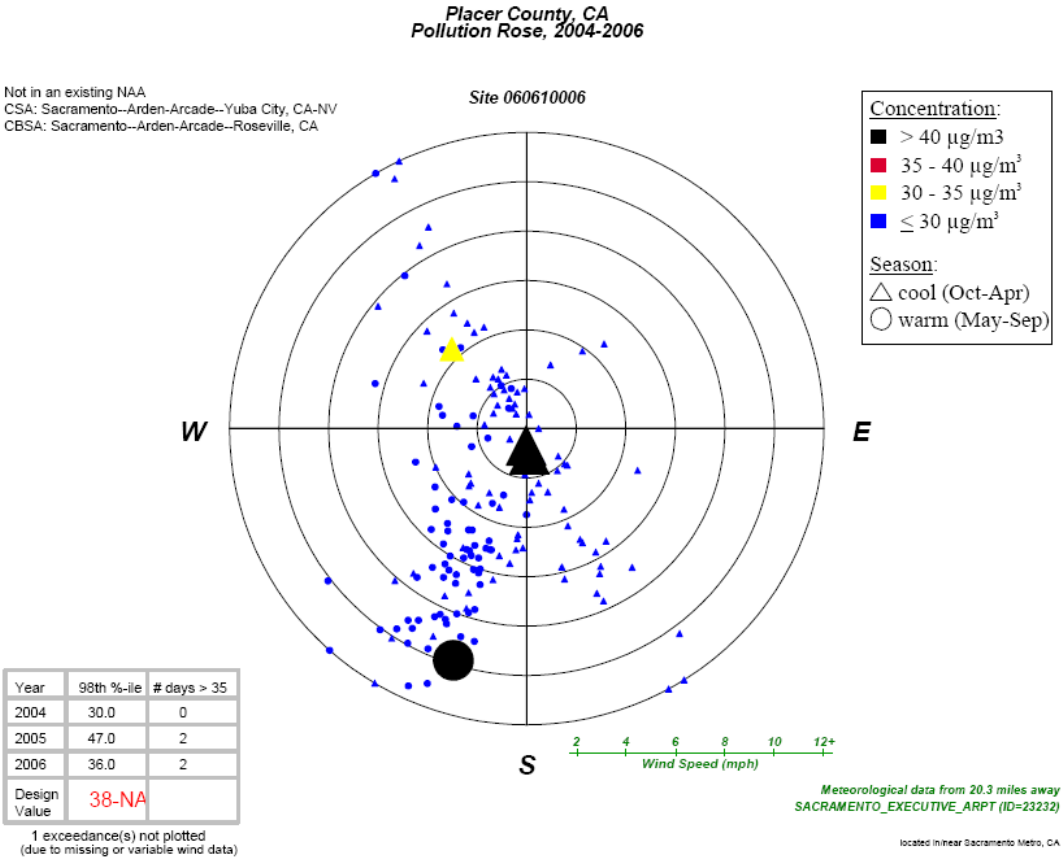
ATTACHMENT 3

POLLUTION ROSES FOR SACRAMENTO AREA



Year	98th %-ile	# days > 35
2004	31.0	1
2005	24.0	0
2006	36.0	4
Design Value	30-A	

3 exceedance(s) not plotted
(due to missing or variable wind data)



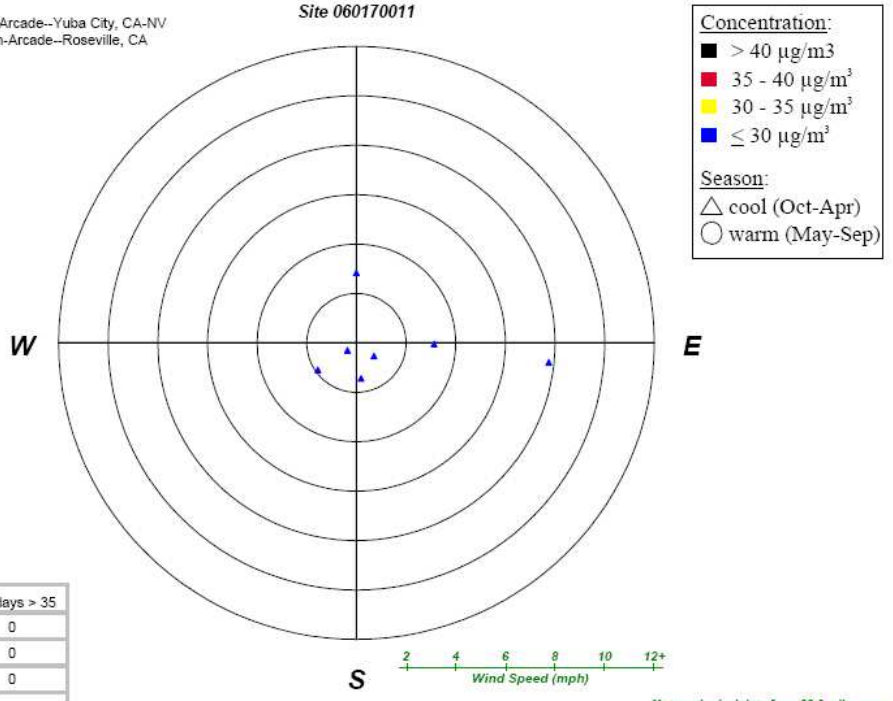
Year	98th %-ile	# days > 35
2004	30.0	0
2005	47.0	2
2006	36.0	2
Design Value	38-NA	

1 exceedance(s) not plotted
(due to missing or variable wind data)

El Dorado County, CA
Pollution Rose, 2004-2006

Not in an existing NAA
CSA: Sacramento--Arden-Arcade--Yuba City, CA-NV
CBSA: Sacramento--Arden-Arcade--Roseville, CA

Site 060170011

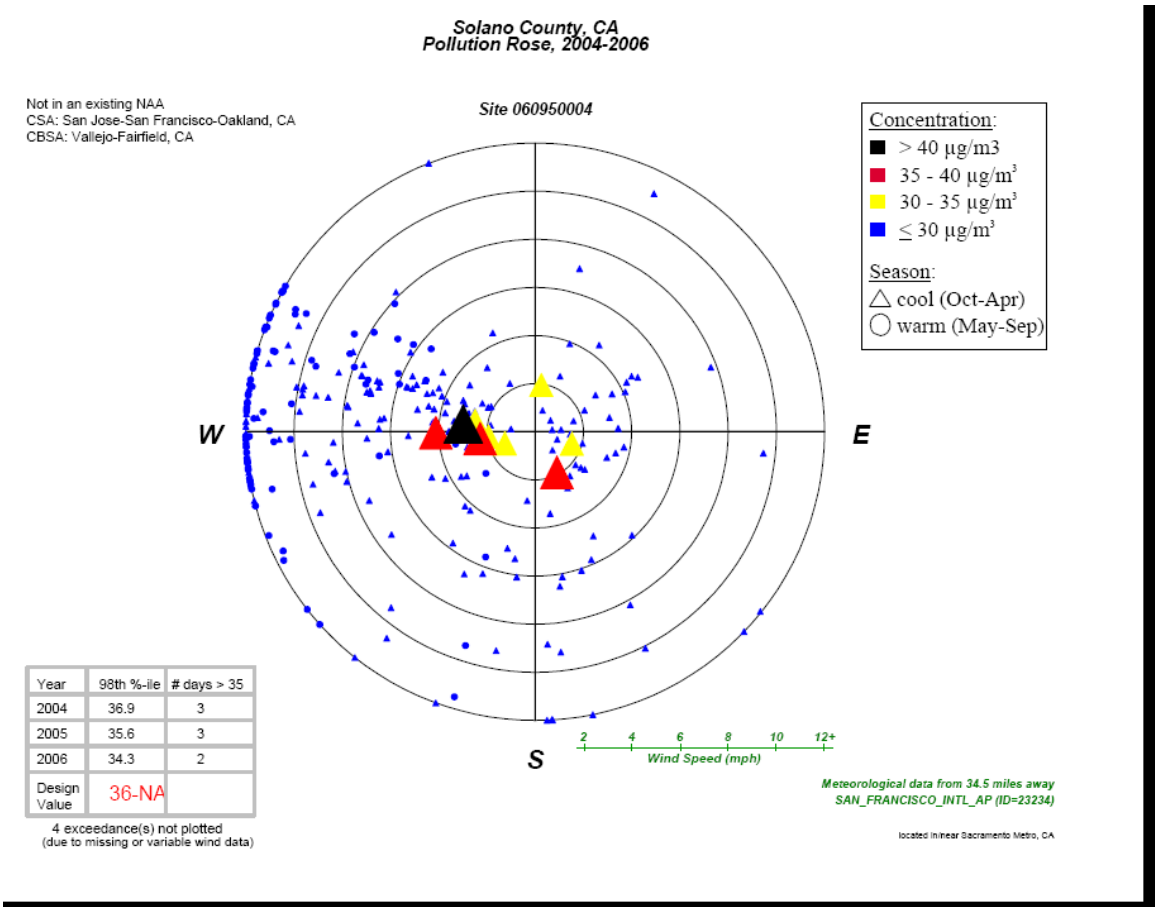


Year	98th %-ile	# days > 35
2004	20.0	0
2005	.	0
2006	.	0
Design Value	20-a	

No exceedances

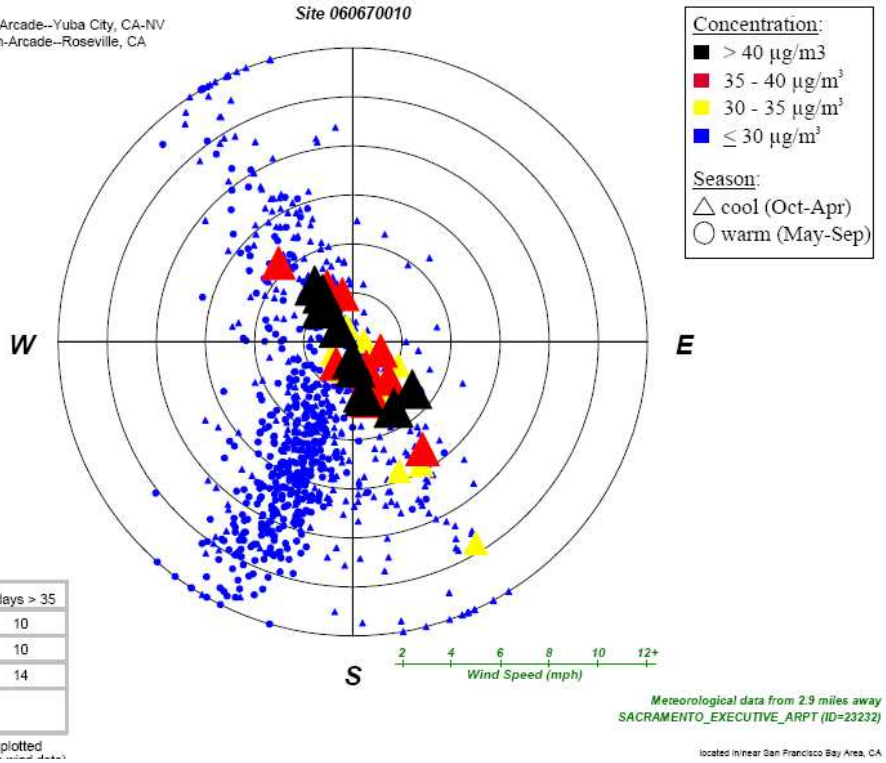
Meteorological data from 39.6 miles away
RENO_TAHOE_INTERNATIONAL_AP (ID=23185)

located in/near Sacramento Metro, CA


Solano County, CA
Pollution Rose, 2004-2006
Not in an existing NAA
CSA: San Jose-San Francisco-Oakland, CA
CBSA: Vallejo-Fairfield, CA
Site 060950004
Concentration:
> 40 µg/m3
35 - 40 µg/m3
30 - 35 µg/m3
≤ 30 µg/m3
Season:
cool (Oct-Apr)
warm (May-Sep)
W
E
S
2 4 6 8 10 12+
Wind Speed (mph)
Meteorological data from 34.5 miles away
SAN_FRANCISCO_INTL_AP (ID=23234)
located in/near Sacramento Metro, CA
Year | 98th %-ile | # days > 35
2004 | 36.9 | 3
2005 | 35.6 | 3
2006 | 34.3 | 2
Design Value | 36-NA
4 exceedance(s) not plotted
(due to missing or variable wind data)

Sacramento County, CA
Pollution Rose, 2004-2006

Not in an existing NAA
CSA: Sacramento--Arden-Arcade--Yuba City, CA-NV
CBSA: Sacramento--Arden-Arcade--Roseville, CA



Year	98th %-ile	# days > 35
2004	37.0	10
2005	47.0	10
2006	39.0	14
Design Value	41-NA	

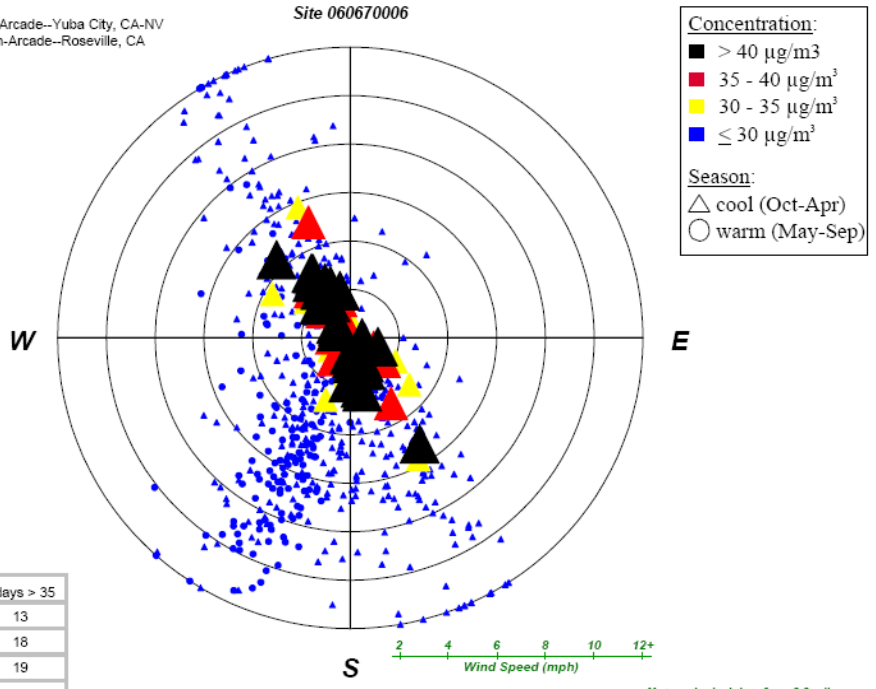
12 exceedance(s) not plotted

Meteorological data from 2.9 miles away
SACRAMENTO_EXECUTIVE_ARPT (ID=23232)

located in/near San Francisco Bay Area, CA

Sacramento County, CA
Pollution Rose, 2004-2006

Not in an existing NAA
CSA: Sacramento--Arden-Arcade--Yuba City, CA-NV
CBSA: Sacramento--Arden-Arcade--Roseville, CA



Year	98th %-ile	# days > 35
2004	42.0	13
2005	49.0	18
2006	55.0	19
Design Value	49-NA	

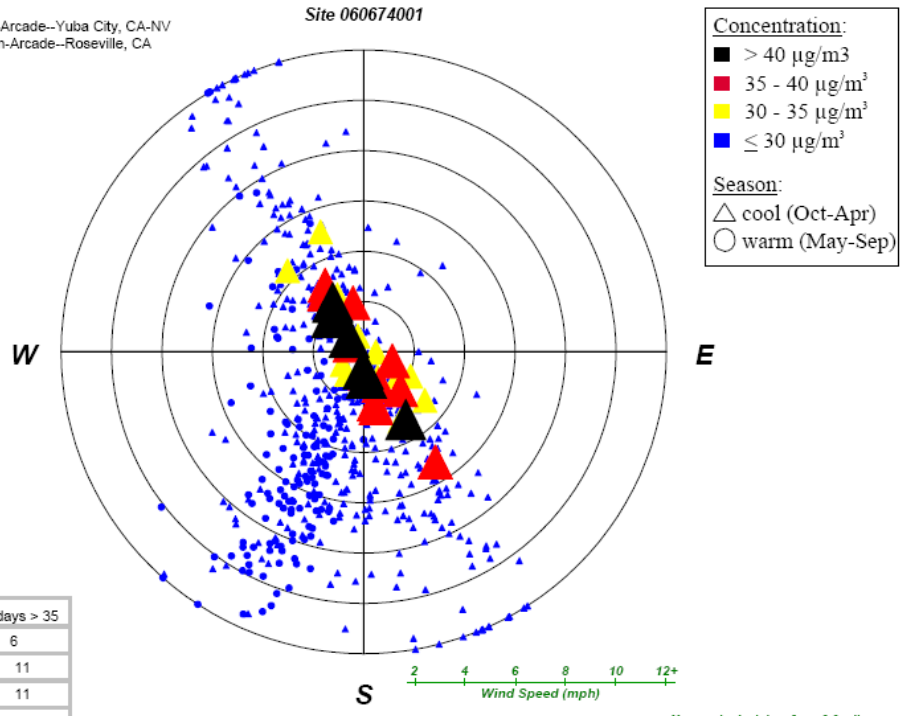
13 exceedance(s) not plotted
(due to missing or variable wind data)

Meteorological data from 9.9 miles away
SACRAMENTO_EXECUTIVE_ARPT (ID=23232)

located inlinear Sacramento Metro, CA

Sacramento County, CA
Pollution Rose, 2004-2006

Not in an existing NAA
CSA: Sacramento--Arden-Arcade--Yuba City, CA-NV
CBSA: Sacramento--Arden-Arcade--Roseville, CA



Year	98th %-ile	# days > 35
2004	35.0	6
2005	42.0	11
2006	39.0	11
Design Value	39-NA	

11 exceedance(s) not plotted
(due to missing or variable wind data)

Meteorological data from 3.6 miles away
SACRAMENTO_EXECUTIVE_ARPT (ID=23232)

located in/near Sacramento Metro, CA