

Technical Support Document for 2008 Ozone NAAQS Designations

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

Technical Analysis for Tehama County (Tuscan Buttes)

Figure 1 is a map of Tehama County, CA. The map provides other relevant information including the locations and design values of air quality monitors, county names and boundaries and indicates EPA's partial county nonattainment designation. See Map 15 in Appendix 1 (and inserted under Factor 1, below) for a detailed map of the partial county boundary that EPA is designating nonattainment.

Tehama County (Tuscan Buttes), CA

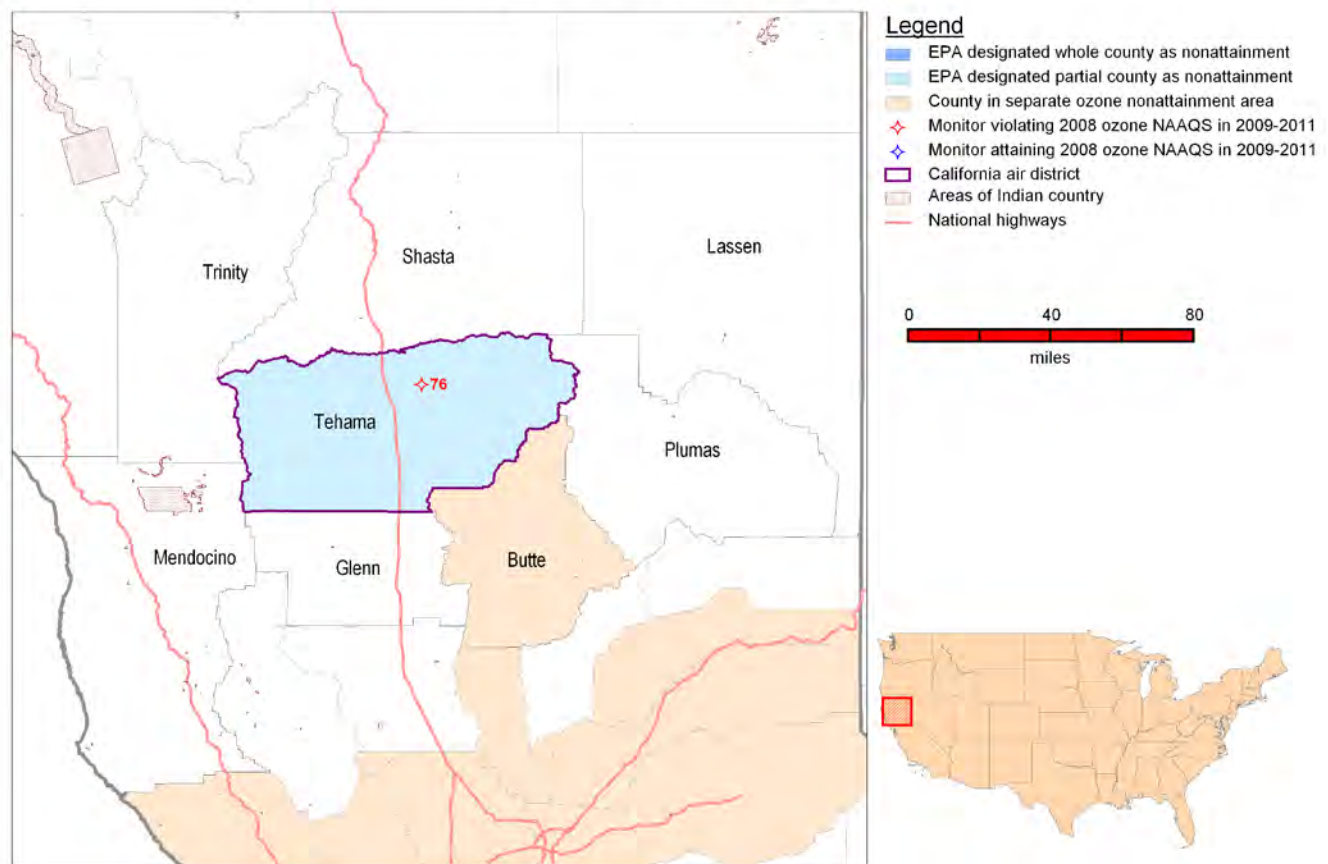


Figure 1

Note: The map shown in Figure 1 provides 8-hour ozone design values in parts per billion (ppb) based on data from the 2009-2011 period (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.

In March 2009, California recommended that a new partial-county area 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 this area. 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 Tehama County (partial) (identified in Table 1 below) nonattainment for the 2008 ozone NAAQS, as the Tuscan Buttes nonattainment area.

Table 1. State’s or Tribe’s Recommended and EPA’s 2008 ozone NAAQS Nonattainment Counties or Areas of Indian country for Tuscan Buttes.

Tuscan Buttes, CA	State or Tribe-Recommended Nonattainment Counties or Areas in Indian country	EPA’s Nonattainment Counties or Areas in Indian country
Tehama County	Tehama County (p)	Tehama County (p)
No areas of Indian country in this nonattainment area		

p = partial county

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values for air quality monitors in Tehama County, 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.]

The Tuscan Buttes nonattainment area comprises the portions of Tehama County above 1,800 feet (see Map 15a in Appendix 2). Certified, quality assured 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, however, the ozone monitor in the Tuscan Buttes nonattainment area has 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 is available in AQS for most areas. States are required to certify and quality assure data by May 1st of the following year. California Air Resources Board (ARB) certified 2011 data by February 29, 2012 for Tehama County. 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 that Tehama County is violating the 2008 ozone NAAQS. Tehama County’s 2010 DV was 80 ppb. Ozone monitors relevant for comparison to the NAAQS and information from additional data sources within Tehama County are shown in Appendix 1, Map 15 (also inserted below).

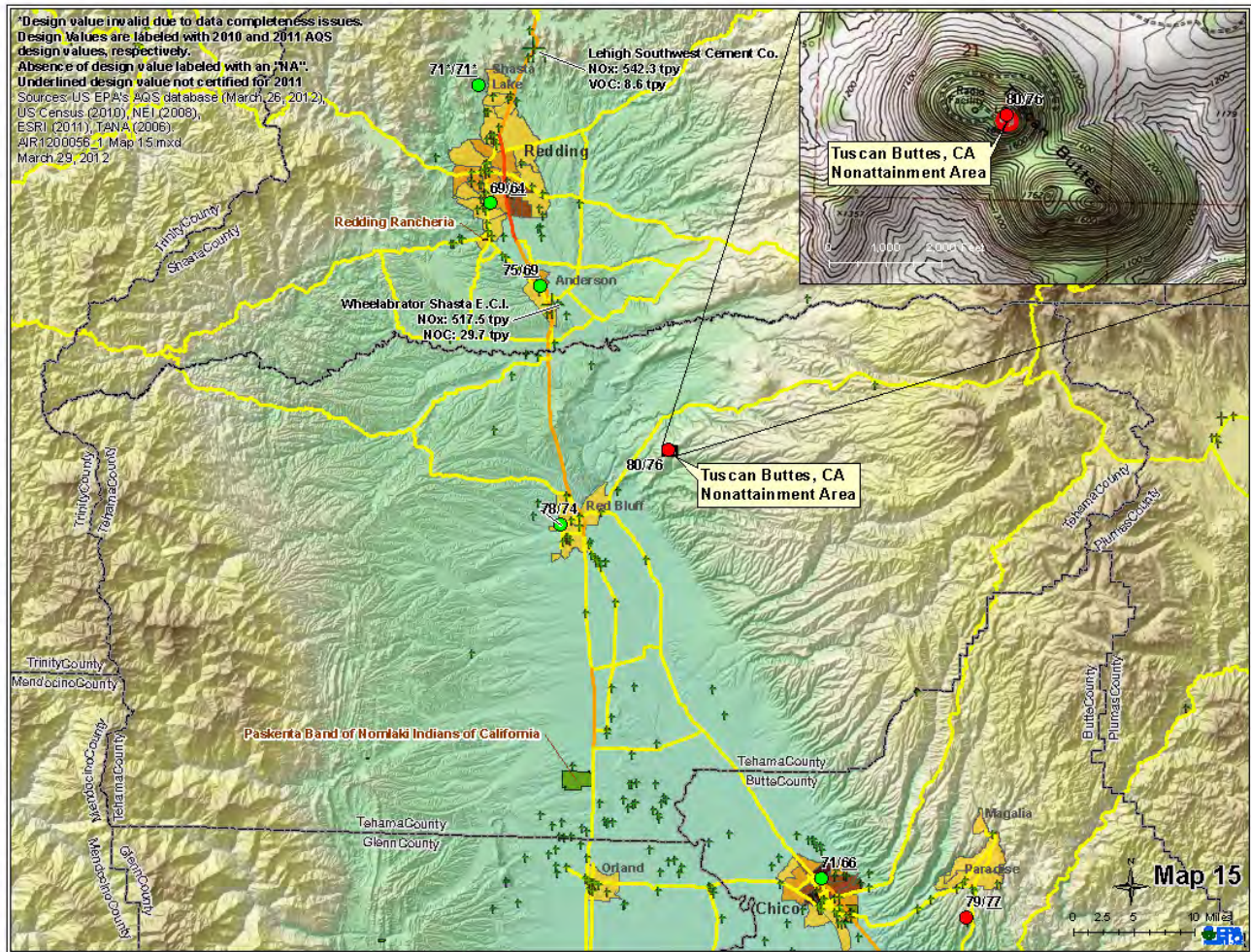
Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2009-2011 Design Value (ppb)
Tehama, CA	Yes (partial)	76

Maps contained in Appendix 1 show the geographic distribution of monitors. Map 15 shows monitor locations for Tehama County. For each monitor, Appendix 1 lists the monitor, the 2008-2010 DV (certified and quality assured in AQS. These were the most recent data available at the time we notified the State of our intended designations) and the 2009-2011 DV (which has been certified and which we are relying on for our final designation decisions for this area). Absence of a DV is symbolized with an “x”.

Appendix 3 lists 2009-2011 DVs for Tehama County. 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.

The monitor in the Tuscan Buttes area of Tehama County shows a violation of the 2008 8-hour ozone standard based on 2009-2011 data. Therefore, this area is included in the Tuscan Buttes 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.



From Appendix 1, Map 15: For map legend describing monitors, red bluffs, emissions, traffic, population, and boundaries, see Appendix 1.

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) for Tehama County.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment?	NO _x (tpy)	VOC (tpy)
Tehama, CA	Yes (partial)	6,027	3,403
	Areawide:	6,027	3,403

Stationary emission sources in Tehama County are all small (less than 100 tons per day of VOCs or NO_x) and are mostly located around Red Bluff, in the central part of the county, and in the southern part of the county, near its borders with Glenn County and Butte County (see Map 15 in Appendix 1). These stationary sources are located at lower elevations and to the south and southwest of the violating monitor. Emissions of NO_x and VOCs in Tehama County are approximately 1.4 times and 2.2 times lower, respectively, than emissions in Butte County, the neighboring nonattainment county to the southeast. Two large sources of NO_x emissions (greater than 500 tons per year) are located north of Tehama County, in Shasta County, near Anderson, California, and Shasta Lake, California. The large stationary NO_x source near Anderson is approximately 5 miles from the Shasta-Tehama County line. The large stationary NO_x source near Shasta Lake is approximately 25 miles from the Shasta-Tehama County line.

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 Tehama County.

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)
Tehama, CA	Yes (partial)	63,463	0.02	7,328	+13%
	Areawide:	63,463	0.02	7,328	+13%

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 15 and 15a in Appendices 1 and 2, respectively, show population in this area. The main population center in Tehama County is in the Red Bluff Micropolitan Area (see Map 15a in Appendix 2), located to the southwest of the Tuscan Buttes. The 2010 population of Tehama County is quite low, as is the 2010 population density. Although Butte County, to the southeast of Tehama County, is also sparsely populated, with a population of 220,000 and a population density of 0.12, Tehama County is still nearly 3.5 times smaller than Butte County in terms of population, with a population density that is over 6 times lower than Butte County. Although population growth in Tehama County over 2000 - 2010 was larger than the growth observed in Butte County (8%), because of the substantially lower population in Tehama County the absolute change in population in Butte County was still over two times greater than the absolute increase in Tehama County.

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 and 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 (VMT) data.

County	State Recommended Nonattainment?	2008 VMT* (million miles)
Tehama, CA	Yes (partial)	449
	Areawide:	449

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

Map 15 in Appendix 1 shows relatively low non-truck traffic volume between Tehama County and Butte County, its neighboring nonattainment county. The highest traffic density appears to occur between Red Bluff and Anderson or Redding to the north in Shasta County, which is in attainment for the 2008 ozone NAAQS. Very few major roads run in the east-west direction across Tehama 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.

As discussed under Factor 4, Tehama County is at the northern end of California's Central Valley, the northern half of which is also called the Sacramento Valley. The Valley has hot, dry summers, including some stagnant periods, and cool, wet winters. The location at the end of the valley may enhance stagnation under some conditions. These could be conducive to ozone formation in the summer, but there do not appear to be sufficient local emissions to create high ozone concentrations.

Previous assessments of pollution transport found that the broader Sacramento area (which is roughly equivalent to the non-mountainous portions of the Sacramento Metropolitan ozone nonattainment area – see Map 10 in Appendix 1) can have an overwhelming impact on counties of the Upper Sacramento Valley, including Tehama County.¹ EPA is designating the Sacramento Metro area as its own nonattainment area.

The Tuscan Buttes ozone monitor is at a rather unique high-elevation location. It is located at over 1,800 feet (500 meters) above mean sea level (MSL) at the summit of Tuscan Buttes, which rises abruptly from the 1,000 feet (300 meters) elevation of the surrounding foothills. Meteorological conditions at the monitor are thus likely different than in the main part of Tehama County. As compared to the wide foothills around the perimeter of the county (to the east, north, and west – see Map 15 in

¹ “Second Triennial Review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California (Revised)”, California Environmental Protection Agency, Air Resources Board, November 1996, p.61. <http://www.arb.ca.gov/aqd/transport/assessments/assessments.htm>

Appendix 1), the slopes of Tuscan Buttes are too short to develop substantial upslope flow, so the ozone concentrations at the top are likely not representative of the rest of the county. In addition, the Tuscan Buttes monitor concentrations may not represent counties immediately to the south, such as Butte County. It likely represents longer range transport aloft from the Sacramento metropolitan area.² As previously noted, EPA is designating the Sacramento Metro area as its own nonattainment area.

A generally north-south flow pattern is seen in the 30-year average of National Weather Service summer wind direction frequencies computed by EPA, as shown in the “radar”-style wind rose diagram below (see Figure 2). This is consistent with the north-south orientation of the Central Valley, and with upslope and downslope flow on the hills to the north, and with ozone transport from areas to the south.

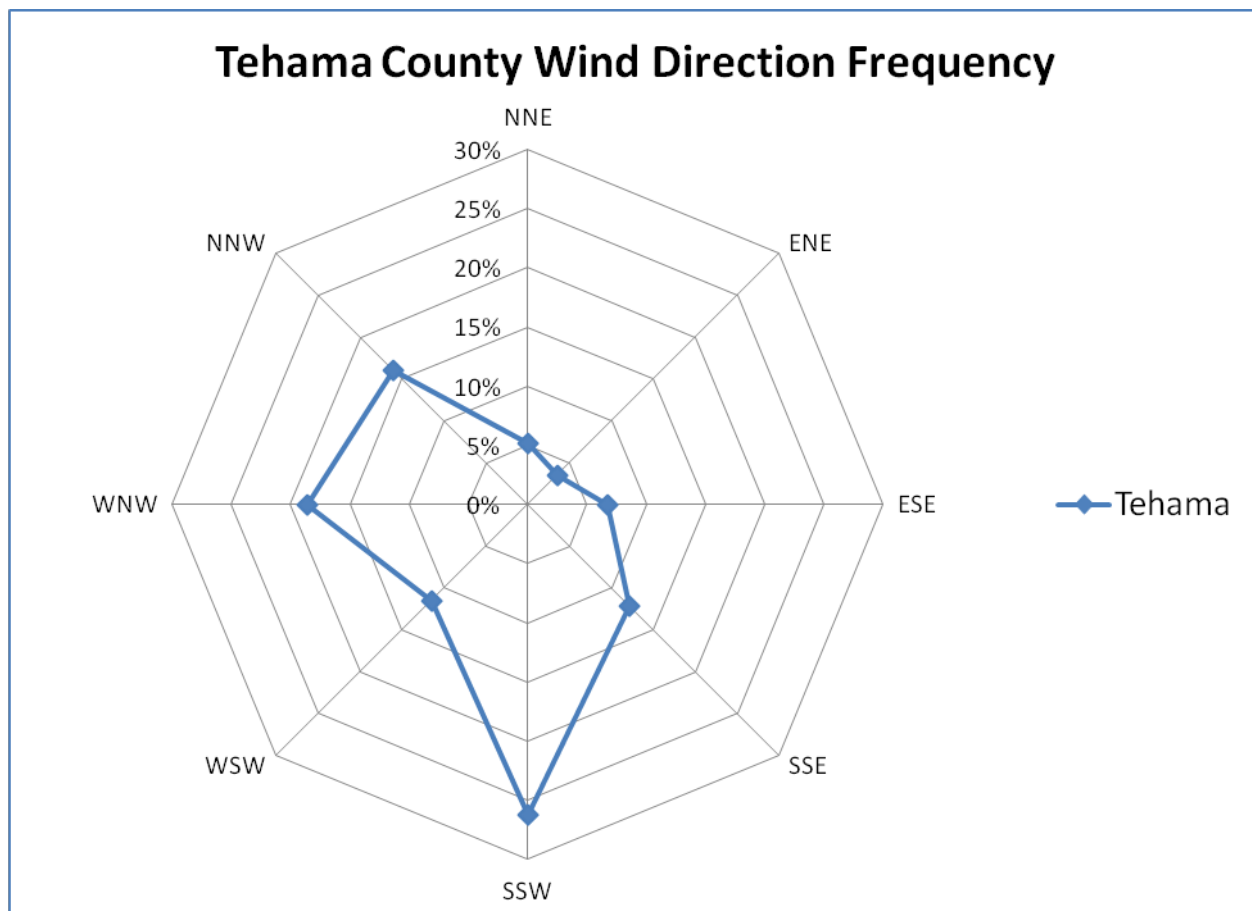


Figure 2

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.

Tehama County is at the northern end of the large, flat, Central Valley of California, the northern half of which is also called the Sacramento Valley. The foothills of the Coast Ranges to the west and the Sierra Nevada mountains to the east converge to close the northern end of the valley, just north of the city of Red Bluff. These foothills and mountain ranges tend to limit flow in all direction except the south, where the Central Valley continues.

² *ibid.* p.62

Red Bluff has an elevation of 299 feet (91 meters) above MSL; starting at some 5 miles (8 kilometers) to the northeast, the foothills start to rise. They rise gradually to 1,000 feet (300 meters) above MSL after 8 kilometers, and then abruptly the Tuscan Buttes rise to over 1,800 feet (500 meters) above MSL over just a half-kilometer distance. Elevation drops as quickly in all directions from the summits of this pair of tall, isolated hills, except for a small ridge to the northeast.

The ozone monitor is at the top of the taller of the two hills, a rather unique location within Tehama County. The uniqueness of this high elevation location means the monitored values are unlikely to be representative of the rest of the county, though they could represent transport aloft from areas farther south.

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 boundary the state recommended as nonattainment for Tehama County (Tuscan Buttes) is not associated with a jurisdictional boundary. The boundary relates to consideration of the other four factors described above, especially the unique location of the monitor at the high-elevation summit of the Tuscan Buttes and the topographical implications on meteorology and likely source impacts. The Tuscan Buttes are in Tehama County, in the northern Sacramento Valley. This county comprises the Red Bluff micropolitan statistical area. Red Bluff is not part of any larger Combined Statistical Area (CSA).

Conclusion

Based on the assessment of factors described above, EPA is designating parts of Tehama County (above 1,800 feet) nonattainment, as the Tuscan Buttes, CA nonattainment area, because the area violates the 2008 ozone NAAQS.

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 the monitor in the Tuscan Buttes area of Tehama County shows a violation of the 2008 8-hour ozone standard based on 2009-2011 data. Therefore, Factor 1 supports designating Tuscan Buttes as nonattainment.

Although there are stationary and mobile sources of emissions as well as a discrete population center in Tehama County, emissions and emission-related data (Factor 2) support the state's recommended boundary for the Tuscan Buttes nonattainment area. EPA expects that this area is predominantly affected by transport from the Sacramento Metro area (see Factor 3), rather than emissions from within Tehama County or adjacent counties. EPA is designating Sacramento Metro as a separate nonattainment area.

Meteorology and weather or transport patterns (Factor 3) and geography and topography (Factor 4) suggest that a mountaintop nonattainment area is appropriate considering the violating monitor atop Tuscan Buttes. The ozone concentrations measured at the Tuscan Buttes monitor are likely influenced by long-range transport from upwind areas, especially the Sacramento Metro nonattainment area. EPA is designating Sacramento Metro and Chico (Butte County) as separate nonattainment areas.

In considering jurisdictional boundaries (Factor 5), EPA notes that the boundary the state recommended as nonattainment for Tehama County (Tuscan Buttes) is not associated with a jurisdictional boundary. The unique location of the monitor at the high-elevation summit of the Tuscan Buttes suggests that the state's recommended nonattainment area boundary is appropriate. EPA used a similar approach in making designations for the 1997 8-hour ozone NAAQS, for example, designating Sutter Buttes in Sutter County in 2004 as an area that was not attaining.

Based on the five factor analysis and information currently available, EPA is designating portions of Tehama County, as identified in Table 1, as the Tuscan Buttes, CA nonattainment area.