

BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT

AIR QUALITY SUMMARY FOR 2009

The following is a summary of Butte County’s air quality for 2009. This document gives the reader an overview of the two criteria pollutants of greatest concern - ozone (O₃ and fine particulate matter PM_{2.5}). The data was obtained from the air monitoring sites located within Butte County.

The **Ambient Air Quality Standards** establishes the concentration at which a pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. Both the California and federal governments have adopted health-based standards for the *criteria pollutants*, which for this report include Ozone and PM_{2.5}. In general, the air quality standards are expressed as a measure of the amount of pollutant per unit of air. For example, the particulate matter standards are expressed as micrograms of particulate matter per cubic meter of air (ug/m³) and the ozone standards are expressed as parts per million (ppm).

Ozone is a colorless gas with a pungent odor. It is the chief component of urban smog. The name “smog” was created from the words smoke and fog. Ozone is not directly emitted as a pollutant, but is formed in the atmosphere when reactive hydrocarbons (ROG) and nitrogen oxides (NO_x) precursor emissions react in the presence of sunlight. Meteorology and terrain play major roles in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and cloudless skies provide for the optimum conditions. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often impacts a widespread area.

Ozone impacts lung function by irritating and damaging the respiratory system. In addition, ozone causes damage to vegetation, buildings, rubber, and some plastics. Recognizing the health impacts of daylong exposure, the United States Environmental Protection Agency promulgated an 8-hour ozone standard in 1997 as a successor to the 1-hour standard, which was established in 1979. The Air Resources Board approved an 8-hour ozone concentration on April 28, 2005 and became effective in early 2006. Table 1 gives the State and National Ozone Standards effective in 2009.

AMBIENT AIR QUALITY STANDARDS - OZONE		TABLE 1
State Ozone Standard: 0.09 ppm for 1 hour, not to be exceeded. 0.07 ppm for 8 hours. not to be exceeded.	National Ozone Standards: --- 0.075 ppm for 8 hours, not to be exceeded, Based on the fourth highest concentration averaged over three years.* * Federal 8-hour ozone standard revised March 2008.	

Sacramento Valley Air Basin includes Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties, the western urbanized portion of Placer County, and the northeastern portion of Solano County. The Sacramento Valley Air Basin occupies 14,994 square miles and has a population of more than two million people.

Because of its inland location, the climate of the Sacramento Valley Air Basin is more extreme than that of the San Francisco Bay Area or South Coast air basins. The winters are generally cool and wet, while the summers are hot and dry.

Emissions from the urbanized portion of the basin (Sacramento, Yolo, Solano, and Placer Counties) dominate the emission inventory for the Sacramento Valley Air Basin, and on-road motor vehicles are the primary source of emission in the metropolitan area. While pollutant concentrations have generally declined over the years, additional emission reductions will be needed to attain the State and national ambient air quality standards in our air basin.

Population and Vehicles Miles Traveled (VMT) Between 1980 and 2020, population in the Sacramento Valley Air Basin is projected to grow at a higher rate than the statewide average—a 120 percent increase compared with an 86 percent increase statewide. Population is projected to grow from 1.5 million in 1980 to almost 3.3 million in 2020. During this same period, the increase in the number of vehicle miles traveled each day is projected to be higher than the overall statewide value: a 200 percent increase in the Sacramento Valley Air Basin. VMT are projected to increase from about 30 million miles in 1980 to nearly 90 million miles in 2020.

Ozone Emission Trends Peak ozone values in the Sacramento Valley Air Basin have not declined as quickly over the last several years as they have in other urban areas. Since 1990, the peak 8-hour indicator has decreased slightly, and the overall decline for the 20-year period is almost 12 percent. Looking at the number of days above the State and federal standard, the trend is much more variable. However, the number of 8-hours exceedance days has declined by nearly 37% since 1988.

The U.S. EPA revised the 8-hour ozone standard on March 12, 2008 to 0.075 parts per million (ppm). The previous standard was set at 0.08 ppm. Because ozone is measured out to three decimal places, the standard effectively became 0.084 ppm: areas with ozone levels as high as 0.084 ppm were considered as meeting the 0.08 ppm standard, because of rounding.

In California, urban areas generally experience more pronounced peak ozone levels (during the day), while many downwind rural areas record slightly lower levels but for a more prolonged period (at night). This trend can be seen in the Chico and Paradise monitoring sites. Based on ozone data from the Paradise monitoring site for the period 2001-2003, Butte County was designated as a Basic nonattainment area for the federal 8-hour ozone standard. The District was required to submit a plan, which describes efforts to reduce ground-level ozone. However, the last three years of ozone data (2005-2007) show Butte County in attainment with the previous ozone standard (0.084 ppm). As such U.S. EPA has suspended the planning requirements until such time as the area is redesignated attainment or EPA determines that the area has violated the new 8-hour ozone standard.

On March 12, 2009, ARB submitted its recommendations for area designations for the revised federal 8-hour ozone standard. These recommendations are based on ozone air quality data collected during 2006 through 2008. Butte County has been recommended as a nonattainment area for the new federal 8-hour standard and will be required to submit a Plan demonstrating compliance with the standards as expeditiously as possible.

Table 2 shows the ozone air quality data for 2009 and Figures 1 through 6 depict the data

graphically. Note: Federal 8-hour Ozone standard is not considered exceeded until the value is 0.075 ppm or above, State 8-hour and 1-hour Ozone standard is not considered exceeded until the value is 0.070 or 0.095 ppm or above respectively.

BUTTE COUNTY OZONE AIR QUALITY DATA 2009 TABLE 2												
Ozone (ppm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Max. 1-Hour Chico	.035	.046	.064	.068	.075	.073	.079	.079	.073	.057	.054	.034
Days Above State Std.	0	0	0	0	0	0	0	0	0	0	0	0
Max. 8-Hour Chico	.030	.041	.057	.062	.070	.066	.073	.070	.065	.047	.044	.030
Days Above State Std.	0	0	0	0	0	0	1	0	0	0	0	0
Days Above Fed. Std.	0	0	0	0	0	0	0	0	0	0	0	0
Max. 1-Hour Paradise	.045	.045	.071	.075	.082	.087	.087	.098	.086	.068	.065	.045
Days Above State Std.	0	0	0	0	0	0	0	1	0	0	0	0
Max. 8-Hour Paradise	.043	.044	.068	.070	.076	.082	.086	.088	.080	.066	.060	.044
Days Above State Std.	0	0	0	0	5	3	12	10	5	0	0	0
Days Above Fed. Std.	0	0	0	0	2	1	7	3	4	0	0	0

Particulate Matter (PM10 and PM2.5) refers to particles with an aerodynamic diameter of 10 microns or smaller. For comparison, the average diameter of a human hair is about 70 microns. PM10 is a mixture of substances that includes elements such as carbon, lead, and nickel; compounds such as nitrates, organic compounds, and sulfates; and complex mixtures such as diesel exhaust and soil. These substances occur in the form of solid particles or as liquid droplets. Some particles are emitted directly into the atmosphere. Other particles, referred to as secondary particles, result from gases that are transformed into particles through physical and chemical processes in the atmosphere.

PM10 includes a subgroup of finer particles called PM2.5. The fine particles pose an increased health risk because they can deposit deep in the lung and contain substances that are particularly harmful to human health, therefore this report will look at PM2.5 data and trends. Table 3 shows the State and National PM10 and PM2.5 standards.

AMBIENT AIR QUALITY STANDARDS - PARTICULATE MATTER TABLE 3		
State PM10 Standards: 50 ug/m3 for 24 hours and 20 ug/m3 annual arithmetic mean, neither to be exceeded ----- - State PM2.5 Standards: 12 ug/m3 annual arithmetic mean not to be exceeded	National PM10 Standards: 150 ug/m3 for 24 hours, not to be exceeded more than once per year and 50 ug/m3 for annual arithmetic mean averaged over three years.	National PM2.5 Standards: 35 ug/m3 for 24 hours, not to be exceeded, based on the 98 th percentile concentration averaged over three years and 15 ug/m3 annual arithmetic mean averaged over 3 years.

Fine Particulate Matter Emission Trends Direct emissions of PM2.5 have remained relatively steady in the Sacramento Valley Air Basin between 1975 and 2005 and are projected to increase slightly through 2020. Emissions are dominated by contributions from areas-wide sources, primarily fugitive dust from construction and demolition, particulates residential fuel combustion (woodstoves and fireplaces) and waste burning. Emissions of directly emitted PM2.5 mobile

sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, sulfur oxides (SO_x), ROG, and ammonia. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 70 percent of the ambient PM_{2.5} in the Sacramento Valley Air Basin.

Table 4 records the Chico, Gridley and Paradise continuous PM_{2.5} mass samplers known as BAMM monitors. This data is useful for public reporting and understanding diurnal and episodic behavior of fine particles, background monitoring, and transport assessment. Continuous monitors also provide 24-hour average data for the days when filter-based samplers are not operating. However, continuous PM_{2.5} monitors have not been approved as a federal reference method (FRM) therefore cannot be used to determine attainment status.

Figure 7 graphs the PM_{2.5} maximum 24-hour data for Chico. The Chico FRM data shows 1 exceedance of the federal PM_{2.5} standard occurring in December. It should be noted that data from the continuous PM_{2.5} monitor for Chico shows 18 days exceeding the federal standard, all occurring in the winter season showing the influence of residential wood combustion in the winter months. It should also be noted that during the months of January, October, November and December Chico had 10 days with no data, Gridley had 19 days and Paradise had 27 days of no reported data. Figure 8 compares the PM_{2.5} data from the BAMM monitors located at Chico, Gridley and Paradise. Most of Butte County (excluding the very upper ridges) is designated as a non attainment area for the federal PM_{2.5} standard based on 2004-2006 monitoring data. Butte County is also non-attainment for the State PM_{2.5} annual average.

BUTTE COUNTY PM_{2.5} AIR QUALITY DATA 2009												
												TABLE 4
Federal Reference Monitors (FRM)												
PM_{2.5} (ug/m³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Max 24-Hour PM_{2.5} Chico (FRM)	30	9	8	6	11	9	9	11	11	13	25	35
Days Above Fed. Std.	0	0	0	0	0	0	0	0	0	0	0	1
BAMM Continuous Monitors (for reporting purposes only)												
Max 24-Hour PM_{2.5} Chico (BAMM)	54	26	15	16	18	16	17	26	20	29	39	58
Days Above Fed. Std	6	0	0	0	0	0	0	0	0	0	3	9
Max 24-Hour PM_{2.5} Gridley (BAMM)	31	22	12	16	18	13	14	25	19	20	22	41
Days Above Fed. Std	0	0	0	0	0	0	0	0	0	0	0	2
Max 24-Hour PM_{2.5} Paradise (BAMM)	19	13	17	16	19	16	18	26	24	17	30	25
Days Above Fed. Std	0	0	0	0	0	0	0	0	0	0	0	0