

## 15 AIR QUALITY

### *A. Introduction*

This section discusses the overall regulatory framework for air quality management in California and the region, including national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), and describes existing air quality conditions in Butte County. Information presented in this section is based in part on guidance provided by the Butte County Air Quality Management District (BCAQMD).

### *B. Regulatory Framework*

This section discusses the federal, State, and local policies and regulations that are relevant to air quality in Butte County.

The air quality management agencies of direct importance in Butte County include the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and the BCAQMD. The EPA has established federal standards for which the ARB and BCAQMD have primary implementation responsibility. The ARB and BCAQMD are responsible for ensuring that state standards are met, and the BCAQMD is responsible for implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. At the local level, air quality is managed through land use and development planning practices, and measures addressing air quality are implemented in Butte County through the general planning process. The BCAQMD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and State air quality laws.

#### **1. Federal and State Ambient Air Quality Standards**

This section discusses the local, State, and federal policies and regulations that are relevant to the analysis of air quality in Butte County.

Air-pollution control programs were established in California before federal requirements were enacted. However, federal Clean Air Act (CAA) legislation in the 1970s resulted in a gradual merging of State and federal air quality programs, particularly those relating to industrial sources. Air quality management programs developed by California since the late 1980s have generally responded to requirements established by the CAA.

The enactment of the California Clean Air Act (CCAA) in 1988 and the federal CAA amendments of 1990 have produced additional changes in the structure and administration of air quality management programs. The CCAA requires preparation of an air quality attainment plan for any area that violates California Ambient Air Quality Standards (CAAQS) for carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), or ozone. Locally prepared attainment plans are not required for areas that violate CAAQS for particulate matter smaller than 10 microns or less in diameter (PM<sub>10</sub>), but the ARB is currently addressing PM<sub>10</sub> attainment issues.

California and the federal government have established standards for several different pollutants. For some pollutants, separate standards have been set for different measurement periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as the protection of crops, the protection of materials, or the avoidance of nuisance conditions). State and federal standards for a variety of pollutants are summarized in Table 15-1.

## **2. Federal Regulations**

The federal CAA, enacted in 1963 and amended several times thereafter (including the 1990 amendments), establishes the framework for modern air-pollution control. The CAA directs the EPA to establish National Ambient Air Quality Standards (NAAQS) for six pollutants: ozone, CO, lead, NO<sub>2</sub>, particulate matter, and SO<sub>2</sub>. The standards are divided into primary and secondary standards. Primary standards are designed to protect human health, including the health of “sensitive” populations, such as asthmatics, children,

TABLE 15-1 AMBIENT AIR QUALITY STANDARDS APPLICABLE IN CALIFORNIA

Pollutant	Symbol	Average Time	Standard (parts per million)			Standard (micrograms per cubic meter)			Violation Criteria
			California	National	California	National	California	National	
Ozone <sup>1</sup>	O <sub>3</sub>	1 hour	0.09	n/a	180	n/a	If exceeded	n/a	
		8 hours	0.070	0.08	137	157	If exceeded	If fourth-highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area	
Carbon monoxide	CO	8 hours	9.0	9.0	10,000	10,000	If exceeded	If exceeded on more than 1 day per year	
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year	
Nitrogen dioxide	NO <sub>2</sub>	Annual average	n/a	0.053	n/a	100	n/a	If exceeded on more than 1 day per year	
		1 hour	0.25	n/a	470	n/a	If exceeded	n/a	
Sulfur dioxide	SO <sub>2</sub>	Annual average	n/a	0.03	n/a	80	n/a	If exceeded	
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year	
Hydrogen sulfide	H <sub>2</sub> S	1 hour	0.25	n/a	655	n/a	If exceeded	n/a	
		24 hours	0.03	n/a	42	n/a	If equaled or exceeded	n/a	
Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	24 hours	0.01	n/a	26	n/a	If equaled or exceeded	n/a	

TABLE 15-1 AMBIENT AIR QUALITY STANDARDS APPLICABLE IN CALIFORNIA (CONTINUED)

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria
			California	National	California	National	
Inhalable particulate matter	PM10	Annual arithmetic mean	n/a	n/a	20	50	If exceeded at each monitor within an area
		24 hours	n/a	n/a	50	150	If exceeded on more than 1 day per year
Inhalable particulate matter	PM2.5	Annual arithmetic mean	n/a	n/a	12	15	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	n/a	n/a	n/a	35 <sup>b</sup>	If 3-year average of 98th percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO <sub>4</sub>	24 hours	n/a	n/a	25	n/a	If equaled or exceeded n/a
Lead particles	Pb	Calendar quarter	n/a	n/a	n/a	1.5	If exceeded no more than 1 day per year
		30-day average	n/a	n/a	1.5	n/a	If equaled or exceeded n/a

Notes: All standards are based on measurements at 25°C and 1 atmosphere pressure. National standards shown are the primary (health effects) standards. n/a = not applicable.

<sup>a</sup> The U.S. Environmental Protection Agency (EPA) recently replaced the 1-hour ozone standard with an 8-hour standard of 0.08 parts per million. The EPA issued a final rule that revoked the 1-hour standard on June 15, 2005. However, the California 1-hour ozone standard will remain in effect.

<sup>b</sup> A revised standard of 35 micrograms per cubic meter was put into effect by the EPA as of December 18, 2006, replacing a less stringent standard of 65 micrograms per cubic meter. Source: California Air Resources Board 2006a.

and the elderly, within an adequate margin of safety. Secondary standards are designed to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The primary legislation that governs federal air quality regulations is the CAA amendments of 1990. The CAA amendments delegate primary responsibility for clean air to the EPA. The EPA develops rules and regulations to preserve and improve air quality, as well as to delegate specific responsibilities to State and local agencies.

Areas that do not meet the federal standards shown in Table 15-1 are called nonattainment areas. For these nonattainment areas, the CAA requires states to develop and adopt State Implementation Plans (SIPs), which are plans showing how air quality standards will be attained. SIPs, which are reviewed and approved by the EPA, must demonstrate how federal standards will be achieved. Failing to submit a plan or secure approval could lead to the denial of federal funding and permits for such improvements as highway construction and sewage-treatment plants. In California, the EPA has delegated authority to prepare SIPs to the ARB, which, in turn, has delegated that authority to individual air districts. In cases in which an SIP is submitted by the State but fails to demonstrate achievement of the standards, the EPA is directed to prepare a federal implementation plan.

### **3. State Regulations**

Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on the ARB and local air districts and is to be achieved through district-level air quality management plans that will be incorporated into the SIPs. In California, the EPA has delegated authority to prepare SIPs to the ARB, which in turn has delegated that authority to individual air districts.

The ARB traditionally has established State air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing

emissions from motor vehicles, developing air-emission inventories, collecting air quality and meteorological data, and approving SIPs.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by the California Environmental Quality Act (CEQA).

The CCAA of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts the authority to implement transportation control measures. The CCAA focuses on attainment of the CAAQS, which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards.

The CCAA requires the designation of attainment and nonattainment areas with respect to CAAQS. The CCAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates State air quality standards for CO, SO<sub>2</sub>, NO<sub>2</sub>, or ozone. These clean-air plans are specifically designed to attain these standards and must be designed to achieve an annual 5 percent reduction in district-wide emissions of each nonattainment pollutant or its precursors. When an air district is unable to achieve a 5 percent annual reduction, the adoption of “all feasible measures” on an expeditious schedule is acceptable as an alternative strategy.<sup>1</sup> No locally prepared attainment plans are required for areas that violate the State PM<sub>10</sub> standards, but the ARB is currently addressing PM<sub>10</sub> attainment issues.

The CCAA requires that the State air quality standards be met as expeditiously as practicable, but, unlike the federal CAA, it does not set precise at-

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<sup>1</sup> Health and Safety Code Section 40914[b][2].

tainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The CCAA emphasizes the control of “indirect and area-wide sources” of air-pollutant emissions. The CCAA gives local air-pollution control districts explicit authority to regulate indirect sources of air pollution and to establish transportation control measures (TCMs). The CCAA does not define indirect and area-wide sources. However, Section 110 of the federal CAA defines an indirect source as: “a facility, building, structure, installation, real property, road, or highway, which attracts, or may attract, mobile sources of pollution. Such term includes parking lots, parking garages, and other facilities subject to any measure for management of parking supply.”

TCMs are defined in the CCAA as “any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions.”

The ARB’s *Air Quality and Land Use Handbook: A Community Health Perspective*<sup>2</sup> provides ARB recommendations for the siting of new sensitive land uses (including residences) near freeways, distribution centers, ports, refineries, chrome plating facilities, dry cleaners, and gasoline stations. The handbook recommends that new development be placed at distances from such facilities.

#### **4. Butte County Air Quality Management District**

The BCAQMD is the local air district responsible for local air quality regulation in Butte County. The BCAQMD’s primary responsibility is to regulate stationary sources and develop plans to achieve and maintain air quality standards. The ARB and the EPA have jurisdiction over controlling emissions from mobile sources. The BCAQMD has jurisdiction over air quality matters in Butte County. Formerly a department of the Butte County government, it is now an independent special district under California law.

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<sup>2</sup> California Air Resources Board, 2005.

Until the passage of the CCAA, air districts' primary role was the control of stationary sources of pollution such as industrial processes and equipment that stayed within the districts' jurisdictional boundaries. With the passage of the CCAA and CAA amendments, air districts were additionally required to implement transportation control measures (TCMs) such as employer-based trip-reduction programs. They also were encouraged to adopt indirect source-control programs to reduce mobile-source emissions. These mandates made it necessary for all Air Districts, including BCAQMD, to work closely with the counties and cities within their jurisdiction, and with regional transportation agencies, to develop new programs.

The BCAQMD works with the Butte County Association of Governments (BCAG) to ensure a coordinated approach in the development and implementation of transportation plans throughout the county. This coordination ensures compliance with pertinent provisions of the CAA and CCAA, as well as with related transportation legislation (such as the Intermodal Surface Transportation Efficiency Act, Transportation Conformity requirements, and transportation improvement plans).

The BCAQMD continues to work with the public, the business sector, and local governments to protect the public's health and provide for the improvement of the county's air quality resources.

To protect public health, the BCAQMD has adopted plans to achieve ambient air quality standards. The district continuously must monitor its progress for plan implementation and must report this effort regularly to the ARB and the EPA. It also must revise its attainment plans periodically to reflect new conditions and requirements. The BCAQMD tries to exercise a uniform emission-control effort to bring the entire region into compliance with State and federal standards as quickly as possible.

## **5. Air Quality Plans**

The CCAA requires districts to adopt air quality attainment plans and to review and revise their plans to address deficiencies in interim measures of pro-

gress once every three years. The BCAQMD has adopted several attainment plans in an attempt to achieve State and federal air quality standards. The BCAQMD's Air Quality Attainment Plan was adopted in 1991 and updated in 1994, 1997, 2000, and 2003.

#### **6. Criteria Pollutants/Air Pollutants of Concern**

The federal and State governments have established ambient air quality standards for the following six criteria pollutants: ozone, CO, NO<sub>2</sub>, SO<sub>2</sub>, particulate matter (PM<sub>10</sub> and particulate matter smaller than 2.5 microns or less in diameter [PM<sub>2.5</sub>]), and lead. Ozone and NO<sub>2</sub> are generally considered "regional" pollutants, as these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO<sub>2</sub>, and lead are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a localized pollutant as well as a regional pollutant. Within Butte County, CO, PM<sub>10</sub>, and ozone are considered pollutants of concern. The more stringent standard for PM<sub>2.5</sub> that went into effect in December 2006 is expected to result in a designation of non-attainment for the federal 24-hour standard, although it was not so designated as of the writing of this report in early 2007.<sup>3</sup> Toxic air contaminants (TACs) are also discussed below, although no State or federal ambient air quality standards exist for these pollutants. Brief descriptions of these pollutants are provided below, and a complete summary of State and national ambient air quality standards (CAAQS and NAAQS, respectively) is provided in Table 15-1. Additional information regarding the County's attainment status for these various pollutants, and regarding the major stationary and mobile sources of air pollution in Butte County, is provided in Section C, below.

It should be noted that Carbon Dioxide (CO<sub>2</sub>), identified as the primary contributor to global warming, is not a regulated pollutant at this time. However, in April 2007 the US Supreme Court ruled that the US EPA has the right to regulate CO<sub>2</sub> as a pollutant, a finding which may result in the development of new standards for CO<sub>2</sub> emissions in the future.

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<sup>3</sup> Gail Williams, Air Quality Planner, Butte County Air Quality Management District. Letter dated March 12, 2007.

a. Ozone (O<sub>3</sub>)

Ozone is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials. Ozone is a severe eye, nose, and throat irritant. Ozone also attacks synthetic rubber, textiles, plants, and other materials. Ozone causes extensive damage to plants by leaf discoloration and cell damage.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors—reactive organic gases (ROGs) and oxides of nitrogen (NO<sub>x</sub>)—react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air-pollution problem. The ozone precursors, ROG and NO<sub>x</sub>, are mainly emitted by mobile sources and by stationary combustion equipment.

On-road motor vehicles and other mobile sources are the largest contributors to NO<sub>x</sub>. NO<sub>x</sub> is a generic term for nitrogen oxides, which are highly reactive gases that contain nitrogen and oxygen in verifiable amounts. Nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) are common NO<sub>x</sub> emissions in the region. However, more stringent mobile-source emission standards and cleaner-burning fuels have largely contributed to the decline in NO<sub>x</sub> emissions. ROGs have been decreasing for the last 30 years because of more stringent motor-vehicle standards and new rules for the control of ROGs from various industrial coating and solvent operations.

State and federal standards for ozone have been set for an 8-hour averaging time. The State 8-hour standard is 0.07 parts per million (ppm), not to be exceeded, and the federal 8-hour standard is 0.08 ppm, not to be exceeded more than three times in any 3-year period. The State has established a 1-hour ozone standard of 0.09 ppm, not to be exceeded, and the federal 1-hour ozone standard of 0.12 ppm recently was replaced by the 8-hour standard. State and federal standards are summarized in Table 15-1.

b. Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials. Particulate emissions are generated by a wide variety of sources, including agricultural activities (including burning), industrial emissions, dust suspended by vehicle traffic and construction equipment, particulates from residential fuel combustion, and secondary aerosols formed by reactions in the atmosphere. On an annual average basis, directly emitted PM<sub>10</sub> and PM<sub>2.5</sub> contribute approximately 70 percent of the ambient PM<sub>10</sub> and PM<sub>2.5</sub> in the region.

The federal and State ambient air quality standard for particulate matter applies to two classes of particulates: PM<sub>10</sub> and PM<sub>2.5</sub>. The State PM<sub>10</sub> standards are 50 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) as a 24-hour average and 20  $\mu\text{g}/\text{m}^3$  as an annual arithmetic mean. The federal PM<sub>10</sub> standards are 150  $\mu\text{g}/\text{m}^3$  as a 24-hour average and 50  $\mu\text{g}/\text{m}^3$  as an annual arithmetic mean. The federal PM<sub>2.5</sub> standards are 15  $\mu\text{g}/\text{m}^3$  for the annual average and 35  $\mu\text{g}/\text{m}^3$  for the 24-hour average. The State PM<sub>2.5</sub> standard is 12  $\mu\text{g}/\text{m}^3$  as an annual arithmetic mean. State and federal standards are summarized in Table 15-1.

c. Carbon Monoxide

CO is essentially inert to plants and materials but can have significant effects on human health. CO is a public health concern because it combines readily with hemoglobin and reduces the amount of oxygen transported in the bloodstream. It can cause health problems such as fatigue, headache, confusion, dizziness, and even death.

Motor vehicles are the dominant source of CO emissions in most areas, although agricultural burning and other managed burning is a significant contributor to CO emissions in the county. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through

early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

State and federal CO standards have been set for both 1-hour and 8-hour averaging times. The State 1-hour standard is 20 ppm by volume, and the federal 1-hour standard is 35 ppm. Both State and federal standards are 9 ppm for the 8-hour averaging period. State and federal standards are summarized in Table 15-1.

d. Toxic Air Contaminants

TACs are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer). They include the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g. dry cleaners). TACs are typically found in low concentrations, even near their source (e.g. benzene near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air with the potential to cause cancer. It is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the ARB, diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the ARB and are listed as carcinogens either under the State's Proposition 65 or under the federal programs for hazardous air pollutants. California has adopted a comprehensive program for reducing diesel risks. The EPA and the ARB have adopted low sulfur diesel-fuel standards that will reduce diesel particulate matter substantially. These went into effect in June 2006.

### *C. Existing Conditions*

Butte County is located in the northern portion of the Sacramento Valley Air Basin (SVAB), which includes the counties of Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba. The SVAB is bounded on the north by the Cascade Range, on the south by the Greater Sacramento Air Region and San Joaquin Valley Air Basin, on the east by the Sierra Nevada, and on the west by the Coast Range.

#### **1. Regional Climate and Meteorology**

Summer conditions in the northern portion of the SVAB are typically characterized by high temperatures and low humidity, with temperatures averaging approximately 90°F during the day and 50°F at night. During the summer months, the prevailing winds are typically from the south.

Winter conditions are characterized by occasional rainstorms interspersed with stagnant and sometimes foggy weather. The daytime average is in the low 50s, and nighttime temperatures average in the upper 30s during winter periods. During winter, winds predominate from the south, but north winds frequently occur. Rainfall occurs mainly between late October and early May, with an average of 17.2 inches per year, but this amount can vary significantly each year. Weather data from the California Irrigation Management Information System monitor in Durham are summarized in Table 15-2 and help to characterize conditions in Butte County.

Dispersion of local pollutant emissions is predominantly affected by the prevailing wind patterns and inversions that often occur in the northern SVAB. Within the SVAB, two types of inversions can occur. During summer months, sinking air forms a “lid” over the region and confines pollution to a shallow layer near the ground, which can contribute to photochemical smog problems. During winter nights, air near the ground cools while the air aloft

remains warm, which can cause localized air-pollution “hot spots” near emission sources because of poor dispersion.<sup>4</sup>

## 2. Ambient Air Quality Conditions

Existing air quality conditions in Butte County can be characterized in terms of the ambient air quality standards that the federal and State governments have established for various pollutants, as shown in Table 15-1, and by monitoring data collected in the region. Monitoring data concentrations are typically expressed in terms of ppm or micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Air quality monitoring stations located in Butte County include the Chico monitoring station, which monitors for ozone,  $\text{NO}_2$ ,  $\text{SO}_2$ ,  $\text{CO}$ , and  $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$ , metals, toxics and meteorological data; the Paradise Airport Road monitoring station, which monitors for ozone; and the Paradise Fire Station monitoring station, which monitors for  $\text{PM}_{10}$ .

Air quality monitoring data from these monitoring stations are summarized in Table 15-3. This information represents air quality monitoring data for the last three years (2003–2005) for which complete data are available. As indicated in Table 15-3, the monitoring stations in Butte County have experienced occasional violations of the following standards during this 3-year monitoring period:

- ◆ 1-hour ozone: CAAQS
- ◆ 8-hour ozone: NAAQS
- ◆  $\text{PM}_{10}$ : CAAQS
- ◆  $\text{PM}_{2.5}$ : NAAQS

## 3. Attainment Status and Air Quality Planning

If monitored pollutant concentrations meet State or federal standards over a designated period of time, the area is classified as being in attainment for that pollutant. If monitored pollutant concentrations violate the standards, the area is considered a nonattainment area for that pollutant. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated unclassified.

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<sup>4</sup> Butte County Air Quality Management District, 1997.

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TABLE 15-2 AVERAGE MONTHLY WEATHER CONDITIONS (1983-2006) AT THE DURHAM MONITORING STATION

Month	Total Precipitation (inches)	Average Maximum Air Temperature (°F)	Average Minimum Air Temperature (°F)	Average Air Temperature (°F)	Average Maximum Relative Humidity (%)	Average Minimum Relative Humidity (%)	Average Relative Humidity (%)	Average Dew Point (°F)	Average Wind Speed (miles per hour)
January	4.39	54.7	37.5	45.4	92	65	81	39.5	4.9
February	3.97	61.3	39.6	49.8	86	49	70	39.1	5.4
March	3.43	66.4	41.9	53.9	88	45	67	42.4	5.4
April	1.61	72.8	45.4	59.1	86	38	61	44.5	5.3
May	1.18	80.5	52.2	66.6	86	36	58	50.2	5.1
June	0.78	86.9	57.9	72.6	85	35	56	55.0	4.8
July	0.19	91.7	60.5	76.3	87	37	58	60.0	3.9
August	0.17	90.5	57.8	74.2	87	36	58	58.1	3.8
September	0.62	87.2	55.0	70.4	84	32	55	52.6	3.9
October	1.33	78.7	48.4	62.3	84	33	58	46.2	4.0
November	2.82	63.9	40.7	51.4	90	50	72	42.0	4.3
December	4.00	54.3	36.6	44.7	92	63	80	38.4	5.0

Source: California Irrigation Management Information System 2005.

TABLE 15-3 AMBIENT AIR QUALITY MONITORING DATA MEASURE AT THE CHICO, PARADISE AIRPORT ROAD, AND PARADISE FIRE STATION MONITORING STATIONS

Pollutant Standards	Chico			Paradise Airport Road			Paradise Fire Station		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
<b>Ozone</b>									
Maximum 1-hour concentration (ppm)	0.092	0.088	0.083	0.101	0.103	0.092	-	-	-
Maximum 8-hour concentration (ppm)	0.076	0.073	0.077	0.091	0.094	0.085	-	-	-
<b>Number of Day Standard Exceeded<sup>a</sup></b>									
NAAQS 1-hour ( $> 0.12$ ppm)	0	0	0	0	0	0	-	-	-
CAAQS 1-hour ( $> 0.09$ ppm)	0	0	0	5	2	0	-	-	-
NAAQS 8-hour ( $> 0.08$ ppm)	0	0	0	8	3	1	-	-	-
<b>Carbon Monoxide (CO)</b>									
Maximum 8-hour concentration (ppm)	2.54	2.86	2.74	-	-	-	-	-	-
Maximum 1-hour concentration (ppm)	3.9	3.6	3.3	-	-	-	-	-	-
<b>Number of Days Standard Exceeded<sup>a</sup></b>									
NAAQS 8-hour ( $\geq 9.0$ ppm)	0	0	0	-	-	-	-	-	-
CAAQS 8-hour ( $\geq 9.0$ ppm)	0	0	0	-	-	-	-	-	-
NAAQS 1-hour ( $\geq 35$ ppm)	0	0	0	-	-	-	-	-	-
CAAQS 1-hour ( $\geq 20$ ppm)	0	0	0	-	-	-	-	-	-
<b>Particulate Matter (PM10)<sup>b</sup></b>									
National <sup>f</sup> maximum 24-hour concentration ( $\mu\text{g}/\text{m}^3$ )	54.0	110.0	71.0	-	-	-	44.0	44.0	40.0
National <sup>f</sup> second-highest 24-hour concentration ( $\mu\text{g}/\text{m}^3$ )	41.0	76.0	61.0	-	-	-	32.0	44.0	38.0
State <sup>d</sup> maximum 24-hour concentration ( $\mu\text{g}/\text{m}^3$ )	54.0	115.0	76.0	-	-	-	42.0	42.0	37.0
State <sup>d</sup> second-highest 24-hour concentration ( $\mu\text{g}/\text{m}^3$ )	44.0	76.0	65.0	-	-	-	30.0	42.0	36.0
National annual average concentration ( $\mu\text{g}/\text{m}^3$ )	14.0	18.0	21.0	-	-	-	16.7	18.5	17.7
State annual average concentration ( $\mu\text{g}/\text{m}^3$ ) <sup>e</sup>	21.7	28.8	23.9	-	-	-	-	17.8	-

TABLE 15-3 AMBIENT AIR QUALITY MONITORING DATA MEASURE AT THE CHICO, PARADISE AIRPORT ROAD, AND PARADISE FIRE STATION MONITORING STATIONS (CONTINUED)

Pollutant Standards	Chico			Paradise Airport Road			Paradise Fire Station		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
<b>Number of Days Standard Exceeded<sup>a</sup></b>									
NAAQS 24-hour (> 150 µg/m <sup>3</sup> ) <sup>f</sup>	0.0	0.0	0.0	-	-	-	-	0.0	0.0
CAAQS 24-hour (> 50 µg/m <sup>3</sup> ) <sup>f</sup>	5.8	30.2	29.0	-	-	-	-	0.0	-
<b>Particulate Matter (PM2.5)</b>									
National <sup>e</sup> maximum 24-hour concentration (µg/m <sup>3</sup> )	33.0	65.0	67.0	-	-	-	-	-	-
National <sup>e</sup> second-highest 24-hour concentration (µg/m <sup>3</sup> )	32.0	54.0	54.0	-	-	-	-	-	-
State <sup>d</sup> maximum 24-hour concentration (µg/m <sup>3</sup> )	56.1	76.3	82.7	-	-	-	-	-	-
State <sup>d</sup> second-highest 24-hour concentration (µg/m <sup>3</sup> )	55.0	71.2	74.1	-	-	-	-	-	-
National <sup>b</sup> annual average concentration (µg/m <sup>3</sup> )	10.5	15.1	12.3	-	-	-	-	-	-
State <sup>c</sup> annual average concentration (µg/m <sup>3</sup> ) <sup>e</sup>	15.9	16.5	13.8	-	-	-	-	-	-
<b>Number of Days Standard Exceeded<sup>a</sup></b>									
NAAQS 24-hour (> 65 µg/m <sup>3</sup> )	0	0	1	-	-	-	-	-	-

Notes: CAAQS = California ambient air-quality standards.

NAAQS = national ambient air-quality standards.

- = insufficient data available to determine the value.

ppm = parts per million

µg/m<sup>3</sup> = micrograms per cubic meter

<sup>a</sup> An exceedance is not necessarily a violation.

<sup>b</sup> Measurements usually are collected every 6 days.

<sup>c</sup> National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

<sup>d</sup> State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

<sup>e</sup> State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

<sup>f</sup> Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored.

Sources: California Air Resources Board, 2006b; U.S. Environmental Protection Agency, 2007.

Attainment status for various pollutants is summarized in Table 15-4.

#### **4. Existing Air Quality Inventory**

Butte County is home to many industries, processes, and actions that generate emissions of criteria pollutants. The ARB compiles an emissions inventory for all sources of emissions within the county. This inventory is used by the BCAQMD and the ARB for regional air quality planning purposes, and is the basis for the region's air quality plans, and includes such sources as *stationary sources* (e.g. landfills, electric utilities, and mineral processes), *area-wide sources* (e.g. farming operations, construction/demolition activities, and residential fuel combustion), and *mobile sources* (e.g. automobiles, aircraft, and off-road equipment).

A summary of emissions of criteria pollutants for 2005 is provided in Table 15-5. In addition to the three source types listed above (stationary, area-wide and mobile), the table includes natural sources such as wildfires and biogenic and geogenic sources. This table reveals a number of findings regarding regional pollution generators. For example, the primary source of CO and NO<sub>x</sub> pollution in Butte County is mobile sources, especially on-road vehicles. As a percentage of total annual emissions in the county, all mobile sources combined produced nearly half of CO emissions and 80 percent of NO<sub>x</sub> emissions in 2005. Also, natural sources of pollution, biogenic sources in particular, contribute substantially to TOG and ROG emissions while wildfires accounted for approximately 40 percent of CO emissions.

#### **5. Agricultural Open Burning**

Agricultural open burning has been an important waste management tool for farmers as well as forest and wildland managers in Butte County. Such burning helps farmers remove crop residues left in the field after harvesting grains such as rice, wheat or corn, and for orchard prunings and removal. Burning is also helpful in removing weeds, preventing disease, and controlling pests. For some crops, particularly rice, the burning of straw or stubble is the most efficient and effective way to control disease. In the Sacramento Valley, rice

TABLE 15-4 **STATE AND FEDERAL ATTAINMENT DESIGNATIONS FOR BUTTE COUNTY**

Pollutant	Federal Standards	State Standards
1-hour ozone	Transitional nonattainment (CAA Section 185A area) <sup>a</sup>	Moderate nonattainment
8-hour ozone	Subpart 1 nonattainment	n/a <sup>b</sup>
Carbon monoxide (CO)	Moderate ( $\leq 12.7$ ppm) maintenance for Chico area; unclassified/attainment in other areas	Attainment
Inhalable particulate matter (PM <sub>10</sub> )	Unclassified/attainment	Nonattainment
Inhalable particulate matter (PM <sub>2.5</sub> )	Unclassified/attainment	Nonattainment

Notes: n/a = not applicable.

<sup>a</sup> Previously in a nonattainment area, no longer subject to the 1-hour standard as of June 15, 2005.

<sup>b</sup> The California Air Resources Board approved the 8-hour ozone standard on April 28, 2005, and it became effective on May 17, 2006. However, the ARB has not yet designated areas for this standard.

has historically accounted for the majority of local agricultural burning, with corn and wheat close behind.

Agricultural burning is not prohibited under state law but the ARB and local air districts strictly regulate this activity. Pollutants from open burning are believed to contribute less than seven percent to Butte County's ground-level ozone and less than nine percent to PM<sub>10</sub> (particulate matter less than 10 microns in diameter). As part of the effort to reduce air pollution in the Sacramento Valley Air Basin, agricultural burning is controlled through a process of permits, rules, and regulations. Penalties for violating California air pollution regulations can be expensive—as much as \$50,000 per day. Keeping agricultural burning operations within the legal requirements not only avoids costly penalties, but also helps provide a healthier environment for the public.

TABLE 15-5 2005 BUTTE COUNTY AIR QUALITY INVENTORY

Source Type	Subcategory	Annual Emissions (Tons Per Day)						
		TOG	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Stationary Sources</b>								
<i>Fuel Combustion</i>								
Stationary	Electric utilities	0.04	0.02	4.3	0.34	0	0.1	0.18
Stationary	Cogeneration	0	0	0.01	0	0	0	0
Stationary	Manufacturing and industrial	0.02	0.01	0.05	0.27	0.01	0.01	0.01
Stationary	Food and agricultural processing	0.04	0.03	0	0.26	0	0.02	0.02
Stationary	Service and commercial	0.05	0.02	0.07	0.38	0	0.01	0.01
Stationary	Other (fuel combustion)	0.06	0.05	0.09	0.39	0.03	0.05	0.04
<i>Total Fuel Combustion</i>		<i>0.21</i>	<i>0.13</i>	<i>4.52</i>	<i>1.64</i>	<i>0.04</i>	<i>0.18</i>	<i>0.26</i>
<i>Waste Disposal</i>								
Stationary	Sewage treatment	0	0	0	0	0	0	0
Stationary	Incinerators	0	0	0	0	0	0	0
Stationary	Other (waste disposal)	0	0	0	0	0	0	0
<i>Total Waste Disposal</i>		<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
<i>Cleaning and Surface Coatings</i>								
Stationary	Laundering	0.05	0	0	0	0	0	0
Stationary	Degreasing	0.65	0.45	0	0	0	0	0
Stationary	Coatings and related process solvents	1.58	1.54	0	0	0	0	0
Stationary	Printing	0.01	0.01	0	0	0	0	0
Stationary	Adhesives and sealants	0.12	0.11	0	0	0	0	0
<i>Total Cleaning and Surface Coatings</i>		<i>2.41</i>	<i>2.11</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
<i>Petroleum Production and Marketing</i>								
Stationary	Oil and gas production	0.33	0.1	0.12	0.03	0	0	0
Stationary	Petroleum marketing	0.74	0.73	0	0	0	0	0
<i>Total Petroleum Production and Marketing</i>		<i>1.07</i>	<i>0.84</i>	<i>0.12</i>	<i>0.03</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
<i>Industrial Processes</i>								
Stationary	Chemical	0	0	0	0	0	0	0
Stationary	Food and agriculture	0	0	0	0.01	0	1.38	0.61
Stationary	Mineral processes	0.01	0.01	0.01	0.01	0.01	0.53	0.21
Stationary	Metal processes	0	0	0	0	0	0	0
Stationary	Wood and paper	0.2	0.14	0	0.01	0	1.73	1.03
Stationary	Other (industrial processes)	0	0	0	0	0	0	0
<i>Total Industrial Processes</i>		<i>0.21</i>	<i>0.15</i>	<i>0.01</i>	<i>0.03</i>	<i>0.01</i>	<i>3.64</i>	<i>1.86</i>
<b>Total Stationary Sources</b>		<b>3.90</b>	<b>3.23</b>	<b>4.65</b>	<b>1.70</b>	<b>0.05</b>	<b>3.82</b>	<b>2.12</b>

TABLE 15-5 2005 BUTTE COUNTY AIR QUALITY INVENTORY (CONTINUED)

Source Type	Subcategory	Annual Emissions (Tons Per Day)						
		TOG	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Area-Wide Sources</b>								
<i>Solvent Evaporation</i>								
Area-wide	Consumer products	1.92	1.65	0	0	0	0	0
Area-wide	Architectural coatings and related process solvents	0.63	0.61	0	0	0	0	0
Area-wide	Pesticides/fertilizers	0.78	0.78	0	0	0	0	0
Area-wide	Asphalt paving/roofing	2.82	2.82	0	0	0	0	0
<i>Total Solvent Evaporation</i>		6.16	5.87	0.00	0.00	0.00	0.00	0.00
<i>Miscellaneous Processes</i>								
Area-wide	Residential fuel combustion	2.91	1.28	18.25	0.67	0.05	2.76	2.66
Area-wide	Farming operations	4.78	0.38	0	0	0	5.49	1.22
Area-wide	Construction and demolition	0	0	0	0	0	1.08	0.22
Area-wide	Paved-road dust	0	0	0	0	0	3.45	0.58
Area-wide	Unpaved-road dust	0	0	0	0	0	7.59	1.61
Area-wide	Fugitive windblown dust	0	0	0	0	0	0.27	0.06
Area-wide	Fires	0.01	0.01	0.12	0	0	0.01	0.01
Area-wide	Managed burning and disposal	1.5	1.04	11.83	0.67	0.02	1.51	1.41
Area-wide	Cooking	0.05	0.04	0	0	0	0.11	0.06
Area-wide	Other (miscellaneous processes)	0	0	0	0	0	0	0
<i>Total Miscellaneous Processes</i>		9.25	2.74	30.20	1.34	0.07	22.27	7.85
<b>Total Area-Wide Sources</b>		<b>15.41</b>	<b>8.62</b>	<b>30.20</b>	<b>1.34</b>	<b>0.07</b>	<b>22.27</b>	<b>7.85</b>
<b>Mobile Sources</b>								
<i>On-Road Motor Vehicles</i>								
Mobile	Light-duty passenger	2.87	2.66	22.08	1.92	0.01	0.08	0.05
Mobile	Light-duty trucks - 1	1.92	1.79	17.1	1.43	0.01	0.04	0.03
Mobile	Light-duty trucks - 2	1.03	0.95	9.09	1.05	0	0.04	0.02
Mobile	Medium-duty trucks	0.58	0.54	5.13	0.63	0	0.02	0.01
Mobile	Light heavy-duty gas trucks—1	0.24	0.22	1.39	0.17	0	0.01	0
Mobile	Light heavy-duty gas trucks—2	0.03	0.03	0.21	0.03	0	0	0
Mobile	Medium heavy-duty gas trucks	0.37	0.35	2.47	0.16	0	0	0
Mobile	Heavy heavy-duty gas trucks	0.22	0.2	2.83	0.25	0	0	0
Mobile	Light heavy-duty diesel trucks—1	0.02	0.01	0.04	0.22	0	0	0
Mobile	Light heavy-duty diesel trucks—2	0.01	0.01	0.02	0.08	0	0	0
Mobile	Medium heavy-duty diesel trucks	0.03	0.02	0.15	0.72	0.01	0.02	0.02
Mobile	Heavy heavy-duty diesel trucks	0.16	0.13	0.6	2.71	0.03	0.07	0.06
Mobile	Motorcycles	0.22	0.21	1.2	0.04	0	0	0
Mobile	Heavy-duty diesel urban buses	0.01	0.01	0.03	0.15	0	0	0

TABLE 16 -5 2005 BUTTE COUNTY AIR QUALITY INVENTORY (CONTINUED)

Source Type	Subcategory	Annual Emissions (Tons Per Day)						
		TOG	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Mobile	Heavy-duty gas urban buses	0.07	0.06	0.67	0.07	0	0	0
Mobile	School buses	0.02	0.02	0.21	0.11	0	0	0
Mobile	Motorhomes	0.1	0.08	2.26	0.19	0	0	0
<i>Total On-Road Motor Vehicles</i>		<i>7.88</i>	<i>7.28</i>	<i>65.47</i>	<i>9.92</i>	<i>0.07</i>	<i>0.29</i>	<i>0.20</i>
<i>Other Mobile Sources</i>								
Mobile	Aircraft	0.54	0.48	4.48	0.24	0.05	0.02	0.02
Mobile	Trains	0.17	0.15	0.59	3.41	0.37	0.1	0.09
Mobile	Ships and commercial boats	0	0	0	0.01	0	0	0
Mobile	Recreational boats	1.2	1.1	4.96	0.23	0	0.11	0.09
Mobile	Off-road recreational vehicles	2.24	2.06	7.87	0.16	0	0.01	0
Mobile	Off-road equipment	1.32	1.19	11.36	2.94	0.01	0.23	0.2
Mobile	Farm equipment	0.48	0.41	2.97	3.02	0.02	0.2	0.19
Mobile	Fuel storage and handling	0.23	0.23	0	0	0	0	0
<i>Total Other Mobile Sources</i>		<i>6.18</i>	<i>5.62</i>	<i>32.23</i>	<i>10.02</i>	<i>0.45</i>	<i>0.67</i>	<i>0.59</i>
<b>Total Mobile Sources</b>		<b>14.06</b>	<b>12.90</b>	<b>97.70</b>	<b>19.94</b>	<b>0.52</b>	<b>0.96</b>	<b>0.79</b>
<b>Natural Sources</b>								
Natural sources	Biogenic sources	42.57	40.61	0	0	0	0	0
Natural sources	Geogenic sources	0	0	0	0	0	0	0
Natural sources	Wildfires	9.79	3.29	89.04	2.74	0.84	9.02	7.65
<b>Total Natural Sources</b>		<b>52.37</b>	<b>43.90</b>	<b>89.04</b>	<b>2.74</b>	<b>0.84</b>	<b>9.02</b>	<b>7.65</b>
<b>BUTTE COUNTY TOTAL</b>		<b>85.74</b>	<b>68.65</b>	<b>221.59</b>	<b>25.72</b>	<b>1.48</b>	<b>36.07</b>	<b>18.41</b>

Notes:

- TOG = Total organic gases
- ROG = Reactive organic gases
- CO = Carbon monoxide
- NO<sub>x</sub> = Oxides of Nitrogen
- SO<sub>x</sub> = Oxides of Sulfur
- PM = Total particulate matter
- PM<sub>10</sub> = Particulate matter 2.5 microns or less in diameter
- PM<sub>2.5</sub> = Particulate matter 2.5 microns or less in diameter

Source: California Air Resources Board 2006c.

A BCAQMD Burn Permit is required for burning agricultural waste, land clearing waste, or levee, ditch, timber harvesting operations, prescribed burning, and right-of-way clearing waste. Burning is allowed only on permissive burn days, when forecasted weather conditions create enough air movement to permit good smoke dispersal. The ARB determines permissive burn days and the number of acres allocated for agricultural and open burning based on meteorological and air quality factors. When conditions have been met, ARB authorizes burning in the Sacramento Valley Air Basin. Burning is also restricted to certain times of the day. All burn permit holders must comply with local fire protection agency permit requirements.

The BCAQMD handles the day-to-day implementation of the agricultural burning program by issuing burn permits, informing growers and land managers of when and how much they can burn, conducting complaint investigations, conducting enforcement procedures in violation cases, and publishing educational materials on air quality issues.

The Rice Straw Burning Reduction Act was enacted in 1991 by the California Legislature to phase down—but not phase out—burning of rice straw in the Sacramento Valley Air Basin. Beginning in 2001, rice straw burning was limited to 25 percent of the planted acres. In order to burn, however, growers must show proof of crop loss due to disease, and only 125,000 acres per year will be allocated basinwide. Because of the phase down, growers are seeking alternatives to burning.

Aside from burning related directly to agricultural processes, burning activities in Butte County also pertain to the operation or maintenance of water delivery systems, wildland burning, forest management burning including silviculture and timber operations, and prescribed burning.

#### **6. Residential/Dooryard Open Burning**

Residential or “dooryard” burning is the burning of vegetative waste in a 4-foot by 4-foot pile and is regulated by local, State and federal fire protection agencies as well as the BCAQMD. It is allowed only on permissible burn

days, as determined by the BCAQMD. Burn day information is available seven days a week from the burn line (530-896-2537) and any person wishing to burn must *confirm* the burn day status before beginning. Commercial entities are allowed to use open burning if the burning is performed for the purpose of fire hazard reduction to comply with local fire agencies, commercial land clearing for future development and sale or fire hazard reduction.

Only vegetative waste or *clean* dry paper products may be burned in accordance with local fire agency requirements. District Rule 300 and State law prohibit the burning of garbage, tires, trash, construction materials, plastic, bedding or furniture, paint, rubber, cotton, wool, petroleum products, other similar smoke or toxic fume producing items, and fireworks.

The ARB has identified smoke and ash from burning residential waste as contributors of toxic air pollutants. As a result, the ARB adopted the Residential Waste Burning Airborne Toxic Control Measure, which took effect in January, 2004. The regulation restricts residential burning statewide to the burning of dry, natural vegetation and prohibits the use of burn barrels. Burn barrels have been prohibited because they were found to contain household garbage that produces toxic smoke and fumes when burned.

## **7. Smoke and Public Health**

As a source of air pollution, smoke can pose a threat to human respiratory systems. Smoke particles are very small droplets of condensed organic vapors, unburned fuel, soot and ash that escape from fire. These can cause and aggravate lung damage, chronic lung disease, and cancer. Smoke contains ozone-forming compounds (volatile organic compounds and oxides of nitrogen) and significant amounts of fine particles and other pollutants. Toxic residue from compounds in smoke can remain in the air for weeks; if inhaled, it can lodge deep in the lungs, causing irritation and coughing.

Responsible compliance with the rules for agricultural and open burning minimizes the impact on public health for residents of the county. The Sacramento Valley Basinwide Air Pollution Control Council, comprised of nine air districts, develops a smoke management programs (SMP), subject to ARB

approval. The SMP specifies requirements for determining agricultural burn hours and daily, basinwide acreage allocations, commensurate with weather conditions and air quality levels. The SMP contributes to a decrease in the total percentage of local acreage being burned by limiting burning on poor air quality days, thus reducing the negative impacts of smoke on the health of Butte County residents.

**BUTTE COUNTY GENERAL PLAN 2030**  
**SETTING AND TRENDS**  
AIR QUALITY