Chapter 2
Air Quality of El Dorado County

2.1 Air Quality Setting

El Dorado County has two distinct air quality settings, which have been recognized formally by division of the county into two separate air basins, the Mountain Counties Air Basin and the Lake Tahoe Air Basin.

Mountain Counties Air Basin

The MCAB (Figure 2.1 below) is comprised of Plumas, Sierra, Nevada, Placer (middle portion), El Dorado (western portion), Amador, Calaveras, Tuolumne, and Mariposa counties.

Figure 2.1

The basin lies along the northern Sierra Nevada mountain range, close to or contiguous with the Nevada border, and covers an area of roughly 11,000 square miles. The western slope of El Dorado County, from Lake Tahoe on the east to the Sacramento County boundary on the west, lies within the MCAB. Elevations range from over 10,000 feet at the Sierra crest down to

several hundred feet above sea level at the Sacramento County boundary. Throughout the county, the topography is highly variable, and includes rugged mountain peaks and valleys with extreme slopes and differences in altitude in the Sierras, as well as rolling foothills to the west.

The general climate of the MCAB varies considerably with elevation and proximity to the Sierra ridge. The terrain features of the basin make it possible for various climates to exist in relatively close proximity. The pattern of mountains and hills causes a wide variation in rainfall, temperature, and localized winds throughout the basin. Temperature variations have an important influence on basin wind flow, dispersion along mountain ridges, vertical mixing, and photochemistry. The Sierra Nevada receives large amounts of precipitation from storms moving in from the Pacific in the winter, with lighter amounts from intermittent "Monsoonal" moisture flows from the south and cumulus buildup in the summer. Precipitation levels are high in the highest mountain elevations but decline rapidly toward the western portion of the basin. Winter temperatures in the mountains can be below freezing for weeks at a time, and substantial depths of snow can accumulate, but in the western foothills, winter temperatures usually dip below freezing only at night and precipitation is mixed as rain or light snow. In the summer, temperatures in the mountains are mild, with daytime peaks in the 70s to low 80s F, but the western end of the county can routinely exceed 100 degrees F.

From an air quality perspective, the topography and meteorology of the MCAB combine such that local conditions predominate in determining the effect of emissions in the basin. Regional airflows are affected by the mountains and hills, which direct surface air flows, cause shallow vertical mixing, and create areas of high pollutant concentrations by hindering dispersion. Inversion layers, where warm air overlays cooler air, frequently occur and trap pollutants close to the ground. In the winter, these conditions can lead to CO "hotspots" along heavily traveled roads and at busy intersections. During summer's longer daylight hours, stagnant air, high temperatures, and plentiful sunshine provide the conditions and energy for the photochemical reaction between reactive organic compounds (ROG) and oxides of nitrogen (NOx) that results in the formation of ozone (O_3). Because of its long formation time, ozone is a regional pollutant rather than a local hotspot problem.

In the summer, the strong upwind valley air flowing into the basin from the Central Valley to the west is an effective transport medium for ozone precursors and ozone generated in the Bay Area and the Sacramento and San Joaquin valleys. These transported pollutants predominate as the cause of ozone in the MCAB and are largely responsible for the exceedances of the state and federal ozone AAQS in the MCAB. The California Air Resources Board (ARB) has officially designated the MCAB as "ozone impacted" by transport from those areas (13 CCR sec. 70500).

Lake Tahoe Air Basin

The LTAB (see Figure 2.2 below) is comprised of the surface of Lake Tahoe (roughly 20 miles long by 10 miles wide) and land up to the surrounding rim of mountain ridges. The southern portion of the air basin is in El Dorado County and the northern portion is in Placer County. The lake is at an altitude of 6,200 feet, and the ridges climb to over 10,000 feet. The mountain slopes surrounding the lake are quite precipitous, and are broken by deep valleys carved by streams that drain into the lake.

Figure 2.2

The meteorology of the LTAB in winter is typified by large amounts of precipitation from Pacific storms that fall mainly as snow, and temperatures below freezing accompanied by winds, cloudiness, and lake and valley fog. Winter days can also bring cool, brilliantly clear days between storms. In the summer, the LTAB experiences sunny, mild days, with daytime peaks in the upper 70s and low 80s F, with an occasional thunderstorm from southern flows of moisture.

The principal impact of these conditions in terms of air quality is excess wintertime concentrations of CO in the more congested/populated areas of the basin, primarily at South Lake Tahoe, from vehicles and residential wood stoves and fireplaces. Some summer transport of ozone from the west is also known to occur, but has not yet been officially recognized as a transport route by CARB.

2.2 National and State Ambient Air Quality Standards

At the federal level, acceptable ambient levels of air pollution, known as the National Ambient Air Quality Standards (national AAQS), have been established by the U.S. EPA for carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. The National AAQS have been divided into primary and secondary standards. Primary standards refer to the levels of air quality necessary, with an adequate margin of safety, to protect the public health. Secondary standards refer to the levels of air quality necessary to protect the public welfare (e.g., agriculture, visibility, property) from any known or anticipated adverse effects of a pollutant. Pollutants for which a national primary AAQS has been established are referred to as “criteria” pollutants, because they are supported by exhaustive studies of health effects criteria used to establish a direct relationship between ambient concentrations and their effects, and to determine what levels are acceptable.

The California Air Resources Board (CARB) has likewise adopted state AAQS which address the national criteria pollutants and, generally, set more stringent limits. The State AAQS also include standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility.

All of the state and national AAQS are displayed in Table B.2.

The air pollutants of primary concern in El Dorado County are discussed in more detail below.

Ozone

Ozone in the lower atmosphere is one of the main components of smog. It is not directly emitted but is formed in the atmosphere over several hours from reactions of various precursors in the presence of sunlight. Nitrogen oxides (NO_x) and reactive organic gases (ROG) are the primary reactive compounds, or precursors, contributing to the formation of ozone. Ozone is treated as both a secondary pollutant (meaning that it is formed in the atmosphere from other pollutants) and a regional pollutant (because there are not ozone "hot spots" but, rather, broad geographic areas in which elevated ozone levels can be found).

Short-term exposure to ozone, a strongly oxidizing form of oxygen, results in injury and damage to the lung, decreases in pulmonary function, and impairment of immune mechanisms. These changes have been implicated in the development of chronic lung disease as the result of longer-term exposure. Symptoms of ozone irritation include shortness of breath, chest pain when inhaling deeply, wheezing, and coughing. Children and persons with pre-existing respiratory disease (e.g., asthma, chronic bronchitis, emphysema) are at greater risk. In addition, effects on vegetation have been documented at concentrations below the standards.

EPA set the national primary and secondary ozone AAQS at 0.12 ppm, averaged over a one-hour period. CARB has set a more stringent one-hour state AAQS for ozone at 0.09 parts per million (ppm). In 1997 EPA adopted a new ozone primary eight-hour standard of 0.08 ppm, ostensibly to replace the one-hour standard. Implementation of the eight-hour standard was delayed by litigation, but was determined to be valid and enforceable by the U.S. Supreme Court in a decision issued in February of 2001. However, the new federal ozone standard is not yet in effect pending final resolution of this litigation and adoption of implementing regulations.

In 2000, CARB inventory data show that average daily emissions of the principal ozone precursors, ROG and NOx, from all anthropogenic (non-natural) sources in El Dorado County were estimated at 116 and 66 tons, respectively, with on- and off-road mobile sources making up about 72% of ROG and 86% of NO_x emissions.

Inhalable Particulates

Inhalable particulates refer to particulate matter less than 10 microns in diameter (PM_{10}). Particulates are classified as primary or secondary depending on their origin. Primary particles are unchanged after being directly emitted (e.g., road dust) and are the most commonly analyzed and modeled form of PM_{10}. Because it is emitted directly and has limited dispersion characteristics, this type of PM_{10} is considered a localized pollutant. In addition, secondary PM_{10}

can be formed in the atmosphere through chemical reactions involving emissions of ROG, NOx, and sulfur oxides (SOx). Much of the PM_{10} and fine particulates ($PM_{2.5}$) that can be breathed into the lungs is comprised of secondary particulate matter.

Recent studies undertaken by EPA identify the following key adverse health effects associated with PM concentrations in excess of the national AAQS:

- premature mortality;
- aggravation of respiratory and cardiovascular disease as indicated by increased hospital admissions, emergency room visits, school absences, work loss days, and restricted activity;
- changes in lung function and increased respiratory symptoms;
- changes to lung tissues and structure; and
- altered respiratory defense mechanisms.

According to EPA, recent epidemiological information indicates that several subpopulations are apparently more sensitive to effects of community air pollution containing PM. Observed effects include decreases in pulmonary function reported in children and increased mortality reported in the elderly and individuals with cardiopulmonary disease.

EPA's 24-hour primary and secondary national AAQS for PM_{10} is 150 $\mu g/m^3$ and its annual average primary and secondary AAQS is 50 $\mu g/m^3$. CARB has established a more stringent 24-hour state AAQS for PM_{10} at 50 micrograms per cubic meter ($\mu g/m^3$), and has also set an annual average state AAQS for PM_{10} at 30 $\mu g/m^3$. In 1997, EPA set a national AAQS for $PM_{2.5}$ at 65 $\mu g/m^3$ over 24 hours and 15 $\mu g/m^3$ as an annual geometric mean; implementation of this standard has also been delayed by litigation and will not occur until EPA has issued court-approved guidance.

In 2000, CARB inventory data show that average daily anthropogenic emissions of PM_{10} in El Dorado County were estimated at 122 tons per day. Of this, about 60% came from road dust, 15% from residential fuel combustion (such as wood-burning stoves and fireplaces), and 13% from construction, demolition and waste burning. Wildfires added another 6 tons per day.

Carbon Monoxide

Carbon monoxide is formed by the incomplete combustion of carbon-containing fuels. Because it is directly emitted from combustion engines, carbon monoxide can have adverse localized impacts, primarily in areas of heavy traffic congestion. Because it is emitted directly and has limited dispersion characteristics, CO is considered a localized pollutant.

When carbon monoxide combines with hemoglobin in the blood, the oxygen-carrying capacity of the blood is reduced and the release of oxygen is inhibited or slowed. This condition places angina patients, persons with other cardiovascular diseases or with chronic obstructive lung disease, asthmatics, persons with anemia, and fetuses at risk. At higher levels, CO also affects the central nervous system. Symptoms of exposure may include headaches, dizziness, sleepiness, nausea, vomiting, confusion, and disorientation.

EPA's primary and secondary AAQS is 35 ppm for one hour. CARB's AAQS for carbon monoxide is 20 ppm for a one-hour period. For an eight-hour average, EPA and CARB have the same AAQS of 9 ppm. CARB also has adopted a special eight-hour CO primary standard, applicable only in the LTAB, of 6 ppm.

CARB inventory data indicate that average daily anthropogenic carbon monoxide emissions in El Dorado County were estimated at 891 tons per day in 2000, with motor vehicles contributing approximately 70% of that total. Residential fuel combustion, utilities, and manufacturing contributed the remainder.

Nitrogen Dioxide (NO_2)

NO_2 is a reddish brown gas that is a by-product of fuel combustion, mostly from motor vehicle and industrial sources. Aside from its contribution to ozone formation, nitrogen dioxide can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as the active coloring agent in a brown cloud on high pollution days, especially when both NO_2 and high ozone levels are present. The national primary and secondary AAQS for NO_2 is 0.053 ppm (annual arithmetic mean). The state AAQS is 0.25 ppm for one hour.

Sulfur Dioxide (SO_2)

Sulfur dioxide is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. SO_2 is a colorless acid gas with a strong, acrid odor. Like nitrogen dioxide, sulfur dioxide can irritate lung tissue and increase the risk of acute and chronic respiratory disease. For SO_2 the primary national AAQS is 0.030 ppm (annual geometric mean) and 0.14 ppm (1-hour), and the secondary national standard is 0.5 ppm (over 3-hours). The state AAQS is 0.04 ppm (24-hour) and 0.25 ppm (1-hour).

2.3 Attainment Status

Under state and federal law, CARB is required to designate areas of the state as attainment, nonattainment, or unclassified with respect to any AAQS. An "attainment" designation signifies that pollutant concentrations did not exceed the standard over the requisite number of years; "nonattainment" indicates that an area exceeded the standard one or more times in a year (excluding exceptional events such as a forest fire); and "unclassified" means that sufficient data do not exist to support classification as attainment or nonattainment. The federal and California Clean Air Acts divide nonattainment air basins into moderate, serious, or severe categories for some pollutants, depending on how high pollutant concentrations are, and impose increasingly stringent emission control requirements as the category designation moves from moderate to severe.

Table 2.1 below summarizes the attainment status of the El Dorado County portion of the MCAB.

Table 2.1 Attainment Status of the El Dorado County Portion of the Mountain Counties Air Basin

Pollutant	Federal	State
Ozone (O_3) - 1 hour	Severe Nonattainment	Nonattainment
Carbon Monoxide (CO)	Unclassified/Attainment	Unclassified
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Inhalable Particulates (PM_{10})	Unclassified	Nonattainment
Sulfates	*(No federal standard)*	*Attainment*
Lead (particulate)	*No designation*	*Attainment*
Hydrogen Sulfide	*(No federal standard)*	*Attainment*
Visibility Reducing Particulates	*(No federal standard)*	*Unclassified*

Source: Air Resources Board, "Area Designations for State and National Ambient Air Quality Standards."

The El Dorado County portion of the LTAB is designated attainment or unclassified for all pollutants, except with regard to the state standard for PM_{10}, for which it is designated nonattainment.

The Federal Clean Air Act has not established national AAQS for toxic air contaminants; nor has ARB done so for California. As a result, they are not considered criteria pollutants; however, they are regulated under separate programs, and are described further in Chapter 7 of this Guide.

2.4 Existing Ambient Air Quality

In El Dorado County, ambient air quality has been monitored at several locations for over 20 years. The most recent data are from monitoring conducted at three CARB-operated monitoring stations in Placerville, Cool, and South Lake Tahoe in 1998-2000. In 2000, a fourth station at Echo Summit started providing data. Table 2.2, below, summarizes pollutants and meteorology monitored at these stations.

Table 2.2 Ambient Air Monitoring Stations in El Dorado County

Pollutants and Meteorology Monitored	Placerville	Cool	S. Lake Tahoe	Echo Summit
Ozone	X	X	X	X
Nitrogen Dioxide			X	X
Nitric Oxide				
Sulfur Dioxide				
Carbon Monoxide	X		X	X
Inhalable Particulates (PM_{10})	X			X
Fine Particulates ($PM_{2.5}$)			X	X
Wind Speed	X	X	X	X
Wind Direction	X	X	X	X
Ambient Temperature	X	X	X	X
Source: California Air Resources Board, 2001				

Based on the most recent three-year set of monitoring data available for complete years (1998-2000), the state and national AAQS for ozone (1-hour) and the state AAQS for PM_{10} (24-hour) have been exceeded in El Dorado County. The ozone exceedances were recorded on a regular basis in the summer "ozone season" each year at the Placerville and Cool stations; there have been no recent ozone exceedances at South Lake Tahoe or Echo Summit. The PM_{10} exceedances were at South Lake Tahoe, and only for the state 24-hr standard in 1998. There have been no recent exceedances of the national or state AAQS for CO, including the special CO standard applicable in Lake Tahoe. Table 2.3, below, summarizes the most recent exceedance data for all measured pollutants from 1998 through 2000 in El Dorado County.

Table 2.3 Number of AAQS Exceedances in El Dorado County 1998-2000

	1998			1999			2000			
	PLA	COO	SLT	PLA	COO	SLT	PLA	COO	SLT	ECH
State 1-hr Ozone	22	30	0	21	36	1	19	34	0	0
National 1-hr Ozone	2	5	0	2	2	0	0	2	0	0
State 24-hr PM_{10}	0	--	2	0	--	0	0	--	0	0
National 24-hr PM_{10}	0	--	0	0	--	0	0	--	0	0
State 8-hr CO	0	--	0	0	--	0	0	--	0	0
National 8-hr CO	0	--	0	0	--	0	0	--	0	0
State 1-hr NO_2	--	--	0	--	--	0	--	--	0	0

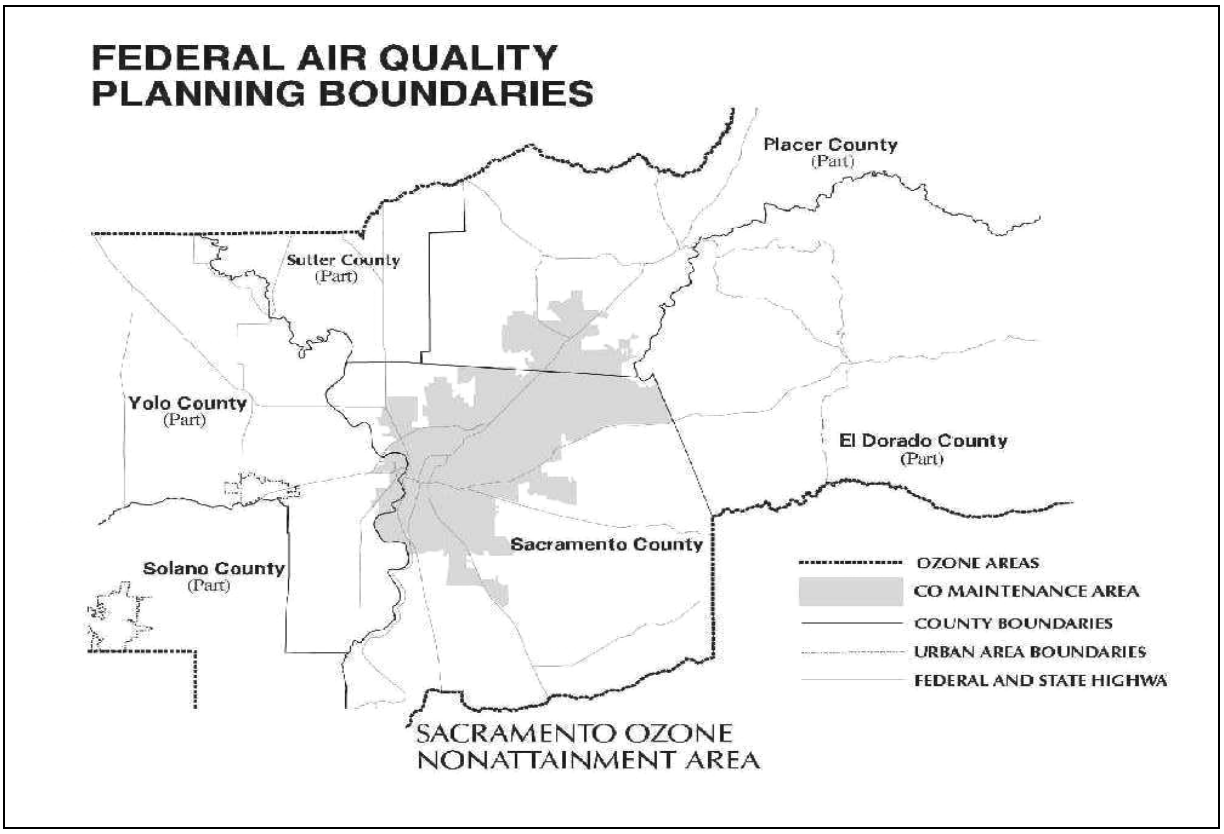
PLA = Placerville
COO = Cool
SLT = South Lake Tahoe
ECH = Echo Summit
Source: California Air Resources Board, 2001

Agencies and project proponents should contact the District to determine whether other data are available to depict air quality in the vicinity of the project site, such as monitoring or meteorological data from permitted facilities. Projects located close to the Sacramento County border should refer to air quality data for the eastern-most portion of Sacramento, particularly data from the Folsom monitoring station.

2.5 Sacramento Federal Ozone Nonattainment Area

The MCAB portion of El Dorado County lies within the area designated by the U.S. Environmental Protection Agency (EPA) as the Sacramento Federal Ozone Nonattainment Area, comprised of Sacramento and Yolo counties, and parts of El Dorado, Solano, Placer, and Sutter counties. See Figure 2.3, below.

Figure 2.3
Sacramento Federal Ozone Nonattainment Area



As the EPA nonattainment designation suggests, this region does not meet the federal ozone standard. The standard was set by the EPA to help achieve one of the primary federal Clean Air Act goals – to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population."[1] The Nonattainment Area is required under state and federal law to meet the federal ozone standard by 2005, or face significant consequences that range from the imposition of financial penalties and permit bans to the adoption of even more stringent federal air emission control requirements.

In response to the complex factors that contribute to the regional ozone problem, the three Air Quality Management Districts (AQMDs) and two Air Pollution Control Districts (APCDs) that govern in the region jointly developed and approved a plan for achieving attainment. The El Dorado APCD is one of the two APCDs involved in the development of the plan. This plan, the Sacramento Area Regional Ozone Attainment Plan – commonly referred to as the 1994 State Implementation Plan (1994 SIP) for Sacramento – identifies a comprehensive regional strategy to reduce emissions to the level required for attainment of the federal standards.

[1] 42 U.S.C.S. § 7401, subs. (b)(1).

Although the Sacramento region currently does not meet the federal ozone standard, it has made significant progress towards attainment. The five nonattainment area air districts in the region completed an assessment of progress in a 1999 Milestone Report. The report, which is available from any of the five districts, details the substantial progress already made, and reinforces the need to aggressively pursue the strategies laid out in the 1994 SIP. This guide addresses one of those strategies — the reduction of air quality emissions from land use development through the review of projects under the California Environmental Quality Act (CEQA).[2]

2.6 Air Quality Management

Various local, regional, state, and federal government agencies share the responsibility for air quality management in El Dorado County. At the local level, the APCD adopts and enforces regulations to control emissions from all sources other than motor vehicles (collectively referred to as stationary sources). As noted above, the APCD takes action to address its part of the regional ozone problem along with four other air districts: Sacramento Metropolitan AQMD, Feather River AQMD, Placer County APCD, and Yolo-Solano AQMD. At the state level, the California Air Resources Board (CARB) sets emission standards for motor vehicles and oversees the actions of all air districts in the state in their efforts to control stationary sources emissions. Together, CARB and the air districts have the responsibility for attaining and maintaining the national and state ambient air quality standards. The air districts and CARB work jointly with the U.S. EPA to develop and implement the State Implementation Plan, or SIP, which is designed to achieve and maintain federal ambient air quality standards; EPA has authority under federal law to step in if state authorities do not meet their obligations in this regard. Local Councils of Governments, county transportation agencies, cities and counties, and various non-governmental organizations also join in the efforts to improve air quality through a variety of programs. These programs include the adoption of regulations and policies, as well as implementation of extensive education and public outreach programs. In the Lake Tahoe Air Basin portion of the county, the Tahoe Regional Planning Agency (TRPA) takes air quality into consideration in its planning and permitting activities.

Appendix B provides further information about these agencies and includes an overview of federal and state laws and programs that affect air quality.

[2] Pub. Resources Code, § 21000, et seq.