

Air Quality

This section of the Background Report describes the existing conditions of the City of Elk Grove relative to Air Quality.

Air Basin Characteristics

The Elk Grove Planning Area (Planning Area) lies at the southern end of the Sacramento Valley, a broad, flat valley bounded by the coastal ranges to the west and the Sierra Nevada to the east. A sea level gap in the Coast Range (the Carquinez Strait) is located approximately 50 miles southwest and the intervening terrain is very flat. The prevailing wind direction is southwesterly, which is the wind direction when marine breezes flow through the Carquinez Strait. Marine breezes dominate during the spring and summer months, and show strong daily variations. Highest average wind speeds occur in the afternoon and evening hours; lightest winds occur in the night and morning hours. During fall and winter, when the sea breeze diminishes, northerly winds occur more frequently, but southwesterly winds still predominate. The Planning Area is within the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD), which is part of the Sacramento Valley Air Basin. The Sacramento Valley Air Basin has been further divided into Planning Areas called the Northern Sacramento Valley Air Basin (NSVAB) and the Greater Sacramento Air region, designated by the U.S. Environmental Protection Agency (EPA) as the Sacramento Federal Ozone non-attainment area. The non-attainment area consists of all of Sacramento and Yolo counties and parts of El Dorado, Solano, Placer, and Sutter counties.

The San Francisco Bay Area Air Basin lies to the west, and the San Joaquin Valley Air Basin is located to the south of the Planning Area. Considerable transport of pollutants occurs between these air basins, so that air quality in the Planning Area is partially determined by the release of pollutants elsewhere. In turn, pollutants generated in the Planning Area affect air quality in areas to the north and east.

Ambient Air Quality Standards

Both the U. S. EPA and the California Air Resources Board (CARB) have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants that represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents. The federal and California state ambient air quality standards are summarized in **Table 2-1** for important pollutants. The federal and state ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the federal and state standards differ in some cases. In general, the California state standards are more stringent. This is particularly true for ozone and PM₁₀.

The U.S. EPA in 1997 adopted new national air quality standards for ground-level ozone and for fine particulate matter. The existing 1-hour ozone standard of 0.12 Parts Per Matter (PPM) will be phased-out and replaced by an 8-hour standard of 0.08 PPM. New national standards for fine particulate matter (diameter 2.5 microns or less) have also been established for 24-hour and annual averaging periods. The current PM₁₀ standards were retained, but the method and form for determining compliance with the standards were revised. Implementation of the new ozone and particulate matter standards was delayed by a lawsuit. On February 27, 2001 the U. S. Supreme Court unanimously ruled in favor of the Environmental Protection Agency, clearing the way for implementation of the new standards.

During the delay caused by the lawsuit, the CARB developed recommended designations for California air basins, proposing that Sacramento County be designated as non-attainment for the new

**Table 2-1
Federal and State Ambient Air Quality Standards**

Pollutant	Averaging Time	Federal Primary Standard	State Standard
Ozone	1-Hour	0.12 PPM	0.09 PPM
	8-Hour	0.08 PPM	--
Carbon Monoxide	8-Hour	9 PPM	9.0 PPM
	1-Hour	35 PPM	20.0 PPM
Nitrogen Dioxide	Annual Average	0.05 PPM	--
	1-Hour	--	0.25 PPM
Sulfur Dioxide	Annual Average	0.03 PPM	--
	24-Hour	0.14 PPM	0.05 PPM
	1-Hour	--	0.25 PPM
PM ₁₀	Annual Average	50 µg/m ³	20 µg/m ³
	24-Hour	150 µg/m ³	50 µg/m ³
PM _{2.5}	Annual	15 µg/m ³	12 µg/m ³
	24-Hour	65 µg/m ³	--

Notes: PPM = Parts per Million; µg/m³ = Micrograms per Cubic Meter
Source: Donald Ballanti, 2003

8-hour ozone standard. Designations for PM_{2.5} have not been made, however, as a minimum 3-year monitoring period is required to determine designations.

Air Pollutants of Concern and Health Effects

The most problematic pollutants in Elk Grove are ozone, carbon monoxide, and particulate matter. Carbon monoxide no longer exceeds the ambient air quality standards in Sacramento County, but has in the past. The health effects and major sources of these pollutants are described below. Toxic air pollutants are a separate class of pollutants and are discussed later in this section.

Ozone

Ground level ozone, commonly referred to as smog, is greatest on warm, windless, sunny days. Ozone is not emitted directly into the air, but formed through a complex series of chemical reactions between reactive organic gases (ROG) and nitrogen oxides (NOx). These reactions occur over time in the presence of sunlight. Ground level ozone formation can occur in a matter of hours under ideal conditions. The time

required for ozone formation allows the reacting compounds to spread over a large area, producing a regional pollution concern. Once formed, ozone can remain in the atmosphere for one or two days.

Ozone is also a public health concern because it is a respiratory irritant that increases susceptibility to respiratory infections and diseases, and because it can harm lung tissue at high concentrations. In addition, ozone can cause substantial damage to leaf tissues of crops and natural vegetation and can damage many natural and manmade materials by acting as a chemical oxidizing agent.

The principal sources of the ozone precursors (ROG and NOx) are the combustion of fuels and the evaporation of solvents, paints, and fuels. Over percent of the NOx produced in the region is from motor vehicles.

Particulate Matter (PM)

Particulate matter can be divided into several size fractions. Coarse particles are between 2.5 and 10 microns in diameter, and arise primarily from natural processes,

such as wind-blown dust or soil. Fine particles are less than 2.5 microns in diameter and are produced mostly from combustion, or burning activities. Fuel burned in cars and trucks, power plants, factories, fireplaces and wood stoves produces fine particles.

The level of fine particulate matter in the air is a public health concern because it can bypass the body's natural filtration system more easily than larger particles, and can lodge deep in the lungs. The health effects vary depending on a variety of factors, including the type and size of particles. Research has demonstrated a correlation between high PM concentrations and increased mortality rates. Elevated PM concentrations can also aggravate chronic respiratory illnesses such as bronchitis and asthma.

Carbon Monoxide (CO)

Carbon monoxide (CO) is an odorless, colorless gas that is formed by the incomplete combustion of fuels. Motor vehicle emissions are the dominant source of CO in the Sacramento region. At high concentrations, CO reduces the oxygen-carrying capacity of the blood and can cause dizziness, headaches, unconsciousness, and even death. CO can also aggravate cardiovascular disease. Relatively low concentrations of CO can significantly affect the amount of oxygen in the bloodstream because CO binds to hemoglobin 220-245 times more strongly than oxygen.

CO emissions and ambient concentrations have decreased significantly in recent years. These improvements are due largely to the introduction of cleaner burning motor vehicles and motor vehicle fuels. The Sacramento region has attained the State and national CO standard. The records from the region's monitoring stations show that the CO standard has not been exceeded since 1999. CO is still a pollutant that must be closely monitored, however, due to its severe effect on human health.

Elevated CO concentrations are usually localized and are often the result of a combination of high traffic volumes and traffic congestion. Elevated CO levels develop primarily during winter periods of light winds or calm conditions combined with the formation of ground-level temperature inversions. Wintertime CO concentrations are higher in winter because of reduced dispersion of vehicle emissions and because CO emission rates from motor vehicles increase as temperature decreases.

Toxic Air Contaminants (TACs)

In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. Unlike criteria pollutants, no safe levels of exposure to TACs have been established. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Public exposure to TACs can result from emissions from normal operations, as well as accidental releases of hazardous materials during upset conditions. The health effects of TACs include cancer, birth defects, neurological damage and death.

Diesel exhaust is a TAC of growing concern in California. The CARB in 1998 identified diesel engine particulate matter as a TAC. The exhaust from diesel engines contains hundreds of different gaseous and particulate components, many of which are toxic. Many of these compounds adhere to the particles, and because diesel particles are so small, they penetrate deep into the lungs. Diesel engine particulate has been identified as a human carcinogen. Mobile sources, such as trucks, buses, automobiles, trains, ships and farm equipment are by far the largest source of diesel emissions. Studies show that diesel particulate matter

concentrations are much higher near heavily traveled highways and intersections.

Ambient Air Quality

The SMAQMD and CARB maintain several air quality monitoring sites in the Sacramento area, including one in the City of Elk Grove. The Elk Grove monitoring site measures two pollutants: ozone and nitrogen dioxide. The nearest monitoring site for carbon monoxide is at T Street in downtown Sacramento. The nearest monitoring site for PM₁₀ is the Sacramento Branch Center Road site, located near Bradshaw Road south of U.S. 50. **Table 2-2** shows historical occurrences of pollutant levels exceeding the state/federal ambient air quality standards for the ten-year period 1992-2001. The number of days that each standard was exceeded is shown. All

Sensitive Receptors and Pollution Sources

Sensitive receptors are facilities where sensitive receptor population groups (children, the elderly, the acutely ill and the chronically ill) are likely to be located. These land uses include schools, retirement homes, convalescent homes, hospitals and medical clinics. The major sensitive receptors in Elk Grove are schools and residences.

The inventory of stationary sources of TACs maintained by the CARB shows few major air pollutant sources in Elk Grove. Larger stationary sources of pollutants include the Sacramento Regional Wastewater Treatment Plant (SRWTP) and associated cogeneration plant at the western boundary of the city and industrial facilities located at the extreme south end of the city limits near State Route 99 (SR 99). The wastewater treatment facility would also be

**Table 2-2
Days Exceeding Ambient Air Quality Standards, 1992-2001**

Pollutant	Standard	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Ozone (Elk Grove)	1-Hour State	-	3	8	15	21	5	7	16	3	10
	1-Hour Federal	-	0	0	0	0	0	1	1	0	0
	8-Hour Federal	-	0	3	4	9	3	4	7	1	3
Carbon Monoxide (T Street)	8-Hour State/Federal	0	0	0	0	0	0	0	0	0	0
	1-Hour State	0	0	0	0	0	0	0	0	0	0
Nitrogen Dioxide (Elk Grove)	1-Hour State	-	0	0	0	0	0	0	0	0	0
PM10 (Branch Center Road)	24-Hour State	-	7	3	4	2	3	8	11	2	3
	24-Hour Federal	-	0	0	0	0	0	0	0	0	0

Source: Ballanti, 2002.

federal ambient air quality standards are met in the Elk Grove area, with the exception of ozone. Additionally, the state ambient standards of ozone and PM₁₀ are regularly exceeded.

a potential source of odors. SR 99 and Interstate 5 (I-5) are also obvious sources of pollution in the Planning Area.

Emerging Air Quality Issues

The following is a discussion of emerging air quality issues that would not normally have been addressed by general plan policies and programs.

Diesel Exhaust/Land Use Issues

In 1998, after a 10-year scientific assessment process, the Air Resources Board identified particulate matter from diesel-fueled engines as a toxic air contaminant (TAC). Unlike criteria pollutants like carbon monoxide, TACs do not have ambient air quality standards. Since no safe levels of TACs can be determined, there are no air quality standards for TACs. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. Two types of risk are usually assessed: chronic non-cancer risk and acute non-cancer risk. Diesel particulate has been identified as a carcinogenic material, but is not considered to have acute non-cancer risks. The state has begun a program of identifying and reducing risks associated with particulate matter emissions from diesel-fueled vehicles. The plan consists of new regulatory standards for all new on road, off-road and stationary diesel-fueled engines and vehicles, new retrofit requirements for existing on-road, off-road and stationary diesel-fueled engines and vehicles, and new diesel fuel regulations to reduce the sulfur content of diesel fuel as required by advanced diesel emission control systems. Land uses where individuals could be exposed to high levels of diesel exhaust include:

- Warehouses
- Schools with high volume of bus traffic
- High volume highways
- High volume arterials and local roadways with high level of diesel traffic.

The only large-scale warehouses in the Planning Area include, but are not limited to, JVC and Apple, which are located north

of Laguna Boulevard in the Laguna West area near I-5. The Elk Grove Unified School District is one of fastest growing districts in the state and currently has 50 schools within its district boundaries. Many of the schools in the District have high volumes of bus traffic during daily morning and afternoon operations, which contribute to diesel emissions in the Planning Area. High volume highways/freeways in the Planning Area include I-5 and SR 99, both of which have high volumes of daily truck traffic. Trucks are considered major sources of diesel related emissions. Additionally, the Planning Area has several high volume arterials and local roadways (i.e., Bradshaw Road, Grant Line Road and Laguna Boulevard) that have considerable amounts of diesel powered vehicles and truck traffic.

Wood Smoke

Wood smoke has long been identified as a significant source of pollutants in urban and suburban areas. Wood smoke contributes to particulate matter and carbon monoxide concentrations, reduces visibility and contains numerous toxic air contaminants. Present controls on this source include the adoption of emission standards for wood stoves and fireplace inserts. Interest in wood smoke is likely to increase with the recent adoption of a PM_{2.5} (particulate matter less than 2.5 microns in diameter) national standard.