GUIDE FOR ASSESSING AND MITIGATING AIR QUALITY IMPACTS

TECHNICAL DOCUMENT

Information for Preparing Air Quality Sections in EIRs

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This *Guide for Assessing and Mitigating Air Quality Impacts Technical Document* (Technical Document) is a companion document to the San Joaquin Valley Air Pollution District*'s Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI).

PREFACE

This *Guide for Assessing and Mitigating Air Quality Impacts Technical Document* (Technical Document) is a companion document to the San Joaquin Valley Air Pollution District*'s Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI*)*. The GAMAQI provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The GAMAQI, at several points, refers readers to the Technical Document for specific air quality information or technical data that are called for in the procedures that it sets forth. The GAMAQI and its supporting Technical Document, thus, should be used together to prepare environmental documents.

The technical document contains the following data:

- Topography and Climate;
- Air Quality Regulation;
- Air Quality in the San Joaquin Valley;
- SJVAPCD District Offices (in Appendix A);
- Transportation Planning Agencies (in Appendix B).

The Technical Document provides extensive data and information on various aspects of air quality. It is the intent of the SJVAPCD that public agencies, consultants, or project applicants be selective in their use of this information. Data may be summarized or expanded upon, depending upon its relevancy to particular projects. The reader is referred to Section 5 of the GAMAQI for further information regarding the data requirements for air quality setting sections of environmental documents.

The SJVAPCD expects to update the Technical Document on a regular basis to reflect current data and information. Public agencies and interested parties will be notified when updated technical documents are available.

GAMAQI TECHNICAL DOCUMENT

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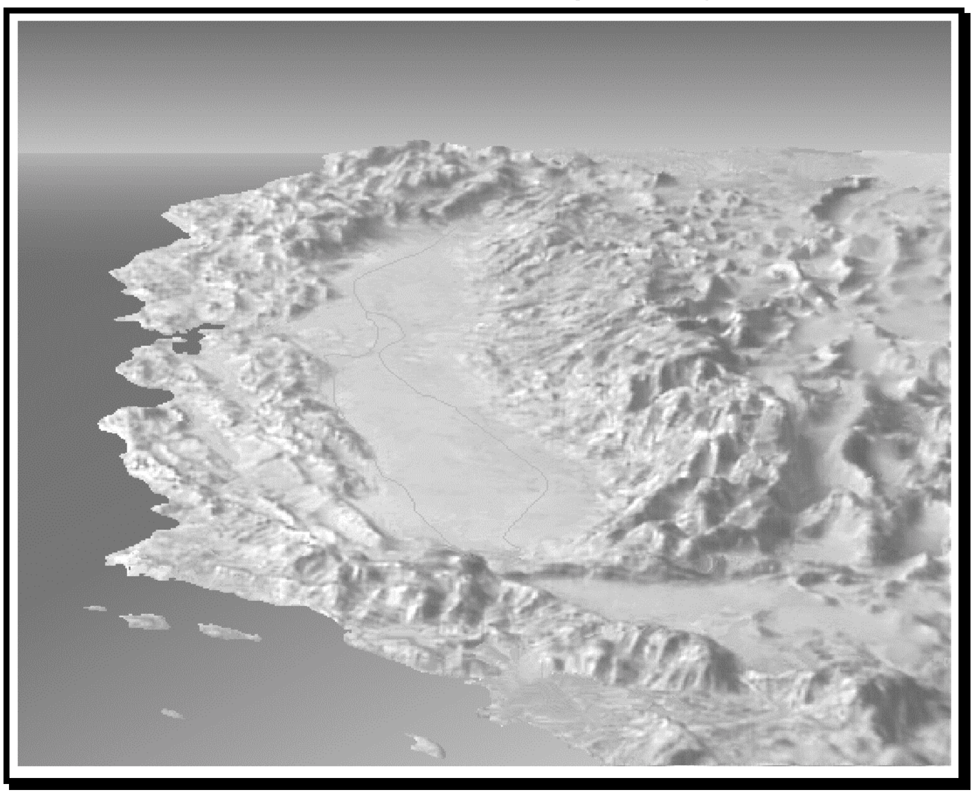
SECTION 1 – TOPOGRAPHY AND CLIMATE

1.1 INTRODUCTION

The California Air Resources Board (ARB) has divided California into regional air basins according to topographic air drainage features. The San Joaquin Valley Air Basin (SJVAB), which is approximately 250 miles long and averages 35 miles wide, is the second largest air basin in the state. Air pollution is directly related to a region's topographic features. The SJVAB is defined by the Sierra Nevada mountains in the east (8,000 to 14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi mountains in the south (6,000 to 8,000 feet in elevation). The valley is basically flat with a slight downward gradient to the northwest. The valley opens to the sea at the Carquinez Straits where the San Joaquin-Sacramento Delta empties into San Francisco Bay. The San Joaquin Valley (SJV), thus, could be considered a "bowl" open only to the north. Figure 1-1 provides an aerial view of the SJV and demonstrates the bowl created in the southern end of the SJV.

Figure 1-1
Aerial View of San Joaquin Valley



Although marine air generally flows into the basin from the San Joaquin River Delta, the region's topographic features restrict air movement through and out of the basin. The Coastal Range hinders wind access into the SJV from the west, the Tehachapis prevent southerly passage of airflow, and the high Sierra Nevada range is a significant barrier to the east. These topographic features result in weak airflow, which becomes blocked vertically by high barometric pressure over the SJV. As a result, the SJVAB is highly susceptible to pollutant accumulation over time. Most of the surrounding mountains are above the normal height of summer inversion layers (1,500-3,000 feet).

Local climatological effects, including wind speed and direction, temperature, inversion layers, and precipitation and fog, can exacerbate the air quality problem in the SJVAB. These factors are described below:

1.2 WIND SPEED AND DIRECTION

Wind speed and direction play an important role in dispersion and transport of air pollutants. Wind at the surface and aloft can disperse pollution by mixing vertically and by transporting it to other locations. Ozone is classified as a "regional" pollutant in part because of the time required for ozone formation. Ozone precursors can be transported well away from the source area before ozone concentrations peak. Respirable particulate matter (PM-10) is also considered a regional pollutant in part because of its tendency to remain suspended in the air over long periods of time. Some other primary pollutants, for example, carbon monoxide (CO), are classified as "localized" pollutants in part because they tend to dissipate easily and therefore may form high concentrations when wind speed is low.

During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of the SJV and flows in a south-southeasterly direction through the SJV, through Tehachapi pass, into the Southeast Desert Air Basin.

During the winter, wind speed and direction data indicate that wind occasionally originates from the south end of the SJV and flows in a north-northwesterly direction. Also during the winter months, the SJV experiences light, variable winds, less than 10 mph. Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high CO and PM-10 concentrations.

Superimposed on this seasonal regime is the diurnal wind cycle. In the SJV, this cycle takes the form of a combination of sea breeze-land breeze and mountain-valley regimes. The sea breeze-land breeze regime has a sea breeze flowing into the SJV from the north during the day and a land breeze flowing out of the SJV at night. The mountain-valley regime has an upslope (mountain) flow during the day and a downslope (valley) flow at night. These phenomena add to the complexity of regional wind flow and pollutant transport within the SJVAB.

1.3 TEMPERATURE

Temperature and solar radiation are particularly important in the chemistry of ozone formation. Ozone is formed in a photochemical reaction requiring sunlight. Generally, the higher the temperature, the more ozone formed, since reaction rates increase with temperature. However, extremely hot temperatures can “lift” or “break” the inversion layer. Typically, if the inversion layer doesn’t lift to allow the build up of contaminants to be dispersed into the Southeast Desert, the ozone levels will peak in the late afternoon, sometimes as late as 3 to 7 p.m. If the inversion layer breaks and the resultant afternoon winds occur, the ozone will peak in the early afternoon and decrease in the late afternoon as the contaminants are transported to the Southeast Desert. Temperature is not as important to formation of high CO or PM-10 levels.

The SJVAB has an “inland Mediterranean” climate averaging over 260 sunny days per year. The valley floor is characterized by warm, dry summers and cooler winters. Summer high temperatures often exceed 100 ºF, averaging in the low 90s in the northern valley and high 90s in the south. In the entire SJV, high daily temperature readings in summer average 95 ºF. Over the last 30 years, the SJV averaged 106 days a year 90 ºF or hotter, and 40 days a year 100 ºF or hotter. The daily summer temperature variation can be as high as 30 ºF.

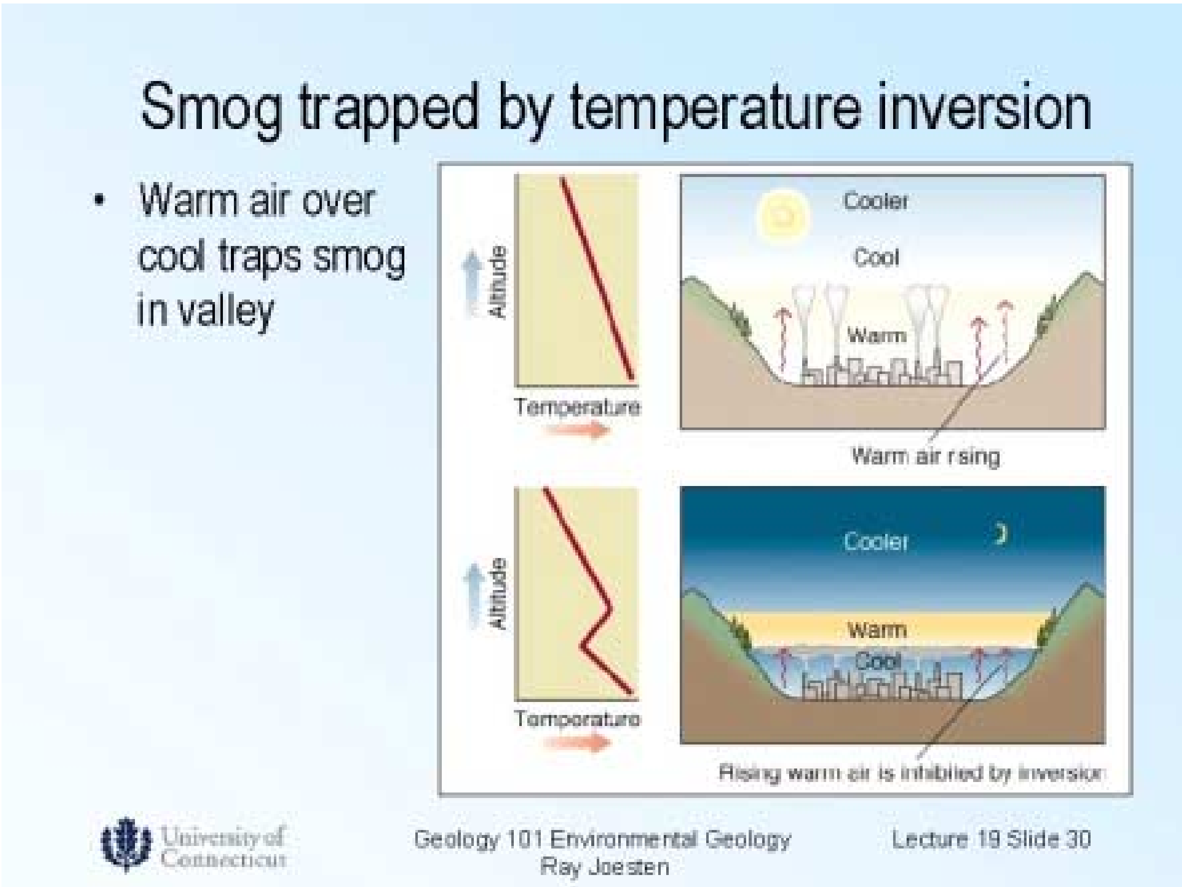
In winter, as the cyclonic storm track moves southward, the storm systems moving in from the Pacific Ocean bring a decidedly maritime influence to the SJV. The high mountains to the east prevent the cold, continental air masses of the interior from influencing the valley. Thus, winters are mild and humid. Temperatures below freezing are unusual. Average high temperatures in the winter are in the 50s, but highs in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature is 45 ºF.

1.4 TEMPERATURE INVERSIONS

The vertical dispersion of air pollutants in the SJV is limited by the presence of persistent temperature inversions. Because of expansional cooling of the atmosphere, air temperature usually decreases with altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. Figure 1-2 depicts a typical temperature inversion. Inversions can exist at the surface, or at any height above the ground. The height of the base of the inversion is known as the “mixing height”. This is the level to which pollutants can mix vertically. Semi-permanent systems of high barometric pressure fronts frequently establish themselves over the SJVAB, deflecting low-pressure systems that might otherwise bring cleansing rain and winds.

Air above and below the inversion base does not mix because of differences in air density. Warm air above the inversion is less dense than below the base. The inversion base represents an abrupt density change where little exchange of air occurs. This phenomenon is similar to that of the abrupt density change that separates skim and whole milk. Inversion layers are significant in determining ozone formation and CO and PM-10 concentrations. Ozone and its precursors will mix and react to produce higher concentrations under an inversion, and inversions trap and hold directly emitted pollutants like CO. PM-10 is both directly emitted and created in the atmosphere as a chemical reaction. Concentration levels are directly related to inversion layers due to the limitation of mixing space. There are two principal types of inversions that occur in the SJV: a surface or radiation inversion, and a subsidence inversion.

Figure 1-2
Temperature Inversion



Surface inversions are formed when the ground surface becomes cooler than the air above it during the night. The earth's surface goes through a radiative process on clear nights, where heat energy is transferred from the ground to a cooler night sky. As the earth's surface cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air: this heating stimulates the ground-level air to float up through the inversion layer. Daytime temperature inversions during the summer are usually encountered 2,000 to 2,500 feet above the valley floor. Inversions are more persistent (stable) during the winter months. The daily cycle has overnight inversions occurring 500 to 1000 feet above the valley floor. Studies in the southern part of the Valley indicate more frequent and persistent daytime radiation inversions than in the north due to the lack of marine air intrusion

Subsidence inversions occur as air is pushed downward by some mechanism, such as the movement of air over mountain ranges, or by differential pressure changes in the atmosphere. As this air moves downward, its pressure increases, causing its temperature to increase. The warm layer of air created by this phenomenon will descend to some relatively static elevation above the ground, creating a low inversion layer. This type of inversion is quite persistent, since heat from the ground does not reach the inversion base to break it up. This is common in high-pressure areas along the coast.

1.5 PRECIPITATION AND FOG

Precipitation and fog tend to reduce or limit some pollutant concentrations. Ozone needs sunlight for its formation, and clouds and fog block the required radiation. CO is slightly water-soluble so precipitation and fog tends to “reduce” CO concentrations in the atmosphere. PM-10 is somewhat “washed” from the atmosphere with precipitation.

Precipitation in the SJV is strongly influenced by the position of the semi-permanent subtropical high-pressure belt located off the Pacific coast (Pacific High). In the winter, this high-pressure system moves southward, allowing Pacific storms to move through the SJV. These storms bring in moist, maritime air that produces considerable precipitation on the western, upslope side of the Coast Ranges. Significant precipitation also occurs on the western side of the Sierra Nevada. On the valley floor, however, there is some downslope flow from the Coast Ranges and the resultant evaporation of moisture from associated warming results in a minimum of precipitation. Nevertheless, the majority of the precipitation falling in the SJV is produced by those storms during the winter. Precipitation during the summer months is in the form of convective rain showers and is rare. It is usually associated with an influx of moisture into the SJV through the San Francisco area during an anomalous flow pattern in the lower layers of the atmosphere. Although the hourly rates of precipitation from these storms may be high, their rarity keeps monthly totals low.

Precipitation on the SJV floor and in the Sierra Nevada decreases from north to south. Stockton in the north receives about 20 inches of precipitation per year, Fresno in the center, receives about 10 inches per year, and Bakersfield at the southern end of the valley receives less than 6 inches per year. This is primarily because the Pacific storm track often passes through the northern part of the state while the southern part of the state remains protected by the Pacific High. Precipitation in the SJVAB is confined primarily to the winter months with some also occurring in late summer and fall. Average annual rainfall for the entire SJV is 9.25 inches on the SJV floor.

Snowstorms, hailstorms, and icestorms occur infrequently in the SJV and severe occurrences of any of these are very rare.

The winds and unstable air conditions experienced during the passage of storms result in periods of low pollutant concentrations and excellent visibility. Between winter storms, high pressure and light winds allow cold moist air to pool on the SJV floor. This creates strong low-level temperature inversions and very stable air conditions. This situation leads to the SJV's famous Tule Fogs. The formation of natural fog is caused by local cooling of the atmosphere until it is saturated (dew point temperature). This type of fog, known as radiation fog is more likely to occur inland. Cooling may also be accomplished by heat radiation losses or by horizontal movement of a mass of air over a colder surface. This second type of fog, known as advection fog, generally occurs along the coast.

Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and PM-10. Ozone levels are low during these periods because of the lack of sunlight to drive the photochemical reaction. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large numbers of fireplaces are in use. A secondary peak in CO concentrations occurs during morning commute hours when a large number of motorists are on the road and the surface inversion has not yet broken.

The water droplets in fog, however, can act as a sink for CO and nitrogen oxides (NOx), lowering pollutant concentrations. At the same time, fog could help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of winter season violations of the PM-10 and PM-2.5 standards.

SECTION 2 – AIR QUALITY REGULATION

2.1 INTRODUCTION

All levels of government have some responsibility for protecting air quality. This section outlines the responsibilities of federal, state, regional, and local government agencies in air quality matters and attempts to explain how they interact.

2.2 FEDERAL

At the federal level, the Environmental Protection Agency (EPA) has been charged with implementing national air quality programs. The EPA's air quality mandates are drawn primarily from the Federal Clean Air Act (FCAA). The predecessor to the FCAA was the Federal Air Pollution Control Act (FAPCA), which was enacted in 1955. It empowered the Secretary of Health, Education, & Welfare (HEW) to work for a better understanding of air pollution causes and effects. The first FCAA was enacted in 1963 and empowered the HEW to define air quality criteria. The FCAA was amended in 1970. With this amendment, the President decided to establish an autonomous regulatory body to oversee the enforcement of environmental policy. Thus, the EPA was created from portions of three federal Departments, three Bureaus, three Administrations, two Councils, one Commission, one Service, and many diverse offices. The FCAA was again substantially amended in 1977 and again in 1990.

The EPA deals with global, international, national, and interstate air pollution issues. Its primary role at the state level is one of oversight of state air quality programs. The EPA sets federal vehicle and stationary source emission standards and provides research and guidance in air pollution programs.

The FCAA required the EPA to set National Ambient Air Quality Standards (NAAQS) for several problem air pollutants on the basis of human health and welfare criteria. Two types of NAAQS have been established: primary standards, which protect public health, and secondary standards, which protect the public welfare from non-health-related adverse effects such as visibility reduction. Primary NAAQS were established for the following "criteria" air pollutants (so called because they were established on the basis of health criteria):

- carbon monoxide (CO);
- ozone;
- PM-10;
- PM-2.5;
- nitrogen dioxide (NO_2);
- sulfur dioxide (SO_2); and
- lead.

The primary NAAQS standards are intended to protect, with an adequate margin of safety, those persons most susceptible to respiratory distress, such as people suffering from asthma or other illness, the elderly, very young children, or others engaged in strenuous work or exercise. Table 2-1 presents the NAAQSs.

Table 2-1
National and California Ambient Air Quality Standards

Air Pollutant	Averaging Time	Units[1]	Standards[2]	
			CAAQS[3]	NAAQS[4]
Ozone (O_3)	8 hour[5] 1-hour[6]	ppm ppm	— 0.09	0.08 0.12
Carbon Monoxide (CO)	8 hour 1 hour	ppm ppm	9.0 20	9 35
Nitrogen Dioxide (NO_2)	Annual Average 1 hour	ppm ppm	— 0.25	0.053 —
Sulfur Dioxide (SO_2)	Annual Average 24 hours 1 hour	ppm ppm ppm	— 0.04 0.25	0.03 0.14 —
Fine Particulate Mater (PM-2.5)[7]	Annual Average[8] 24 hours[9]	µg/m³ µg/m³	— —	15 65
Respirable Particulate Matter (PM-10)	Annual 24 hours[10]	µg/m³ µg/m³	30[11] 50	50[12] 150
Lead (Pb)	30 Day Average Calendar Quarter	µg/m³ µg/m³	1.5 —	— 1.5
Sulfates (SOx)	24 hour	µg/m³	25	—
Visibility Reducing Particulates (VSP)	8 hour	—	[13]	—
Vinyl Chloride (chloroethane)	24 hour	ppm	0.010	—
Hydrogen Sulfide (H_2S)	1 hour	ppm	0.03	—

Sources: California Air Resources Board, Facts About Air Quality and 62 FR 38421 (Presidential Executive Order, dated July 16, 1997)

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[1] *Concentration expressed in the following units: ppm refers to parts per million by volume and µg/m³ is micrograms per cubic meter.*
[2] *Only the primary standards are established to protect the public health and are the most stringent federal standards*
[3] *California standards for ozone, CO, SO_2 (1-hour averaging period), NO_2, and PM-10 are not to be exceeded.*
[4] *National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once per year.*
[5] *The 8-hour standard is presented her for information purposes only. The Standard is established but implementation criteria are still to be determined at this time. The federal standard will be evaluated on the 4th highest (daily maximum) 8-hour average per year, averaged over 3 years.*
[6] *The federal 1-hour standard will be attained when the 4th highest (daily maximum) 1-hour average per year, averaged over 3 years, is equal to or less than the standard. Once attained this standard will no longer be in effect.*
[7] *The PM-2.5 standard is presented here for information purposes only. Implementation is in the data-gathering phase.*
[8] *The annual standard will be met when the 3-year average of the annual arithmetic mean PM-2.5 concentration is less than or equal to 15 µg/m³.*
[9] *The 24-hour standard will be met when the 3-year average of the 98th percentile of 24-hour PM-2.5 concentration is less than or equal to 65 µg/m³.*
[10] *The 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.*
[11] *The state PM-10 annual standard is attained when the expected annual geometric mean concentration is less than or equal to 30 µg/m³.*
[12] *The federal PM-10 annual standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 µg/m³.*
[13] *In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.*

The FCAA required each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The Federal Clean Air Act Amendments of 1990 (FCAAA) added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The EPA has responsibility to review all state SIPs to determine if they conform with the mandates of the FCAAA and will achieve air quality goals when implemented. If the EPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

2.3 STATE

The California Air Resources Board (ARB) is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing its own air quality legislation called the California Clean Air Act (CCAA), adopted in 1988. The ARB was created in 1967 from the merging of the California Motor Vehicle Pollution Control Board and the Bureau of Air Sanitation and its Laboratory.

The ARB has primary responsibility in California to develop and implement air pollution control plans designed to achieve and maintain the NAAQS established by the EPA. Whereas the ARB has primary responsibility and produces a major part of the SIP for pollution sources that are statewide in scope, it relies on the local air districts to provide additional strategies for sources under their jurisdiction. The ARB combines its data with all local district data and submits the completed SIP to the EPA. The SIP consists of the emissions standards for vehicular sources and consumer products set by the ARB, and attainment plans adopted by the APCDs and AQMDs and approved by the ARB.

States may establish their own standards, provided the state standards are at least as stringent as the NAAQS. California has established California Ambient Air Quality Standards (CAAQS) pursuant to California Health and Safety Code (CH&SC) [§39606(b)] and its predecessor statutes. Table 2-1 also presents the CAAQSs.

The CH&SC [§39608] requires the ARB to “identify” and “classify” each air basin in the state on a pollutant-by-pollutant basis. Subsequently, the ARB designated areas in California as nonattainment based on violations of the CAAQSs. Designations and classifications specific to the SJVAB can be found in the next section of this document. Areas in the state were also classified based on severity of air pollution problems. For each nonattainment class, the CCAA specifies air quality management strategies that must be adopted. For all nonattainment categories, attainment plans are required to demonstrate a five-percent-per-year reduction in nonattainment air pollutants or their precursors, averaged every consecutive three-year period, unless an approved alternative measure of progress is developed. In addition, air districts in violation of CAAQS are required to prepare an Air Quality Attainment Plan (AQAP) that lays out a program to attain and maintain the CCAA mandates.

Other ARB duties include monitoring air quality. The ARB has established and maintains, in conjunction with local air pollution control districts (APCDs) and air quality management districts, a network of sampling stations (called the State and Local Air Monitoring [SLAMS] network), that monitor what the pollutants levels are actually present in the ambient air. Table 2-2 presents a list of monitoring stations active in the SJVAB as of the writing of this document. In addition, Table 2-2 also indicates which pollutants are monitored and the agency responsible for site operations. The SJVAPCD and ARB add and change monitoring station capability on an ongoing basis. Consult with the ARB web site for the most recent monitoring information.

ARB also sets emissions standards for new motor vehicles, consumer products, small utility engines, and off-road vehicles. In many cases, California standards are the toughest in the nation.

2.4 REGIONAL

State law recognized that air pollution does not respect political boundaries and therefore required the ARB to divide the state into separate air basins that each have similar geographical and meteorological conditions [CH&SC §39606(a)]. Originally, air pollution was regulated separately by county APCDs. Although this is still the practice in most counties in California, many county agencies began to realize that air quality problems are best managed on a regional basis and began to combine their regulatory agencies into regional agencies. This was the case for the SJV, where until 1991, each county operated a local APCD.

Air districts have the primary responsibility for control of air pollution from all sources other than emissions directly from motor vehicles, which are the responsibility of the ARB and the EPA. Air districts adopt and enforce rules and regulations to achieve state and federal ambient air quality standards and enforce applicable state and federal law.

Currently, the San Joaquin Valley Air Pollution Control District (SJVAPCD) has jurisdiction over air quality matters in the SJVAB. The SJVAPCD was formed in 1991. Its headquarters are located in Fresno with regional offices located in Bakersfield in the Southern Region and Modesto in the Northern Region. Note that the eastern portion of Kern County falls outside the SJVAB and is within the Southeast Desert Air Basin and is under another local air pollution control district's (Kern County Air Pollution Control District) jurisdiction.

Table 2-2
Ambient Air Monitoring Stations in the SJV as of June 2001

Fresno County Sites[14]	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency[15]
Clovis – N. Villa Ave.[16]	X	X		X	X			SJVAPCD
Fresno – Sierra Skypark #2[17]	X			X	X			SJVAPCD
Fresno – First St.[18]	X	X	X	X	X			ARB
Fresno – East Drummond[19]	X	X		X	X			SJVAPCD
Parlier[20]	X				X			SJVAPCD
Shaver Lake – Perimeter Road[21]	X							ARB

Kern County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Arvin – Bear Mountain Blvd[22]	X				X			ARB
Bakersfield – Golden State Hwy[23]	X	X		X	X			ARB
Bakersfield – California Ave.[24]	X	X	X	X	X	X		ARB
Edison[25]	X				X			ARB
Maricopa – Stanislaus St.[26]	X							ARB
Oildale – Manor St.[27]	X	X			X			ARB
Shafter – Walker St.[28]	X				X			ARB
Taft – Taft College[29]		X	X					ARB

[14] Latitude/Longitude data from ARB website (www.arb.ca.gov/aaqm/mldaqsb/amn.html)
[15] Agency responsible for operations of station (as of April 2001).
[16] Latitude: 36º 49’ 10” – Longitude:119° 42’ 60”
[17] Latitude: 36º 50’ 28” – Longitude:119° 52’ 58”
[18] Latitude: 36º 46’ 59” – Longitude:119° 46’ 21”
[19] Latitude: 36º 42’ 20” – Longitude:120° 15’ 31”
[20] Latitude: 36º 35’ 48” – Longitude:119° 30’ 15”
[21] Latitude: 37º 8’ 18” – Longitude:119° 15’ 67”
[22] Latitude: 35º 12’ 32” – Longitude:119° 46’ 35”
[23] Latitude: 35º 23’ 8” – Longitude:119° 1’ 0”
[24] Latitude: 35º 21’ 22” – Longitude:119° 2’ 25”
[25] Latitude: 35º 20’ 45” – Longitude:118° 51’ 2”
[26] Latitude: 35º 3’ 16” – Longitude:119° 24’ 1”
[27] Latitude: 35º 26’ 19” – Longitude:119° 1’ 1”
[28] Latitude: 35º 30’ 13” – Longitude:119° 16’ 22”
[29] Latitude: 35º 8’ 6” – Longitude:119° 27’ 3”

Table 2-2 (cont.)
Current Ambient Air Monitoring Stations in the SJV

Kings County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Corcoran – Patterson Ave.[30]		X	X					SJVAPCD
Corcoran – Van Dorsten Ave.[31]		X	X					SJVAPCD
Hanford – S. Irwin St.[32]	X	X			X			SJVAPCD

Madera County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Madera – Pump Yard[33]	X				X			SJVAPCD

Merced County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Merced – M St.[34]		X						SJVAPCD
Merced – S. Coffee Ave.[35]	X				X			SJVAPCD

San Joaquin County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Stockton – Hazelton St.[36]	X	X	X	X	X			ARB
Stockton – Claremont St.[37]				X				ARB
Stockton – E. Mariposa[38]	X							ARB
Stockton – Wagner Holt School[39]		X						SJVAPCD
Tracy – Patterson Pass Road[40]	X				X			SJVAPCD

Stanislaus County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Modesto – 14th Street[41]	X	X	X	X	X			ARB
Turlock – S. Minaret St.[42]	X	X		X	X			SJVAPCD

[30] Latitude: 36º 6’ 10” – Longitude:119° 33’ 58”
[31] Site shut down in 1997 – Patterson site is replacement
[32] Latitude: 36º 18’ 54” – Longitude:119° 38’ 39”
[33] Latitude: 36º 57’ 47” – Longitude:120° 01’ 00”
[34] Latitude: 37º 18’ 31” – Longitude:120° 28’ 47”
[35] Latitude: 37º 16’ 57” – Longitude:120° 25’ 57”
[36] Latitude: 37º 57’ 6” – Longitude:121° 16’ 8”
[37] Latitude: 38º 33’ 12” – Longitude:121° 22’ 29”
[38] Latitude: 37º 54’ 19” – Longitude:121° 8’ 47”
[39] Latitude: 38º 1’ 47” – Longitude:121° 21’ 9”
[40] Latitude: 37º 44’ 12” – Longitude:121° 32’ 3”
[41] Latitude: 37º 38’ 33” – Longitude:120° 59’ 37”
[42] Latitude: 37º 29’ 18” – Longitude:120° 50’ 11”

Tulare County Sites	O_3	PM-10	PM-2.5	CO	NO_2	SO_2	H_2S	Agency
Sequoia NP – Ash Mountain[43]	X							NPS[44]
Sequoia NP – Lookout Point[45]	X							NPS
Sequoia NP – Lower Kaweah[46]	X							NPS
Visalia – N. Church St.[47]	X	X	X	X	X			ARB

Source: ARB Website (http://www.arb.ca.gov/aqd/aqd.htm)

2.4.1 The SJVAPCD's Role

Until the passage of the CCAA, the air districts' primary role was the control of stationary sources of pollution such as industrial processes and equipment that stayed within their political boundaries. With the passage of the CCAA and FCAAA, air districts were also required to implement transportation control measures and were encouraged to adopt indirect source control programs to reduce mobile source emissions. These mandates created the necessity for the SJVAPCD to work more closely with cities and counties and with regional transportation planning agencies to develop new programs.

The SJVAPCD has entered into a memorandum of understanding with the transportation planning agencies of the eight counties in the SJVAB. A list of the Transportation Planning Agencies and their addresses are presented in Appendix B of this document. This memorandum of understanding ensures a coordinated approach in the development and implementation of transportation plans throughout the SJV. This action helps the Regional Transportation Planning Agencies comply with pertinent provisions of the federal and state Clean Air Acts, as well as related transportation legislation (such as the Transportation Equity Act for the 21st Century, Congestion Management Act, Transportation Improvement Plans, etc.).

In addition, whereas the ARB produces a major part of the SIP, it is the responsibility of the local air districts to provide additional strategies for sources under their jurisdiction for inclusion in the state's SIP.

2.4.2 Air Quality Plans

The SJVAPCD has adopted several attainment plans to achieve state and federal air quality standards to comply with CCAA and FCAAA requirements. The SJVAPCD must continuously monitor its progress in implementing attainment plans and must periodically report to the ARB and the EPA. It must also periodically revise its attainment plans to reflect new conditions and requirements in accordance with schedules mandated by the CCAA and FCAAA.

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[43] Latitude: 36º 29' 22" – Longitude:118° 49' 45"
[44] National Park System
[45] Latitude: 36º 25' 43" – Longitude:118° 46' 4"
[46] Latitude: 36º 38' 58" – Longitude:118° 46' 40"
[47] Latitude: 36º 19' 58" – Longitude:119° 17' 27"

The CCAA requires districts to adopt air quality attainment plans and to review and revise their plans to address deficiencies in interim measures of progress once every three years. The SJVAPCD's *Air Quality Attainment Plan* was adopted in 1991 and most recently updated in 2001.

To meet FCAAA and CCAA requirements, the SJVAPCD has submitted numerous plans for attaining ozone, PM-10 and carbon monoxide standards. The current applicable plans and their purposes are shown on Table 2-3. All air quality plans are available for purchase from the SJVAPCD District Headquarters office in Fresno. The most current plans meeting FCAAA requirements can be downloaded from the SJVAPCD web site. The ozone plan projected attainment of the federal ozone standard by 1999, but did not achieve its goal. The EPA has officially redesignated the SJVAB to severe nonattainment for ozone effective December 10, 2001 with a May 31, 2002 deadline for plan submittal. The carbon monoxide plan demonstrates that CO attainment has already been reached. The PM-10 attainment plan sets forth the approach the SJVAPCD will use to attain the NAAQS for PM-10. The 1997 PM-10 Attainment Demonstration Plan has not been approved by EPA to date and the SJVAPCD expects that EPA will disapprove the plan in the next few months triggering the need for a new plan submittal. Since the FCAAA PM-10 attainment deadline for areas classified as serious (December 31, 2001) has passed, the SJVAPCD will be required to submit a new plan by December 31, 2002.

2.4.3 SJVAPCD Rules, Regulations, and Programs

The SJVAPCD's primary means of implementing air quality plans is by adopting rules and regulations. The CH&SC [§42300 *et. seq.*] authorizes districts to adopt rules and regulations and to pursue civil and criminal penalties for violations. The law allows for fines and civil penalties of up to $50,000 per day and imprisonment in the county jail for up to one year. The SJVAPCD has adopted rules on sources ranging from architectural coatings (Rule 4601) to Orchard Heaters (Rule 4303) to Rubber Tire Manufacturing (Rule 4681). The SJVAPCD rulebook contains more than 130 rules and more are scheduled for rule development over the next few years.

Table 2-3
SJVAPCD Air Quality Plans

SJVAPCD Plan	Plan Purpose
1991 Air Quality Attainment Plan for the San Joaquin Valley, January 30, 1992	Establishes the regulatory groundwork in order to bring the SJVAB into compliance with the CAAQS for ozone and CO.
1992 Federal Attainment Plan for Carbon Monoxide	Establishes the regulatory groundwork in order to bring the SJVAB into compliance with the NAAQS for CO.
The Ozone Attainment Demonstration Plan November 14, 1994	Establishes the regulatory groundwork in order to bring the SJVAB into compliance with the NAAQS for ozone. This plan also satisfies the required triennial review for the CAAQS.
Revised 1993 Rate of Progress Plan, November 4, 1994	Demonstrates reasonable further progress in reducing VOC emissions between 1991 and 1996 mandated by FCAAA.
Revised Post-1996 Rate of Progress Plan, September 20, 1995	Demonstrates reasonable further progress in reducing VOC emissions between 1997 and 1999 mandated by FCAAA.
California Clean Air Act Triennial Progress Report and Plan Revision 1995-1997, December 1998	Reports progress in implementing the 1991 Air Quality Attainment Plan for the period 1995 to 1997.
California Clean Air Act Triennial Progress Report and Plan Revision 1997-1999, March 15, 2001	Reports progress in implementing the 1991 Air Quality Attainment Plan for the period 1997 to 1999.
2000 Ozone Rate of Progress Report, April 27, 2000	Demonstrates that mandated emission reductions were achieved from 1997 to 1999 and from 1990 to 1999 mandated by the FCAA.
PM-10 Attainment Demonstration Plan, May 15, 1997	Establishes the regulatory groundwork in order to bring the SJVAB into compliance with the NAAQS for PM-10.
PM-10 Attainment Plan Progress Report, August 17, 2000	Describes progress achieved by the SJVAPCD in implementing the PM-10 Attainment Demonstration Plan.

Among the rules adopted by the SJVAPCD are several which apply to sources never before regulated in the valley. Rule 4901 - Residential Wood Burning Fireplaces and Wood Heaters, calls for voluntary curtailment of wood burning on “No Burn Days” and the prohibition of sale of non-EPA certified wood heaters within the SJVAPCD’s jurisdiction. Rule 4902 Residential Water Heaters, adopted June 17, 1993, requires new residential water heaters sold in the San Joaquin Valley to meet lower NOx emission standards.

In addition, the SJVAPCD identified three strategies for reducing emissions generated by indirect sources in the *1991 Air Quality Attainment Plan*. These strategies include enhanced SJVAPCD California Environmental Quality Act (CEQA) participation, encouragement of all cities and counties in the SJV to adopt an air quality element or air quality policies as part of their General Plan, and implementation of a new and modified indirect source review (ISR) program. The SJVAPCD now actively reviews and comments on CEQA documents prepared by lead agencies and suggests mitigation measures to reduce air quality impacts. Th*e Air Quality Guidelines for General Plans,* adopted by the SJVAPCD in 1994, is the primary means for implementing the second strategy. The SJVAPCD has not implemented a ISR program but is promoting voluntary strategies to reduce indirect source emissions.

The SJVAPCD has undertaken steps to comply with Assembly Bill (AB) 2061 (Polanco). This bill requires assessment of socioeconomic impacts of certain new and modified rules put forth by the SJVAPCD, plus a good faith effort to minimize adverse effects to industry and the public. Where required, the SJVAPCD now examines its proposed activities for socioeconomic effects.

Legislation including AB 1807 Tanner Air Toxics Act, AB 2588 Air Toxics “Hot Spots” Information and Assessment Act, AB 3205 Toxic Emissions Near Schools, SB 1731 “Hot Spots” Risk Reduction Mandates, the Federal Clean Air Act Amendments Title III mandate the SJVAPCD to implement a comprehensive toxic air emission program. AB 2588 requires the SJVAPCD to develop a uniform approach to catalogue the emissions of 729 toxic substances in the Valley. Prior to SJVAPCD unification, approaches to the AB 2588 requirement varied by county.

The SJVAPCD has also adopted a number of voluntary air quality programs. Examples include a Smoking Vehicles Program, and the District Air Quality Education Program. Although these programs are voluntary, they provide an important link to local government and the public. The Smoking Vehicles program started as a pilot program in San Joaquin County and was expanded to cover the entire SJV in April 1993. By the end of year 2000, over 43,000 vehicles had been reported to the SJVAPCD. Nearly 30% of those receiving notice responded to the SJVAPCD and of those 53% indicate repairs were accomplished.

2.5 NONATTAINMENT CLASSIFICATIONS

2.5.1 Ozone Nonattainment Classifications

Federal: In July 1997, EPA adopted a new eight-hour standard for ozone that is replacing the one-hour standard. The Clean Air Act, however, includes provisions (Subpart 2 of part D of Title I) that address the requirements for nonattainment areas that do not meet the one-hour standard. EPA has concluded that these provisions should continue to apply until an area attains the one-hour standard, at which time the provisions will no longer apply.

The one-hour ozone classifications were based on the “design value” for ozone. Table 2-4 depicts the one-hour ozone classifications established by the EPA [Federal Register 11/6/91, pg. 56694]. Exceedance of the standard is based on the fourth highest ozone reading in three consecutive years registered at any monitoring station in the air basin. The SJVAPCD has been redesignated the SJVAB to severe nonattainment with a 2005 attainment date based on the failure to attain the ambient ozone standard by 1999. Several monitoring sites exceeded the standard numerous times during 1999 and 2000 (see Table 3-6).

The nonattainment classification system for the eight-hour standard has not yet been designed. Nonattainment areas are yet to be designated. Exceedance of the standard, however will be based on the fifth highest eight-hour average per year, averaged over three consecutive years at any monitoring station in the air basin.

Table 2-4
Federal Ozone Classifications

Category	Design Value	Primary Standard Attainment Date[48]
Marginal	0.121 up to 0.138 ppm	3 years after enactment *(November 15, 1993)*
Moderate	0.138 up to 0.160 ppm	6 years after enactment *(November 15, 1996)*
Serious	0.160 up to 0.180 ppm	9 years after enactment *(November 15, 1999)*
Severe 15	0.180 up to 0.191 ppm	15 years after enactment *(November 15, 2005)*
Severe 17	0.190 up to 0.280 ppm	17 years after enactment *(November 15, 2007)*
Extreme	0.280 ppm and above	20 years after enactment *(November 15, 2020)*

[48] The primary standard attainment date is measured from the date of the enactment of the Clean Air Amendments of 1990 *(November 15,1990).*

California: Ozone classifications are based on the maximum 1-hour concentration of ozone registered at any monitoring station in the air basin during the year, discounting highly irregular or exceptional events. Table 2-5 depicts the ozone classifications established by ARB and listed in the CH&SC [§40921.5]. California has not adopted an eight-hour ozone standard.

Table 2-5
California Ozone Classifications

Category	Maximum 1-hour Concentration
Moderate	greater than 0.09 to not more than 0.12 ppm, inclusive
Serious	0.13 to 0.15 ppm, inclusive
Severe	0.16 to 0.20 ppm, inclusive
Extreme	greater than 0.20 ppm

2.5.2 PM-10 Nonattainment Classifications

Federal: The SJVAB is designated as serious non-attainment for PM-10 and is required to reach attainment of the annual and 24-hr standards by December 31, 2001. The SJVAPCD failed to attain the 24-hr and annual standards by that date[49] and is required to submit a new plan by December 31, 2002 to demonstrate attainment at the earliest practicable date. USEPA has not acted on the PM-10 Attainment Plan submitted in 1997, but is expected to disapprove the plan. The 1997 plan requested a five-year extension from EPA, but it has also not been approved to date. An extension, if approved, would allow the SJVAB to achieve both the annual and the 24-hr standards by December 31, 2006.

California: The ARB has no separate classification scheme other than nonattainment or attainment for PM-10.

2.5.3 PM-2.5 Nonattainment Classifications

Federal: The EPA adopted a PM-2.5 standard in July 1997. Due to lack of PM-2.5 data, in accordance with the Clean Air Act requirement that EPA make designation determinations (i.e., attainment, nonattainment, or unclassifiable) within 2-3 year of revising a standard, EPA will designate all air basins as unclassifiable in 1999. Between 2001 and 2005, as monitoring data becomes available, EPA will redesignate areas to attainment or nonattainment.

California: The ARB has not adopted a PM-2.5 standard.

[49] PM-10 Attainment demonstration Plan, May 15, 1997

2.5.4 Carbon Monoxide Nonattainment Classifications

Federal: Carbon monoxide classifications are based on the “design value” for CO. This is the fourth highest CO reading in three consecutive years registered at any monitoring station in the air basin. Table 2-6 depicts the CO classifications established by the EPA [Federal Register 11/6/91, pg. 56694]:

Table 2-6
Federal Carbon Monoxide Classifications

Category	Design Value	Attainment Date
Moderate	9.1 to less than 16.5 ppm	1995
Serious	greater than or equal to 16.5 ppm	2000

California: Carbon monoxide classifications are based on the maximum 8-hour average of CO registered at any monitoring station in the air basin during the year, discounting highly irregular or exceptional events. Table 2-7 depicts the CO classifications established by ARB and listed in the CH&SC [§40921.5]:

Table 2-7
California Carbon Monoxide Classifications

Category	Maximum 8-hour Average Concentration
Moderate	greater than 9.0 to 12.7 ppm, inclusive
Serious	greater than 12.7 ppm

SECTION 3 - AIR QUALITY IN THE SAN JOAQUIN VALLEY

3.1 SJVAB AIR QUALITY DESIGNATIONS AND CLASSIFICATIONS

As detailed in the previous section, both the ARB and the EPA have established air pollution standards in an effort to protect human health and welfare. Geographic areas are designated "attainment" if these standards are met and nonattainment if they are not met. In addition, each agency has several levels of classifications based on severity of the problem. The SJVAB is classified "severe nonattainment" for the state and the federal ozone[50] standard and "serious nonattainment" for the federal PM-10 standard. The urbanized areas of Fresno, Bakersfield, Stockton, and Modesto are classified "attainment" and all the non-urbanized area of the SJVAB are classified as "unclassified/attainment" for federal carbon monoxide standards. Fresno, Kern, Tulare, Stanislaus, and San Joaquin Counties are designated as "attainment" and Merced, Madera, and Kings Counties are designated "unclassified" by the state for carbon monoxide standards. Current state and federal designations in the SJVAB for each criteria air pollutant are shown in Table 3-1. Because of the recent adoption of the PM-2.5 Standard, and the lack of PM-2.5 data, EPA has made no attainment classification for any air basin.

3.2 AIR POLLUTANT PROPERTIES, EFFECTS AND SOURCES

The following section describes the pollutants of greatest importance in the San Joaquin Valley. It provides a description of the physical properties, the health and other effects of the pollutant, and the sources of the pollutant.

3.2.1 Pollutant: Ozone

Description and Physical Properties - Ozone is what is known as a photochemical pollutant. It is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between reactive organic gases (ROG), NOx, and sunlight. ROG and NOx are emitted from automobiles, solvents, and fuel combustion, the sources of which are widespread throughout the SJV. In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. Ozone is a regional air pollutant. It is generated over a large area and is transported and spread by wind. The worst ozone concentrations tend to be found downwind from emission sources in SJV metropolitan areas, though the results of the San Joaquin Valley Air Quality Study indicates that "high ozone concentrations in the Valley were due to varying combinations of local and transported pollutants".[51]

[50] The SJVAB was reclassified to "severe" nonattainment effective December 10, 2001
[51] San Joaquin Valley Air Quality Study Results, Bulletin #1.

Table 3-1
SJVAPCD Designations and Classifications

POLLUTANT	DESIGNATION / CLASSIFICATION	
	Federal	State
O_3 - One hour	Nonattainment/Severe[52]	Nonattainment/Severe
O_3 - Eight hour	*To Be Determined*	*No State Standard*
PM-10	Nonattainment/Serious	Nonattainment
PM-2.5	*To Be Determined*	*No State Standard*
CO - Fresno Urbanized Area Remainder of Fresno County	Attainment[53] Unclassified/Attainment	Attainment[54] Attainment
CO - Merced, Madera, and Kings Counties	Unclassified/Attainment	Unclassified
CO - Kern (SJVAB portion), Tulare, Stanislaus, and San Joaquin Counties	Unclassified/Attainment	Attainment
NO_2	Unclassified/Attainment	Attainment
SO_2 - Kern County (SJVAB portion)	Attainment	Attainment
SO_2 - All Other Counties	Unclassified	Attainment
Lead (Particulate)	*No Designation*	Attainment
Hydrogen Sulfide	*No Federal Standard*	Unclassified
Sulfates	*No Federal Standard*	Attainment
Visibility Reducing Particles	*No Federal Standard*	Unclassified

Source: *Maps & Tables of the Area Designations for the State and National Ambient Air Quality Standards and Expected Peak Day Concentrations and Designation Values,* Air Resources Board, January 1998; Classification letter, ARB Staff, March 16, 1993; ARB Action, November 9, 1994; ARB Action, November 21, 1996; ARB Action, September 24, 1998.

[52] The SJVAB was reclassified to "severe" nonattainment for ozone effective December 10, 2001. The EPA final rule was published in the Federal Register on November 8, 2001. The rule requires a new state implementation plan by May 31, 2002 and changes the boundary of the nonattainment area to separate out eastern Kern County as its own nonattainment area. EPA declined to extend the attainment deadline from November 15, 2005 to a November 15, 2007 date.

[53] 40 CFR Parts 52 and 81 -- Fresno Urbanized Area, Bakersfield Metropolitan Area, Stockton Urbanized Area and Modesto Urbanized Area redesignated on March 31, 1998, effective June 1, 1998.

[54] Fresno Urbanized Area was designated attainment at the ARB Board Meeting of September 24, 1998.

Effects - While ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation, high concentrations of ground level ozone can adversely affect the human respiratory system. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. Ozone also damages natural ecosystems such as forests and foothill communities, and damages agricultural crops and some man-made materials, such as rubber, paint, and plastics.[55]

3.2.2 Pollutant: Reactive Organic Gases (ROG)

Description and Physical Properties - Reactive organic gases, in this document also known as volatile organic compounds, are photochemically reactive hydrocarbons that are important for ozone formation. This definition excludes methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonates, methylene chloride, methyl chloroform and various chlorofluorocarbons (CFCs).

Effects - There are no health standards for ROG separately. The main concern with ROG is its role in photochemical ozone formation. In addition, some compounds that make up ROG are also toxic. An example is benzene, which is a carcinogen.

Sources - The primary sources of ROG are mobile sources, solvents, farming operations and other area sources, and oil & gas production. Table 3-2 shows the 1999 ROG inventory[56] for the entire SJV.

Table 3-2

1999 ROG Emissions *(SJV)*		
Category	**tons/day**	**% of total**
Fuel Combustion	10.32	2.0%
Waste Disposal	4.03	.79%
Cleaning & Surface Coating	31.41	6.1%
Oil & Gas Production & Marketing	52.04	10.2%
Industrial Processes	12.08	2.4%
Solvent Evaporation	73.69	14.3%
Farming Operations	70.07	13.7%
Waste Burning & Disposal	31.45	6.1%
Other Area Sources	6.93	1.4%
On-road Motor Vehicles	165.69	32.3%
Other Mobile Sources	52.76	10.3%
Natural Sources	2.16	0.4%
Total	512.64	100%

55 California Air Resources Board, *Facts about Smog and California Crops*, 1991a.
56 Data from the Emission Inventory for 1999, published by the ARB on their World Wide Web site (http://arbis.arb.ca.gov).

3.2.3 Pollutant: Oxides of Nitrogen (NOx)

Description and Physical Properties - NOx is a family of gaseous nitrogen compounds and are precursors to ozone formation. The major component of NOx, nitrogen dioxide (NO_2), is a reddish-brown gas that is toxic at high concentrations. NOx results primarily from the combustion of fossil fuels under high temperature and pressure.

Effects - Health effects associated with NOx are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction.[57] NOx can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to production of particulate nitrates.[58] Airborne NOx can also impair visibility. NOx is a major component of acid disposition in California.

Sources - On-road and off-road motor vehicles and fuel combustion are the major sources of this air pollutant, and they emit approximately 43.6% (on-road), 23.6% (off-road) and 26.5% (fuel combustion) of the total NOx released in the SJV. Table 3-3 shows the 1999 NOx inventory for the SJVAB.

Table 3-3

1999 NOx Emissions *(SJV)*		
Category	**tons/day**	**% of total**
Fuel Combustion	160.47	26.8%
Other Industrial Processes	23.63	4.0%
Area Wide Sources	11.40	1.9%
Light-duty Auto and Trucks	114.50	19.1%
Med. & Heavy Gas & Diesel Trucks	133.94	22.4%
Buses (Transit and School)	4.05	17.6%
Mobile Homes	2.35	.68%
Farm Equipment	67.41	11.3%
Off-Road Equipment	50.86	8.5%
Trains	19.65	3.29%
Other Mobile	8.02	1.34%
Natural Sources (wildfire)	1.8	0.3%
Total	598.06	100%

[57] Sittig, Marshall, *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, Second Edition, 1985.
[58] Hodges, Laurent, *Environmental Pollution*, second edition, New York: Holt, Rhinehart, and Winston, 1977.

3.2.4 Pollutant: Carbon Monoxide (CO)

Description and Physical Properties - CO is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels and is emitted directly into the air (unlike ozone). Under most conditions, CO does not persist in the atmosphere and is rapidly dispersed. CO exceedances are most likely to occur in the winter, when relatively low inversion levels trap pollutants near the ground and concentrate the CO. Since CO is somewhat soluble in water, normal winter conditions of rainfall and fog can suppress CO concentrations.

Effects - Carbon monoxide binds strongly to hemoglobin, the oxygen-carrying protein in blood, and thus reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. At high concentrations, CO can cause heart difficulties in people with chronic diseases, can impair mental abilities, and can even cause death.

Sources - The main source of CO in the SJV is on-road motor vehicles. On-road motor vehicles contribute approximately 68.3% of total CO emissions. Other CO sources in the SJV include other mobile sources and waste burning. Because most of these CO sources are the indirect result of urban development, most emissions and unhealthful CO levels occur in major urban areas. Table 3-4 shows the 1999 CO inventories for the entire SJVAB.

Table 3-4

1999 CO Emissions *(SJV)*		
Category	**tons/day**	**% of total**
Fuel Combustion	56.65	2.0%
Industrial Processes	2.72	0.1%
Waste Burning & Disposal	373.57	13.3%
Residential Fuel Combustion	80.56	2.9%
Other Area/Stationary Sources	1.42	0.05%
Light-duty Passenger	660.87	23.5%
Light-duty & Medium Trucks	720.53	25.6%
Heavy-duty Trucks	462.92	16.4%
Other On-road Vehicles	37.86	1.3%
Other Mobile Sources	374.62	13.3%
Natural Sources	43.54	1.55%
Total	2,815.27	100%

3.2.5 Pollutant: Particulate Matter (PM-10 and PM-2.5)

Description and Physical Properties - Suspended particulate matter (airborne dust) consists of particles small enough to remain suspended in the air for long periods. Respirable particulate matter (PM-10 and PM-2.5) includes particulates of 10 microns or less in diameter—those which are small enough to be inhaled, pass through the respiratory system, and lodge in the lungs, with resultant health effects.

PM-10 and PM-2.5 are comprised of dust, sand, salt spray, metallic, and mineral particles, pollen, smoke, mist, and acid fumes. Also of importance are sulfate (SO_4) and nitrates (NO_3) which are secondary particles formed as precipitates from photochemical reactions of gaseous sulfur dioxide (SO_2) and NOx in the atmosphere.

The actual composition of PM-10 and PM-2.5 varies greatly with time and location. It depends on the sources of the material and meteorological conditions.

Effects - Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases, heart and lung disease, and coughing, bronchitis, and respiratory illnesses in children. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air.[59] Non-health-related effects include reduced visibility and soiling of buildings.

Sources - Generally speaking, PM-2.5 sources tend to be combustion sources like vehicles, power generation, industrial processes, and wood burning, while PM-10 sources include these same sources plus roads (36.6%) and farming activities (23.2%).[60] Fugitive windblown dust and other area sources also represent sources of airborne dust in the SJVAB. Table 3-5 shows the 1999 PM-10 inventories for the entire SJVAB. A PM-2.5 inventory will be developed, as data becomes available.

Table 3-5

1999 PM-10 Emissions *(SJV)*		
Category	**tons/day**	**% of total**
Fuel Combustion	8.99	1.9%
Industrial Processes/Other Stationary	20.15	4.2%
Farming Operations	111.28	23.1%
Construction & Demolition	24.46	5.1%
Road Dust	175.47	36.4%
Fugitive Windblown	51.13	10.6%
Waste Disposal & Burning	51.09	10.6
Other Area-wide Sources	14.13	2.9%
Mobile Sources	16.4	3.4%
Natural Sources	8.35	1.7%
Total	481.45	100%

[59] Schenker, Marc, "Pollution and Mortality", *New England Journal of Medicine*, Volume 329, Number 24, December 9, 1993.
[60] California Air Resources Board. "Proposed Federal Standards for Ozone & Particulate Matter" Public Forums, El Monte January 16, 1997 and Sacramento, January 17, 1997.

3.2.6 Other Pollutants

Sulfur Dioxide: Sulfur dioxide (SO_2) is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. Historically, in the late 1970's in Kern County, SO_2 was a pollutant of concern but with the successful application of regulations, the levels have reduced significantly. In fact, the latest data from the ARB demonstrates that the highest 1-hour concentration for SO_2 was 0.011 ppm. With the CAAQS being 0.25 ppm, it demonstrates that SO_2 concentrations in the SJVAB are only about 4 percent of the standard.

Sulfates: Sulfates are particulate products of combustion of sulfur-containing fossil fuels. When SO or SO_2 come in contact with oxygen it precipitates out into sulfates (SO_3 or SO_4). Data collected in the SJVAB demonstrate levels of sulfates significantly less than the health standards.

Lead: Lead is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Lead was used until recently to increase the octane rating in auto fuel.[61] Since gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels and the use of leaded fuel has been mostly phased out, the ambient concentrations of lead have dropped dramatically. In fact, the SJVAPCD no longer even monitors lead in the ambient air of the SJVAB.

Hydrogen Sulfide: Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations. The California ambient air quality standard for H_2S is .030 ppm for 1 hour. Hydrogen sulfide is extremely hazardous in high concentrations (800 ppm can cause death) especially in enclosed spaces. OSHA regulates workplace exposure to H2S. The entire SJVAB is unclassified for H_2S attainment.

Visibility Reducing Particles: This standard is a measure of visibility. The ARB does not yet have a measuring method with enough accuracy or precision to designate areas in the state attainment or nonattainment. The entire state is labeled unclassified.

3.3 SPECIFIC ANNUAL AIR QUALITY DATA

3.3.1 Introduction

The SJVAPCD and the ARB maintain a network of stations that measure the levels of criteria pollutants in the ambient air. These stations are distributed throughout the SJV (a list is presented in Table 2-2). The pollutants of concern for the SJVAB are those that we

[61] L. Hodges, op. cit.

are designated nonattainment (SJVAPCD designations appear in Table 3-1). Subsequently, data presented in this section are detailed air quality information for each air monitoring station for ozone, PM-10, and carbon monoxide only.

3.3.2 Air Quality Data Tables – Explanatory Notes

The air quality data tables present data from air monitoring station in the SJVAB for the latest available three years. At the time of this publication, the year 1999 is the last year for which data has been finalized by the ARB. Data are reported for each monitoring station that measures the pollutant. Some stations monitor ozone, PM-10, and carbon monoxide or a combination thereof. Other stations monitor only one specific pollutant. There is some variation in monitoring stations from year to year as new stations were added and, in some cases, existing stations were relocated. Tables 3-6 (a) to (c) present the air quality data for 1-hr and 8-hr ozone[62] readings. Tables 3-7 (a) to (c) present the data for carbon monoxide. An explanation of the various data follows:

Ozone Data: Ozone data are presented in the following formats: maximum 1-hour concentration; number of days over the state and federal 1-hr standards; maximum 8-hr concentration; and number of days over the federal 8-hr standard. Data in each column are important for determining exceedances of state and federal standards and for gaining a clearer picture of existing air quality conditions in the SJVAB.

- Concentrations – Maximum 1-Hour – This column reports the greatest 1-hour concentration of ozone collected at each station during the year. Data is presented in parts per million (ppm)

- # of days exceeded – State 1-Hour – This column reports the number of days on which the California 1-hr standard of 0.09 ppm was exceeded at each station during each particular year.

- # of days exceeded – Federal 1-Hour – This column reports the number of days on which the Federal 1-hr standard of 0.12 ppm was exceeded at each station during each particular year.

- Concentrations – Maximum 8-Hour – This column reports the greatest 8-hour concentration of ozone collected at each station during the year.

- # of days exceeded – Federal 8-Hour – This column reports the number of days on which the Federal 8-hr standard of 0.08 ppm was exceeded at each station during each particular year.

Carbon Monoxide: Carbon monoxide data are presented in the following formats: maximum 8-hour average; number of days the state 8-hr average was exceeded; and number of days the federal 8-hour average was exceeded. Data in each column are

[62] Ozone data for 8-hr standard is presented for informational purposes only.

important for determining exceedances of state and federal standards and for gaining a clearer picture of existing air quality conditions in the SJVAB.

- Concentrations – Maximum 8-Hour – This column reports the highest 8-hour average concentration, in ppm during any eight hour period. The State standard is 9.0 ppm and cannot be exceeded. The highest 8-hour average greater than or equal to 9.1 ppm is used by ARB to determine if the 8-hour State standard was violated during the year. The Federal standard is 9 ppm and cannot be exceeded more than once per year. The highest 8-hour average greater than or equal to 9.5 ppm is used by EPA to determine if the 8-hour standard was violated.

- # of days exceeded – State 8-hour ave (9.0 ppm) – This column reports the number of times the State 8-hour standard was exceeded during the year.

- # of days exceeded – Federal 8-hour ave (9 ppm) – This column reports the number of times the Federal 8-hour standard was exceeded during the year.

PM-10 Data: PM-10 data are presented in the following formats: maximum 24-hour concentration; annual geometric mean; annual arithmetic mean; and the calculated number of exceedances of the state 24-hour standard and the federal 24-hour standard. Data in each column are important for determining exceedances of state and federal standards and for gaining a clearer picture of existing air quality conditions in the SJVAB.

- Calculated # of days exceeded – State 24-hour (50 $\mu g/m^3$) – Due to the current logistics of collecting and measuring 24-hour samples, PM-10 is only monitored on a cycle of usually once every six days. This column reports the number of days the standard would have exceeded if readings were made daily. The State 24-hour standard is exceeded when the 24-hour PM-10 concentration is greater than or equal to 50.5 $\mu g/m^3$.

- Calculated # of days exceeded – Federal 24-hour (150 $\mu g/m^3$) – Due to the current logistics of collecting and measuring 24-hour samples, PM-10 is only monitored on a cycle of usually once every six days. This column reports the number of days the standard would have exceeded if readings were made daily. The federal 24-hour PM-10 standard is exceeded when the 24-hour PM-10 concentration is greater than or equal to 155 $\mu g/m^3$.

- Concentrations – Maximum 24-hour – This column reports the maximum 24-hour concentration of PM-10 in $\mu g/m^3$ at each station during the year.

- Concentrations – Annual geometric mean (AGM) – This column reports the annual geometric mean each station during the year. The State annual standard is exceeded when the annual geometric mean of all 24-hour concentrations at a site is greater than or equal to 30.5 $\mu g/m^3$. Exceedances are represented in **bold** type.

- Concentrations – Annual arithmetic mean (AAM) – This column reports the annual arithmetic mean each station during the year. The national annual standard is exceeded when the annual arithmetic mean of all 24-hour concentrations at a site is greater than or equal to 50.5 $\mu g/m^3$. Exceedances are represented in **bold** type.

Table 3-6 (a)
1997 Air Quality Data for 1-Hour and 8-hour Ozone

MONITORING STATIONS	OZONE (O_3) 1-Hour Average			O_3 8-Hour Average	
	Concentrations *(ppm)*	# of days exceeded		Concentrations *(ppm)*	# of days over
	Maximum 1-hour	State 1-hr *(0.09 ppm)*	Federal 1-hr *(0.12 ppm)*	Maximum *8-hour*	Federal 8-hr *(0.08 ppm)*
Fresno County					
Clovis - Villa Ave.	0.147	79	9	0.127	69
Fresno - Sierra Sky Park	0.129	19	1	0.102	15
Fresno - First St.	0.128	30	1	0.107	23
Fresno - Drummond St.	0.131	19	1	0.099	11
Parlier	0.137	68	9	0.112	48
Shaver Lake - Perimeter Rd.	0.138	19	1	0.106	11
Kern County					
Arvin - Bear Mt.	0.134	57	7	0.112	46
Bakersfield - Golden State	0.117	8	0	0.104	11
Bakersfield - California Ave.	0.120	14	0	0.109	23
Edison	0.146	50	3	0.118	30
Maricopa - Stanislaus St.	0.116	24	0	0.104	36
Oildale - Manor St.	0.114	5	0	0.103	5
Shafter - Walker St.	0.112	4	0	0.101	4
Kings County					
Hanford - S. Irwin St.	0.126	23	2	0.106	26
Madera County					
Madera - Pump Yard	0.085	0	0	0.080	0
Merced County					
Merced - S. Coffee Ave.	0.102	1	0	0.095	1
San Joaquin County					
Stockton - Hazelton St.	0.102	1	0	0.082	0
Stockton - E. Mariposa St.	0.101	3	0	0.083	0
Tracy - Patterson Pass Rd.	0.119	5	0	0.099	3
Stanislaus County					
Modesto - 14th Street	0.115	5	0	0.091	2
Turlock - S. Minaret St.	0.120	15	0	0.100	8
Tulare County					
Sequoia - Lookout Pt.	0.120	39	0	0.106	45
Sequoia - Lower Kaweah	0.112	24	0	0.100	26
Visalia - Church St.	0.125	24	1	0.104	17

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-6 (b)
1998 Air Quality Data for 1-Hour and 8-hour Ozone

MONITORING STATIONS	OZONE (O_3) 1-Hour Average			O_3 8-Hour Average	
	Concentrations *(ppm)*	# of days exceeded		Concentrations *(ppm)*	# of days over
	Maximum 1-hour	State 1-hr *(0.09 ppm)*	Federal 1-hr *(0.12 ppm)*	Maximum *8-hour*	Federal 8-hr *(0.08 ppm)*
Fresno County					
Clovis - Villa Ave.	0.169	63	26	0.130	62
Fresno - Sierra Sky Park	0.156	52	13	0.134	52
Fresno - First St.	0.151	46	15	0.118	44
Fresno - Drummond St.	0.148	49	8	0.115	41
Parlier	0.164	64	13	0.120	54
Shaver Lake - Perimeter Rd.	0.122	26	0	0.093	12
Kern County					
Arvin - Bear Mt.	0.151	71	12	0.123	64
Bakersfield - Golden State	0.132	32	1	0.111	33
Bakersfield - California Ave.	0.124	29	0	0.110	38
Edison	0.165	71	22	0.136	61
Maricopa - Stanislaus St.	0.143	62	8	0.134	66
Oildale - Manor St.	0.122	37	0	0.110	44
Shafter - Walker St.	0.115	21	0	0.102	27
Kings County					
Hanford - S. Irwin St.	0.143	27	3	0.113	31
Madera County					
Madera - Pump Yard	0.139	16	2	0.116	13
Merced County					
Merced - S. Coffee Ave.	0.143	37	3	0.129	35
San Joaquin County					
Stockton - Hazelton St.	0.126	9	1	0.100	4
Stockton - E. Mariposa St.	0.123	9	0	0.099	2
Tracy - Patterson Pass Rd.	0.116	14	0	0.094	5
Stanislaus County					
Modesto - 14th Street	0.134	24	3	0.119	13
Turlock - S. Minaret St.	0.153	35	4	0.125	29
Tulare County					
Sequoia - Lookout Pt.	0.109	10	0	0.092	13
Sequoia - Lower Kaweah	0.131	32	1	0.103	26
Visalia - Church St.	0.148	54	6	0.122	45

Table 3-6 (c)
1999 Air Quality Data for 1-Hour and 8-hour Ozone

MONITORING STATIONS	OZONE (O_3) 1-Hour Average			O_3 8-Hour Average	
	Concentrations *(ppm)*	# of days exceeded		Concentrations *(ppm)*	# of days over
	Maximum 1-hour	State 1-hr *(0.09 ppm)*	Federal 1-hr *(0.12 ppm)*	Maximum *8-hour*	Federal 8-hr *(0.08 ppm)*
Fresno County					
Clovis - Villa Ave.	0.142	56	5	0.121	61
Fresno - Sierra Sky Park	0.136	36	1	0.109	36
Fresno - First St.	0.135	53	4	0.123	49
Fresno - Drummond St.	0.132	38	4	0.108	34
Parlier	0.155	81	15	0.109	59
Shaver Lake - Perimeter Rd.	0.129	30	1	0.095	29
Kern County					
Arvin - Bear Mt.	0.130	94	9	0.112	85
Bakersfield - Golden State	0.118	26	0	n/d	n/d
Bakersfield - California Ave.	0.116	44	0	0.101	47
Edison	0.140	68	5	0.110	55
Maricopa - Stanislaus St.	0.113	9	0	0.101	14
Oildale - Manor St.	0.104	16	0	0.103	28
Shafter - Walker St.	0.116	31	0	0.097	25
Kings County					
Hanford - S. Irwin St.	0.140	28	2	0.111	25
Madera County					
Madera - Pump Yard	0.118	12	0	0.095	10
Merced County					
Merced - S. Coffee Ave.	0.132	42	2	0.117	40
San Joaquin County					
Stockton - Hazelton St.	0.144	6	2	0.108	4
Stockton - E. Mariposa St.	0.143	4	1	0.093	4
Tracy - Patterson Pass Rd.	0.132	16	1	0.113	10
Stanislaus County					
Modesto - 14th Street	0.119	13	0	0.104	7
Turlock - S. Minaret St.	0.111	12	0	0.099	9
Tulare County					
Sequoia - Lookout Pt.	0.124	64	0	0.112	73
Sequoia & Kings Canyon NP	0.127	48	2	0.111	52
Sequoia - Lower Kaweah	0.115	36	0	0.100	39
Visalia - Church St.	0.126	52	1	0.106	33

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-6 (d)
2000 Air Quality Data for 1-Hour and 8-hour Ozone

MONITORING STATIONS	OZONE (O_3) 1-Hour Average			O_3 8-Hour Average	
	Concentrations *(ppm)*	# of days exceeded		Concentrations *(ppm)*	# of days over
	Maximum 1-hour	State 1-hr *(0.09 ppm)*	Federal 1-hr *(0.12 ppm)*	Maximum *8-hour*	Federal 8-hr *(0.08 ppm)*
Fresno County					
Clovis - Villa Ave.	0.153	49	8	0.131	44
Fresno - Sierra Sky Park	0.139	69	8	0.125	70
Fresno - First St.	0.143	48	5	0.109	41
Fresno - Drummond St.	0.131	37	2	0.104	24
Parlier	0.165	81	17	0.120	66
Shaver Lake - Perimeter Rd.	0.116	26	0	0.091	13
Kern County					
Arvin - Bear Mt.	0.145	82	9	0.117	73
Bakersfield - Golden State	0.117	28	0	0.101	30
Bakersfield - California Ave.	0.125	41	1	0.106	40
Edison	0.151	72	9	0.117	58
Maricopa - Stanislaus St.	0.112	8	0	0.099	15
Oildale - Manor St.	0.124	31	0	0.107	36
Shafter - Walker St.	0.123	18	0	0.106	25
Kings County					
Hanford - S. Irwin St.	0.124	48	0	0.11	51
Madera County					
Madera - Pump Yard	0.104	8	0	0.096	9
Merced County					
Merced - S. Coffee Ave.	0.120	32	0	0.112	37
San Joaquin County					
Stockton - Hazelton St.	0.107	4	0	0.080	0
Stockton - E. Mariposa St.	0.108	4	0	0.084	0
Tracy - Patterson Pass Rd.	0.122	7	0	0.094	3
Stanislaus County					
Modesto - 14th Street	0.131	7	1	0.101	4
Turlock - S. Minaret St.	0.131	15	1	0.107	10
Tulare County					
Sequoia - Lookout Pt.	0.116	45	0	0.106	52
Sequoia & Kings Canyon NP	0.120	41	0	0.108	40
Sequoia - Lower Kaweah	0.108	8	0	0.094	8
Visalia - Church St.	0.129	46	1	0.099	29

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-7 (a)
1997 Air Quality Data for Carbon Monoxide and PM-10

MONITORING STATIONS	CARBON MONOXIDE (CO)			PARTICULATE MATTER (PM-10)				
	Concentrations *(ppm)*	# of days exceeded		calculated # of days exceeded		Concentrations *(μg/m³)*		
	Maximum 8-hour average	State 8-hr ave *(9.0 ppm)*	Fed 8-hr ave *(9 ppm)*	State 24-hr *(50 μg/m³)*	Federal 24-hr *(150 μg/m³)*	Maximum *24-hour*	AGM *(state)*	AAM *(federal)*
Fresno County								
Clovis - Villa Ave.	2.87	0	0	60	0	103	**34.6**	39.0
Fresno - Sierra Sky Park	2.83	0	0					
Fresno - First St.	5.69	0	0	72	0	124	**37.1**	42.6
Fresno - Fisher St.	7.50	0	0					
Fresno - Drummond St.	4.10	0	0	108	0	121	**41.5**	46.7
Kern County								
Bakersfield - Golden State	2.91	0	0	84	0	124	**43.1**	46.5
Bakersfield - California Ave.	4.01	0	0	78	0	137	**38.4**	41.9
Oildale - Manor St.				54	0	125	**35.7**	39.4
Taft College				36	0	78	27.7	30.9
Kings County								
Hanford - S. Irwin St.				102	0	143	**41.3**	46.2
Corcoran - Patterson				90	6	199	**42.3**	48.1
Corcoran - Van Dorsten Ave.				90	0	154	**40.0**	45.4
Madera County								
Merced County								
San Joaquin County								
Stockton - Hazelton St.	3.60	0	0	30	0	98	26.8	29.7
Stockton - Claremont St.	4.24	0	0					
Stockton - Wagner Holt Sch.				24	0	130	22.5	26.1
Stanislaus County								
Modesto - 14th Street	4.99	0	0					
Modesto - "I" Street				42	0	119	29.2	32.3
Turlock - S. Minaret St.	3.93	0	0	54	0	111	**33.3**	37.1
Tulare County								
Visalia - Church St.	4.14	0	0	66	0	96	**38.6**	41.5

AGM = Annual Geometric Mean of all measurements. The State Standard is 30 μg/m³ and exceedances are in **bold** type.
AAM = Annual Arithmetic Mean of 4 quarterly averages. The Federal Standard is 50 μg/m³ and exceedances are in **bold** type.
Note: PM-10 exceedances are the estimated number of days that a site would have been greater than the standard had measurements been collected every day.

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-7 (b)
1998 Air Quality Data for Carbon Monoxide and PM-10

MONITORING STATIONS	CARBON MONOXIDE (CO)			PARTICULATE MATTER (PM-10)				
	Concentrations *(ppm)*	# of days exceeded		calculated # of days exceeded		Concentrations *(µg/m³)*		
	Maximum 8-hour average	State 8-hr ave *(9.0 ppm)*	Fed 8-hr ave *(9 ppm)*	State 24-hr *(50 µg/m³)*	Federal 24-hr *(150 µg/m³)*	Maximum *24-hour*	AGM *(state)*	AAM *(federal)*
Fresno County								
Clovis - Villa Ave.	3.64	0	0	78	0	113	27.4	33.3
Fresno - Sierra Sky Park	2.61	0	0					
Fresno - First St.	5.88	0	0	60	0	141	27.1	33.7
Fresno - Fisher St.	8.03	0	0					
Fresno - Drummond St.	4.44	0	0	84	0	132	**31.2**	39.3
Kern County								
Bakersfield - Golden State	3.11	0	0	114	6	159	**43.6**	68.9
Bakersfield - California Ave.	3.90	0	0	84	0	148	**31.9**	37.5
Oildale - Manor St.				93	0	103	**30.5**	37.0
Taft College				36	0	84	23.3	29.0
Kings County								
Hanford - S. Irwin St.				90	0	146	29.8	39.2
Corcoran - Patterson				66	0	128	**32.8**	41.9
Corcoran - Van Dorsten Ave.				36	0	78	24.0	29.5
Madera County								
Merced County								
San Joaquin County								
Stockton - Hazelton St.	7.90	0	0	48	0	106	24.4	29.1
Stockton - Claremont St.	7.18	0	0					
Stockton - Wagner Holt Sch.				30	0	99	20.8	25.5
Stanislaus County								
Modesto - 14th Street	7.34	0	0	33	0	125	**38.4**	46.3
Modesto - "I" Street				12	0	61	20.8	24.4
Turlock - S. Minaret St.	3.19	0	0	48	0	108	25.2	31.0
Tulare County								
Visalia - Church St.	3.79	0	0	102	6	160	**32.1**	39.9

AGM = Annual Geometric Mean of all measurements. The State Standard is 30 µg/m³ and exceedances are in **bold** type.
AAM = Annual Arithmetic Mean of 4 quarterly averages. The Federal Standard is 50 µg/m³ and exceedances are in **bold** type.
Note: PM-10 exceedances are the estimated number of days that a site would have been greater than the standard had measurements been collected every day.

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-7 (c)
1999 Air Quality Data for Carbon Monoxide and PM-10

MONITORING STATIONS	CARBON MONOXIDE (CO)			PARTICULATE MATTER (PM-10)				
	Concentrations *(ppm)*	# of days exceeded		calculated # of days exceeded		Concentrations *(µg/m^3)*		
	Maximum 8-hour average	State 8-hr ave *(9.0 ppm)*	Fed 8-hr ave *(9 ppm)*	State 24-hr *(50 µg/m^3)*	Federal 24-hr *(150 µg/m^3)*	Maximum *24-hour*	AGM *(state)*	AAM *(federal)*
Fresno County								
Clovis - Villa Ave.	2.98	0	0	114	0	151	**38.0**	46.6
Fresno - Sierra Sky Park	2.29	0	0					
Fresno - First St.	5.53	0	0	114	0	159	**35.8**	44.6
Fresno - Fisher St.	7.69	0	0					
Fresno - Drummond St.	4.89	0	0	108	6	162	**42.1**	53.1
Kern County								
Bakersfield - Golden State	5.00	0	0	168	6	183	**150.3**	59.5
Bakersfield - California Ave.	4.51	0	0	108	0	143	**40.3**	47.4
Oildale - Manor St.				105	6	156	**41.1**	50.5
Taft College				60	0	101	28.7	39.4
Kings County								
Hanford - S. Irwin St.				102	0	143	**41.6**	53.4
Corcoran - Patterson				132	9	174	**41.3**	53.2
Corcoran - Van Dorsten Ave.								
Madera County								
Merced County								
San Joaquin County								
Stockton - Hazelton St.	7.75	0	0	60	0	150	**30.2**	36.4
Stockton - Claremont St.	5.34	0	0					
Stockton - Wagner Holt Sch.				24	0	118	21.6	22.0
Stanislaus County								
Modesto - 14th Street	6.36	0	0	84	0	125	33.6	40.9
Modesto - "I" Street								
Turlock - S. Minaret St.	3.67	0	0	63	1	157	**32.6**	31.5
Tulare County								
Visalia - Church St.	4.11	0	0	174	0	152	**45.5**	59.9

AGM = Annual Geometric Mean of all measurements. The State Standard is 30 µg/m^3 and exceedances are in **bold** type.
AAM = Annual Arithmetic Mean of 4 quarterly averages. The Federal Standard is 50 µg/m^3 and exceedances are in **bold** type.
Note: PM-10 exceedances are the estimated number of days that a site would have been greater than the standard had measurements been collected every day.

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

Table 3-7 (d)
2000 Air Quality Data for Carbon Monoxide and PM-10

MONITORING STATIONS	CARBON MONOXIDE (CO)			PARTICULATE MATTER (PM-10)				
	Concentrations *(ppm)*	# of days exceeded		calculated # of days exceeded		Concentrations *(µg/m³)*		
	Maximum 8-hour average	State 8-hr ave *(9.0 ppm)*	Fed 8-hr ave *(9 ppm)*	State 24-hr *(50 µg/m³)*	Federal 24-hr *(150 µg/m³)*	Maximum *24-hour*	AGM *(state)*	AAM *(federal)*
Fresno County								
Clovis - Villa Ave.	5.68	0	0	60	0	114	**33.4**	39.4
Fresno - Sierra Sky Park	2.18	0	0					
Fresno - First St.	5.24	0	0	66	0	138	**33.5**	40.3
Fresno - Fisher St.	6.23	0	0					
Fresno - Drummond St.	3.53	0	0	114	0	130	**37.6**	42.7
Kern County								
Bakersfield - Golden State	5.38	0	0	156	0	145	**45.4**	53.1
Bakersfield - California Ave.	4.89	0	0	102	0	140	**37.7**	45.9
Oildale - Manor St.				65	0	122	**35.4**	40.8
Taft College				60	0	99	29.1	34.1
Kings County								
Hanford - S. Irwin St.				99	0	119	**41.9**	49.0
Corcoran - Patterson				120	0	128	**32.7**	46.7
Corcoran - Van Dorsten Ave.								
Madera County								
Merced County								
San Joaquin County								
Stockton - Hazelton St.	3.91	0	0	45	0	91	**29.1**	32.2
Stockton - Claremont St.	6.63	0	0					
Stockton - Wagner Holt Sch.				51	0	104	24.8	29.3
Stanislaus County								
Modesto - 14th Street	5.95	0	0	60	0	112	29.4	34.8
Modesto - "I" Street								
Turlock - S. Minaret St.	3.53	0	0	57	0	104	**29.8**	33.9
Tulare County								
Visalia - Church St.	4.23	0	0	180	0	130	**45.2**	52.7

AGM = Annual Geometric Mean of all measurements. The State Standard is 30 µg/m³ and exceedances are in **bold** type.
AAM = Annual Arithmetic Mean of 4 quarterly averages. The Federal Standard is 50 µg/m³ and exceedances are in **bold** type.
Note: PM-10 exceedances are the estimated number of days that a site would have been greater than the standard had measurements been collected every day.

Source: California Air Resources Board. California Air Quality Data. (http://www.arb.ca.gov/aqd/aqd.htm)

APPENDIX A – SJVAPCD DISTRICT OFFICES

Northern Office – *(San Joaquin, Stanislaus, and Merced Counties)*

CEQA Representative
4230 Kiernan Avenue, Suite 130
Modesto, CA 95356

Telephone: (209) 545-7000
Fax: (209) 545-8652

Central Office – *(Fresno, Madera, and Kings[63] Counties)*

CEQA Representative
1990 East Gettysburg Avenue
Fresno, CA 93276

Telephone: (559) 230-5800
Fax: (559) 230-6064

Southern Office – *(Kern and Tulare Counties)*

CEQA Representative
2700 "M" Street, Suite 275
Bakersfield CA 93301-2370

Telephone: (661) 326-6900
Fax: (661) 326-6985

[63] For CEQA purposes only Kings County projects are sent to Southern Region Office

APPENDIX B – TRANSPORTATION PLANNING AGENCIES

Local Agencies

San Joaquin Council of Governments
6 South El Dorado
Stockton, CA 95202-2804
(209) 468-3913

Stanislaus County Association of Governments
1025 15th Street
Modesto, CA 95354
(209) 558-7830

Merced County Association of Governments
369 W. 18th Street
Merced, CA 95340
(209) 723-3153

Madera County Transportation Commission
411 North "I" Street
Madera, CA 93637
(559) 675-0721

Council of Fresno County Governments
2100 Tulare Street, Suite 601
Fresno, CA 93721
(559) 233-4148

Kings County Association of Governments
1400 W. Lacey Blvd.
Hanford, CA 93230
(559) 582-3211

Tulare County Association of Governments
5961 S. Mooney Blvd.
Visalia, CA 93277
(559) 733-6291

Kern Council of Governments
1401 19th Street, Suite 300
Bakersfield, CA 93301
(661) 861-2191

State Agencies

Caltrans District 10
P.O. Box 2018
Stockton, CA 95201
(209) 948-7975

Caltrans District 6
P.O. Box 12616
Fresno, CA 93778
(559) 488-4115