# San Joaquin Valley Air Pollution Control District

# Monitoring Network Plan

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## Acronyms, Abbreviations, and Initialisms

AIRS: Aerometric information retrieval system
AQI: Air Quality Index
AQS: Air quality system
ARB: California Air Resources Board
ARM: approved regional method
BAM: beta attenuation monitor
CAA: Clean Air Act
CBSA: Core-based statistical area
CCOS: Central California Ozone Study
CFR: Code of Federal Regulations
CRPAQS: California Regional Particulate Air Quality Study
CO: Carbon Monoxide
CSA: Combined statistical area
District: San Joaquin Valley Air Pollution Control District
EBAM: environmental beta attenuation monitor
EPA: U.S. Environmental Protection Agency
FEM: Federal Equivalent Method
FIPS: Federal information processing standard
FR: Federal Register
FRM: Federal Reference Method
GHG: green house gases
MSA: Metropolitan statistical area
NAAQS: National Ambient Air Quality Standard
NCore: National Core
NMHC: Non-methane hydrocarbons
NMOC: non-methane organic carbons
NO2: Nitrogen dioxide
NOx: oxides of nitrogen
NPS: National Park Service
O3: ozone
PAMS: Photochemical Assessment Monitoring Station
Pb: lead
PM: particulate matter
PM2.5: particulate matter 2.5 microns or less in diameter
PM10: particulate matter 10 microns or less in diameter
SLAMS: State and Local Air Monitoring Station
SJV: San Joaquin Valley
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO2: Sulfur Dioxide
SPM: Special Purpose Monitor
STN: Speciated Trends Network
TEOM: Tapered Element Oscillating Microbalance
TSP: total suspended particles
VOC: Volatile Organic Compounds

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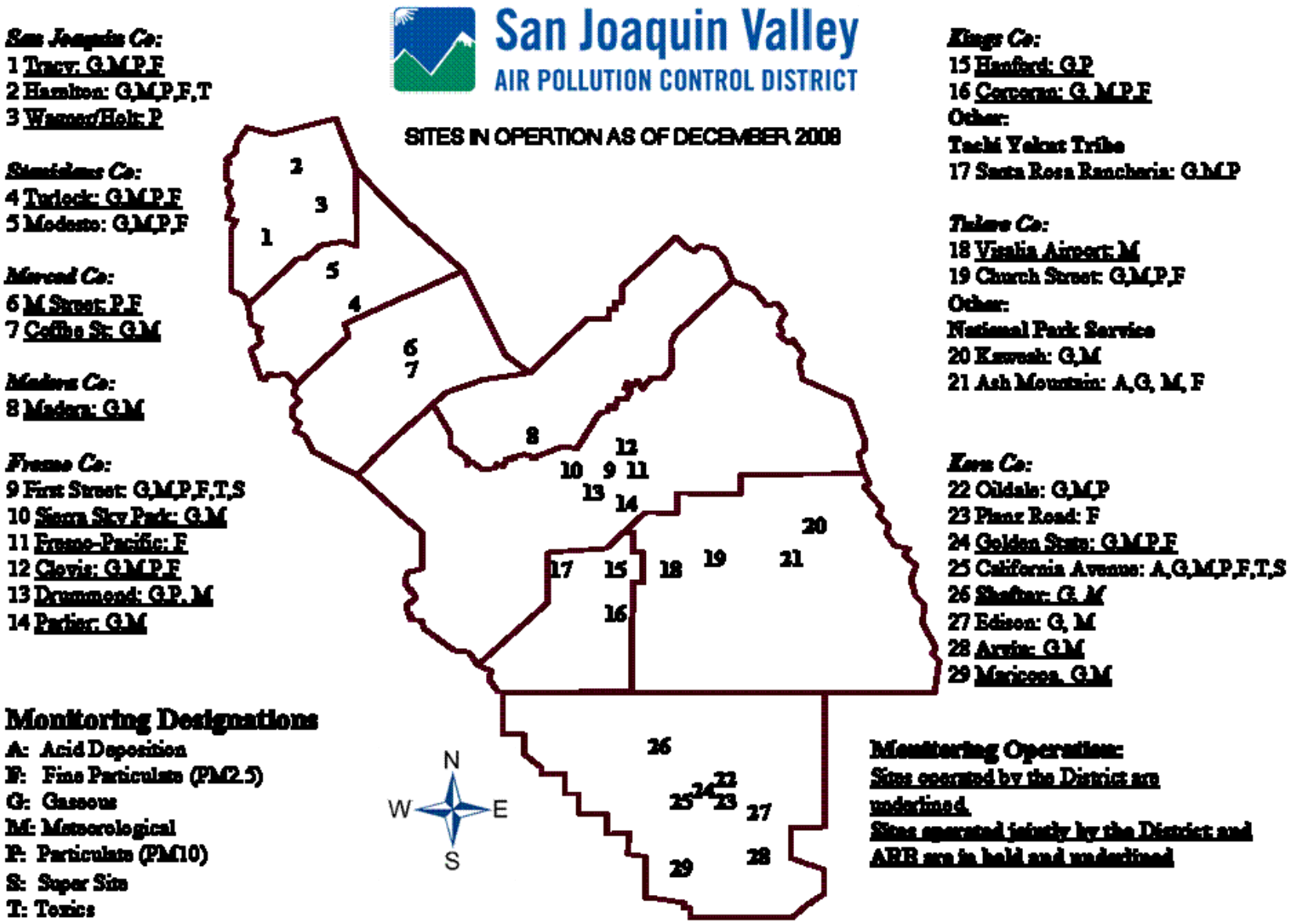
**Executive Summary**

The San Joaquin Valley Air Pollution Control District (District) operates an extensive network of air quality monitors throughout the San Joaquin Valley (Valley) to support its mission of improving and protecting public health. On a short term scale, District staff use the hourly readings from real-time monitors daily to generate a air quality index (AQI) for each of the Valley's eight counties. Through their appearance on the District website, in Valley media, and as school air quality flags, the AQI communicate the current state of air quality to Valley residents so they can keep air quality in mind as they plan their activities. The District also uses real-time air quality data to manage prescribed burning and residential wood combustion to make sure these activities do not make air quality unhealthy.

As part of the District's long-term efforts to improve public health, other air monitors collect samples that are rigorously analyzed by laboratory technicians and District staff. This data determines the Valley's attainment status for the U.S. Environmental Protection Agency's (EPA) health-based air quality standards. This data is also the foundation of the District's air quality attainment plans (such as the *2007 Ozone Plan* and the *2008 PM2.5 Plan*) and the studies that contribute to these plans. These monitoring data are fundamental in the Valley's effort to achieve improved air quality and attainment of EPA's health-based standards as quickly as possible.

The San Joaquin Valley covers an area of 23,490 square miles, and the area is home to one of the most challenging air quality situations in the nation. The Valley is nonattainment for federal PM2.5 and ozone standards, and it is an attainment/maintenance area for PM10. The Valley includes several major metropolitan areas, vast expanses of agricultural land, industrial sources, highways, and schools. This expansive and diverse area holds many air quality needs, yet there are limited financial and personnel resources for air quality monitoring. The District follows federal monitoring requirements and guidelines to ensure an efficient and effective monitoring network. This monitoring network plan demonstrates the District's approach for implementing federal air monitoring and quality control requirements and summarizes recent and upcoming changes to the monitoring network.


San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT
SITES IN OPERTION AS OF DECEMBER 2008
San Joaquin Co:
1 Tracy: G,M,P,F
2 Hamilton: G,M,P,F,T
3 Wagner/Holt: P
Stanislaus Co:
4 Turlock: G,M,P,F
5 Modesto: G,M,P,F
Merced Co:
6 M Street: P,F
7 Coffee St: G,M
Madera Co:
8 Madera: G,M
Fresno Co:
9 First Street: G,M,P,F,T,S
10 Sierra Sky Park: G,M
11 Fresno-Pacific: F
12 Clovis: G,M,P,F
13 Drummond: G,P, M
14 Parlier: G,M
Kings Co:
15 Hanford: G,P
16 Corcoran: G, M,P,F
Other:
Tachi Yokut Tribe
17 Santa Rosa Rancheria: G,M,P
Tulare Co:
18 Visalia Airport: M
19 Church Street: G,M,P,F
Other:
National Park Service
20 Kaweah: G,M
21 Ash Mountain: A,G, M, F
Kern Co:
22 Oildale: G,M,P
23 Planz Road: F
24 Golden State: G,M,P,F
25 California Avenue: A,G,M,P,F,T,S
26 Shafter: G, M
27 Edison: G, M
28 Arvin: G,M
29 Maricopa, G,M
Monitoring Designations
A: Acid Deposition
F: Fine Particulate (PM2.5)
G: Gaseous
M: Meteorological
P: Particulate (PM10)
S: Super Site
T: Toxics
N
W
E
S
Monitoring Operations:
Sites operated by the District are underlined.
Sites operated jointly by the District and ARB are in bold and underlined
June, 2009

**Introduction: What's required in this monitoring network plan**

Annual monitoring network plans review a region's existing and proposed monitoring network in compliance with 40 CFR (Code of Federal Regulations) 58.10 as well as requirements linked to the District's EPA 105 Grant. The annual monitoring network plans are updated and submitted to the EPA Regional Administrator each year, and each plan must be made available for public inspection for at least 30 days prior to submission to EPA. The plans are to provide for the establishment and maintenance of an air monitoring network that includes the following types of stations and equipment:

| Abbreviation | Full Name | Description |
|---|---|---|
| ARM | Approved Regional Method | A method that has been approved within a specific region for comparison to federal air quality standards. *There are no ARM monitors in the San Joaquin Valley.* |
| FEM | Federal Equivalent Method | These monitors are considered to be equivalent to FRM monitors for the purpose of determining compliance with EPA's health-based air quality standards. |
| FRM | Federal Reference Method | EPA defines how these monitors are to work, how they are to be engineered, and how they are to measure pollutants. These monitors are used to determine compliance with EPA's health-based air quality standards. |
| NCore | National Core | Multipollutant monitoring stations; in California, these are operated by the California Air Resources Board (ARB) |
| PAMS | Photochemical Assessment Monitoring Station | VOC (volatile organic compounds) speciation sites used in serious, severe, or extreme ozone nonattainment areas for precursor evaluation. |
| SLAMS | State and Local Air Monitoring Station | Monitoring sites that are used for determinations of compliance with federal air quality standards, though they may be used for other purposes as well |
| SPM | Special Purpose Monitor | Not included when showing compliance with the minimum air monitoring requirements; an example might include a temporary monitoring station set up in an area to measure short term air quality impacts of a source. |
| STN | Speciated Trends Network | PM2.5 speciation stations that provide chemical speciation data of PM |

The monitoring network plan should include a statement of purpose for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of 40 CFR part 58. The plan must contain the following information for each existing and proposed site (40 CFR 58.10 (b)):

- AQS (air quality system) site identification number
- Locations: street address and geographical coordinates
- The MSA, CBSA, CSA, or other area represented by the monitor. MSA, CBSA, and CSA are statistical-based definitions for metropolitan areas provided by the Office of Management and Budget and the Census Bureau (see Table 1):
    - MSA: Metropolitan statistical area
    - CBSA: Core-based statistical area
    - CSA: Combined statistical area
- Sampling and analysis methods for each measured parameter
- Operating schedules for each monitor
- Monitoring objective and spatial scale of representativeness for each monitor (as defined in Appendix D to 40 CFR 58)
- Any proposals to remove or move a monitoring station within 18 months of a plan submittal. Any proposed additions and discontinuations of SLAMS monitors are subject to approval according to 40 CFR 58.14

**Table 1 SJV Areas of Representation**

| ***Title*** | ***Code*** |
|---|---|
| **Combined Statistical Area (CSA)** | **CSA Code** |
| Fresno-Madera CSA | 260 |
| **Metropolitan Statistical Area (MSA)** | **Core-based Statistical Area (CSBA) Code** |
| Bakersfield [1] | 12540 |
| Fresno | 23420 |
| Hanford-Corcoran | 25260 |
| Madera | 31460 |
| Merced | 32900 |
| Modesto | 33700 |
| Stockton | 44700 |
| Visalia - Porterville | 47300 |
| **Counties** | **Federal Information Processing Standard (FIPS) Code** |
| Fresno | 06019 |
| Kern | 06029 |
| Kings | 06031 |
| Madera | 06039 |
| Merced | 06047 |
| Stanislaus | 06099 |
| San Joaquin | 06077 |
| Tulare | 06107 |

[1] Monitors from both the San Joaquin Valley Air District and the Kern County Air Pollution Control District are counted in determining compliance with minimum monitoring requirements for the Bakersfield MSA.

There are several network plan requirements that pertain specifically to PM2.5 monitoring. For example, the monitoring network plan must identify which sites are suitable and which are not suitable for comparison against the annual PM2.5 national ambient air quality standards (NAAQS) as described in 40 CFR 58.30. The plan must also document how agencies provide for public review of

changes to the PM2.5 monitoring network when the change impacts the location of a violating PM2.5 monitor or the creation/change to a community monitoring zone. This should include a description of the proposed use of spatial averaging for purposes of making comparisons to the annual PM2.5 NAAQS as required in Appendix N to part 50. Agencies should submit any public comments received from PM2.5 monitoring changes in the submittal of the network plan.

In addition, a network assessment must be completed every five years to demonstrate that the monitoring network meets monitoring objectives, whether any sites are no longer needed, whether new technologies might be appropriate. The first assessment is due July 1, 2010. The District has engaged a consultant to complete this analysis in fall of 2009. This comprehensive review will be reflected in the 2010 Monitoring Network Plan.

**Table 2 SJV 2008 Population**

| County | Total County Population | Major Urban Area Pop > 100,000 | Urban Area Pop. > 100,000 and < 50,000 |
|---|---|---|---|
| Fresno | 928,066 | Fresno | Clovis |
| Kings | 153,572 | | Hanford |
| Madera | 150,249 | | Madera |
| Merced | 253,471 | Merced | |
| San Joaquin | 681,316 | Stockton | Lodi<br>Manteca<br>Tracy |
| Stanislaus | 522,313 | Modesto | Turlock |
| Tulare | 433,764 | Visalia | Porterville<br>Tulare |
| Kern (Valley Portion) | 759,654 | Bakersfield | Delano |
| **SJV Total** | **3,882,405** | | |

Data from California Department of Finance E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark

## What an Air Monitor Represents

Air monitors are sited so that one can expect the data from the monitor to satisfy a specific objective, represent generally consistent pollution concentrations, and represent a specific geographic scale.

Appendix D to 40 CFR Part 54 identifies three basic **monitoring objectives**:

- Provide air pollution data to the general public in a timely manner (**timely/public**)

- Support compliance with ambient air quality standards and emissions strategy development (**standards/strategy**)
- Support for air pollution research studies (**research support**)

Appendix D then identifies several general monitoring **site types** to meet the objectives:

- Sites located to determine the **highest concentrations** in the area covered by the network
- **Population oriented** sites to measure typical concentrations in areas of high population density
- **Source impact** sites to determine the impact of significant sources or source categories on air quality
- **General/background sites** determine background concentration levels
- **Regional transport sites** located to determine the extent of regional pollutant transport among populated areas and in support of secondary standards
- Sites located to measure air pollution impacts on visibility, vegetation damage, or other **welfare-related** impacts

Appendix D also identifies several geographic locations of monitor sites in terms of spatial scale of representativeness, described in terms of physical dimensions of the air parcel or zone where air quality is expected to be reasonably consistent around the monitor. The monitor thus represents that area, not just the point of the monitor. The **spatial scales** are:

- **Microscale**: an area ranging from several meters up to about 100 meters
- **Middle scale**: an area covering between about 100 meters to 0.5 kilometers
- **Neighborhood scale**: covering an area between 0.5 and 4.0 kilometers in range
- **Urban scale**: covering an area of city-like dimensions, from about 4 to 50 kilometers
- **Regional scale**: covering a rural area of reasonably homogeneous geography without large sources, extending from tens to hundreds of kilometers
- **National and global scales**: representing concentrations characterizing the nation and the globe as a whole.

Table 3 summarizes all the ambient air monitoring sites in the San Joaquin Valley Air Basin. It should be noted that in addition to the monitoring sites discussed in this monitoring network plan, ARB operates two special purpose monitors in the Valley, Lodi East and Lodi West.

New monitoring stations and new monitors must meet EPA siting criteria. A particular site might be appropriate for one or more pollutants. Some sites might be appropriate for all air pollutant monitoring, while other sites might only be appropriate for a particular pollutant. The San Joaquin Valley Air District balances a wide range of pollutant siting criteria, spatial scales, monitoring objectives, and practical concerns as it plans and operates its monitoring network.

**Table 3 Ambient Air Monitoring Sites in the San Joaquin Valley Air Basin**
**(See Appendices A and B for more information)**

| MSA, County | Site Name | AIRS | Agency | Address | Pollutants Monitored |
|---|---|---|---|---|---|
| Fresno, Fresno | Clovis-N Villa Avenue | 60195001 | SJV APCD | 908 N. Villa Av, Clovis CA 93612 | Ozone, PM10 FRM, PM2.5 BAM/FEM, PM2.5 FRM, CO, NO2, NMHC, NMOC (PAMS), wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| | Fresno - Drummond Street | 60190007 | SJV APCD | 4706 E. Drummond Street, Fresno CA 93725 | Ozone, PM10 FRM, CO, NO2, wind speed, wind direction, outdoor temperature, barometric pressure |
| | Fresno - First Street | 60190008 | ARB | 3425 N. First St, Fresno CA 93726 | Ozone, PM10 FRM, PM10 BAM, PM2.5 FRM, PM2.5 BAM, CO, NO2, SO2, toxics, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure |
| | Fresno - Pacific | 60195025 | SJV APCD | 1716 Winery, Fresno CA 93726 | PM2.5 FRM |
| | Fresno - Skypark | 60190242 | SJV APCD | 4508 Chennault Ave, Fresno CA 93722 | Ozone, CO, NO2, wind speed, wind direction, outdoor temperature |
| | Huron | Pending | SJVAPCD | 16875 4th Street, Huron, CA 93234 | PM2.5 BAM |
| | Parlier | 60194001 | SJV APCD | 9240 S. Riverbend Av, Parlier CA 93648 | Ozone, NO2, NMOC (PAMS), NMHC, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| Bakersfield, Kern | Arvin | 60295001 | SJVAPCD and ARB | 20401 Bear Mountain Blvd, Arvin CA 93203 | Ozone, NO2, NMOC (PAMS), NMHC, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| | Bakersfield - Airport - Planz | 60290016 | ARB | 401 E. Planz Rd., Bakersfield CA 93307 | PM2.5 FRM |
| | Bakersfield- California Avenue | 60290014 | ARB | 5558 California, Bakersfield CA 93309 | Ozone, PM10 FRM, PM2.5 FRM, PM2.5 BAM/FEM, NO2, toxics, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |

| MSA, County | Site Name | AIRS | Agency | Address | Pollutants Monitored |
|---|---|---|---|---|---|
| | Bakersfield-Golden | 60290010 | SJVAPCD | 1128 Golden State Hwy, Bakersfield CA 93301 | Ozone, PM10 FRM, PM10 TEOM, PM2.5 FRM, PM2.5 BAM, CO, NO2, NMOC (PAMS), NMHC, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| | Edison | 60290007 | ARB | Johnson Farm-Shed Rd, Edison CA 93320 | Ozone, NO2, wind speed, wind direction, outdoor temperature |
| | Lebec | (pending) | SJVAPCD | Beartrap Road (no #), Lebec, CA 91350 | PM2.5 BAM, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| | Maricopa | 60290008 | SJV APCD | 755 Stanislaus Street, Maricopa CA 93352 | Ozone, wind speed, wind direction, outdoor temperature, barometric pressure |
| | Oildale | 60290232 | ARB | 3311 Manor St, Oildale CA 93308 | Ozone, PM10 FRM, wind speed, wind direction, outdoor temperature |
| | Shafter | 60296001 | ARB | 578 Walker St, Shafter CA 93263 | Ozone, NO2, NMOC (PAMS), NMHC, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| Hanford – Corcoran, Kings | Corcoran-Patterson Avenue | 60310004 | SJVAPCD | 1520 Patterson Av, Corcoran CA 93212 | Ozone, PM10 FRM, PM10 TEOM, PM2.5 FRM, PM2.5 BAM, wind speed, wind direction, outdoor temperature, barometric pressure |
| | Hanford-S Irwin Street | 60311004 | SJVAPCD | 807 S Irwin St, Hanford CA 93230 | PM10 FRM |
| | Santa Rosa Rancheria | | Tachi-Yokut | | Ozone, PM10, meteorology |
| Madera, Madera | Madera - Pump Yard | 60390004 | SJVAPCD | Av 8 and Road 29 1/2, Madera CA 93637 | Ozone, NO2, NMOC (PAMS), NMHC, wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| Merced, Merced | Merced - Coffee Road | 60470003 | SJVAPCD | 385 S. Coffee St., Merced CA 95340 | Ozone, NO2, wind speed, wind direction, outdoor temperature |
| | Merced M Street | 60472510 | SJVAPCD | 2334 M Street, Merced CA 95340 | PM10 FRM, PM2.5 FRM |

| MSA, County | Site Name | AIRS | Agency | Address | Pollutants Monitored |
|---|---|---|---|---|---|
| Stockton, San Joaquin | Stockton-Hazelton | 60771002 | ARB | 1593 E Hazelton St, Stockton CA 95205 | Ozone, PM10 FRM, PM2.5 FRM, PM2.5 BAM, CO, NO2, toxics, wind speed, wind direction, outdoor temperature, relative humidity |
| | Stockton-Wagner-Holt School | 60773010 | SJVAPCD | 8778 Brattle Pl, Stockton CA 95209 | PM10 FRM |
| | Tracy-Airport | 60773005 | SJVAPCD | 5749 S. Tracy Blvd., Tracy CA 95376 | Ozone, PM10 TEOM, PM2.5 BAM, NO2, wind speed, wind direction, outdoor temperature, barometric pressure |
| Modesto, Stanislaus | Modesto-14th Street | 60990005 | ARB | 814 14th Street, Modesto CA 95354 | Ozone, PM10 FRM, PM2.5 FRM, PM2.5 BAM, CO wind speed, wind direction, outdoor temperature, barometric pressure |
| | Turlock | 60990006 | SJVAPCD | 1034 S Minaret St, Turlock CA 95380 | Ozone, PM10 FRM, PM2.5 BAM, CO, NO2, wind speed, wind direction |
| Visalia – Porterville, Tulare | Sequoia -Ash Mountain | 61070009 | National Park Service (NPS) | Ash Mountain, Sequoia National Park CA | Ozone, PM2.5 FRM, PM2.5 BAM, wind speed, wind direction, outdoor temperature, relative humidity, solar radiation |
| | Sequoia -Lower Kaweah | 61070006 | National Park Service (NPS) | Lower Kaweah Campground, Sequoia National Park, CA | Ozone, wind speed, wind direction, outdoor temperature, relative humidity, solar radiation |
| | Visalia-Airport | 61073000 | SJVAPCD | Airport, Visalia CA 93291 | wind speed, wind direction, outdoor temperature, relative humidity, barometric pressure, solar radiation |
| | Visalia - Church | 61072002 | ARB | 310 N. Church St, Visalia CA 93291 | Ozone, PM10 FRM, PM2.5 FRM, PM2.5 BAM, NO2, wind speed, wind direction, outdoor temperature, barometric pressure |

## Ozone

Ozone is formed when its precursors (oxides of nitrogen (NOx) and volatile organic compounds (VOC)) react in the presence of sunlight. The Valley's topography, low precipitation levels, high temperatures, subsidence inversions, and light winds are conducive to elevated ozone levels. Winds (at ground level or at higher altitudes) transport pollutants from other basins into the Valley, within the Valley to areas downwind, and from the Valley into other regions.

Ozone formation and transport has been studied in the Valley for many years. The most recent effort has been the Central California Ozone Study (CCOS), which includes most of northern California and all of central California. CCOS monitoring was conducted during the summer of 2000. Emission inventory development, data analysis, and modeling are on-going, and the entire CCOS effort is expected to be completed by 2011. CCOS work is directed by the Policy and Technical Committees, comprised of representatives from federal agencies, ARB, the California Energy Commission, local air pollution agencies, researchers, and industry and sponsoring organizations. CCOS results have been used in the development of attainment plans, such as the District's *2007 Ozone Plan*.

The Valley's SLAMS ozone monitors are continuous analyzers that detect ozone through ultraviolet absorption. As continuous devices, these monitors meet the "Timely/Public" objective, providing District staff with the data used in Air Quality Index forecasting and reporting. Ozone monitoring site requirements are based on MSA population and on design values based on MSA, as shown in Table 4. Table 5 shows that the Valley's ozone network meets the requirements of Table 4. Sites are intended to represent population exposures and maximum concentrations, so most ozone monitors are represent neighborhood or urban scale measurements. Table 6 shows the Valley's ozone monitoring sites.

**Table 4 SLAMS Minimum Ozone Monitoring Requirements**
**(Table D-2 of Appendix D to Part 58)**

| MSA population, based on latest available census figures | Number of monitors required if: | |
|---|---|---|
| | Most recent 3-year design value concentrations ≥85% of any ozone NAAQS | Most recent 3-year design value concentrations <85% of any ozone NAAQS |
| > 10 million | 4 | 2 |
| 4 – 10 million | 3 | 1 |
| 350,000 – < 4 million | 2 | 1 |
| 50,000 – < 350,000 | 1 | 0 |

**Table 5 Ozone Requirements for the San Joaquin Valley**

| Metropolitan Statistical Area (MSA) | 2008 Population | Highest 2006-2008 Ozone Design Value in MSA (ppb)[1] | ≥85% of 2008 ozone NAAQS (75 ppb)[1] | Number of monitors required (Table 3) | Number of active ozone monitors |
|---|---|---|---|---|---|
| Bakersfield | 759,654 | 108 | Yes | 2 | 7 |
| Fresno | 928,066 | 99 | Yes | 2 | 5 |
| Hanford-Corcoran | 153,572 | 96 | Yes | 1 | 1 |
| Madera | 150,249 | 82 | Yes | 1 | 1 |
| Merced | 253,471 | 92 | Yes | 1 | 1 |
| Modesto | 522,313 | 89 | Yes | 2 | 2 |
| Stockton | 682,316 | 76 | Yes | 2 | 2 |
| Visalia - Porterville | 433,764 | 104 | Yes | 2 | 3 [2] |

[1] These data are preliminary. Air quality data may include data influenced by exceptional events and/or data completeness and substitution requirements.

[2] In Tulare County, in the Visalia – Porterville MSA, the Ash Mountain and Kaweah monitors in Sequoia National Park do not reflect general population exposure. While these monitors can be counted towards the number of monitors required, the District is installing an additional monitor to better capture population exposure. This air monitoring station is currently under construction in Porterville.

**PAMS**

The monitoring objective of Photochemical Assessment Monitoring Stations is research support. Federal regulations (Clean Air Act Section 182 and 40 CFR 58) require serious, severe, and extreme ozone nonattainment areas to have PAMS sites to take speciated measurements of ozone precursors and allow for better understanding of the effect of precursors, control measures, and photochemistry on ozone formation. PAMS sites measure ozone, NOx, speciated VOC (NMOC and NMHC), CO, and meteorology concurrently. Type 2 sites (as described below) also measure PM2.5 (as required by 40 CFR 58 Appendix D).

There are four classifications of PAMS sites:

- Type 1: Upwind/background sites, where ozone concentrations are presumed not to be influenced by upwind or nearby emissions
- Type 2: Maximum ozone precursor emissions sites, typically located in an urban center, where emissions strengths are the greatest

**Table 6 San Joaquin Valley Ozone Monitors**

| MSA | County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective |
|---|---|---|---|---|---|---|---|
| Fresno | Fresno | Clovis | 60195001 | SJVAPCD | Neighborhood | Population | All sites meet the objectives of:<br>• Timely/public<br>• Standards/ strategy<br>• Research support |
| | | Fresno – Drummond | 60190007 | SJVAPCD | Neighborhood | Population, Regional transport | |
| | | Fresno – First | 60190008 | ARB | Neighborhood | Population | |
| | | Fresno – Skypark | 60190242 | SJVAPCD | Neighborhood | Population, Regional transport | |
| | | Parlier | 60194001 | ARB | Neighborhood | High Concentration, Regional transport | |
| Bakersfield | Kern | Arvin | 60295001 | ARB and SJVAPCD | Neighborhood | High Concentration, Regional transport | |
| | | Bakersfield – California | 60290014 | ARB | Neighborhood | Population | |
| | | Bakersfield – Golden | 60290010 | SJVAPCD | Neighborhood | Population | |
| | | Edison | 60290007 | ARB | Neighborhood | High concentration, regional transport | |
| | | Maricopa | 60290008 | SJVAPCD | Neighborhood | regional transport | |
| | | Oildale | 60290232 | ARB | Neighborhood | regional transport | |
| | | Shafter | 60296001 | ARB and SJVAPCD | Neighborhood | General/background | |
| Hanford-Corcoran | Kings | Corcoran[1] | 60310004 | SJVAPCD | Neighborhood | Population | |
| Madera | Madera | Madera | 60390004 | SJVAPCD | Neighborhood | General/background | |
| Merced | Merced | Merced – Coffee | 60472510 | SJVAPCD | Neighborhood | Population | |
| Stockton | San Joaquin | Stockton – Hazelton | 60771002 | ARB | Neighborhood | Population | |
| | | Tracy - Airport | | SJVAPCD | Neighborhood | Regional transport | |
| Modesto | Stanislaus | Modesto – 14th | 60990005 | ARB | Neighborhood | Population | |

| MSA | County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective |
|---|---|---|---|---|---|---|---|
| | | Turlock | 60990006 | SJVAPCD | Neighborhood | Population | |
| Visalia - Porterville | Tulare | Ash Mountain – Sequoia National Park | 61070009 | NPS | Regional | Regional transport | |
| | | Lower Kaweah – Sequoia National Park | 61070006 | NPS | Regional | Regional transport | |
| | | Visalia – Church | 61072002 | ARB | Neighborhood | Population | |

[1] The Corcoran ozone monitor will be moved back to its original Hanford location upon completion of Hanford monitoring site upgrades.

- Type 3: Maximum ozone concentration sites, intended to show the highest ozone concentrations
- Type 4: Extreme downwind monitoring sites, which are expected to capture concentrations of transported pollutants but have lower ozone concentrations due to a lack of more local emissions sources (currently not required for the SJV)

The District has a total of six PAMS sites configured as of two smaller networks, one centered on Fresno and one on Bakersfield (see Table 7). The PAMS program operates from June 1 through August 31 every year on a 1 in 3 day sampling schedule. At least four, three-hour integrated samples are collected each sampling day, referred to as a "Trend Day." However, additional samples are collected on "Episode Days," days that are forecasted to have high ozone concentrations. The goal is to sample on three to five multi-day episodes

**Table 7 SJV PAMS sites**

| | | |
|---|---|---|
| **Fresno MSA** | Type 1: Upwind/Background site | Madera-Pump Yard |
| | Type 2: Maximum precursor emissions | Clovis-Villa |
| | Type 3: Maximum ozone concentrations | Parlier |
| **Bakersfield MSA** | Type 1: Upwind/Background site | Shafter-Walker |
| | Type 2: Maximum precursor emissions | Bakersfield-Golden |
| | Type 3: Maximum ozone concentrations | Arvin |

**NCore**

NCore sites are operated by ARB and will be described in ARB's monitoring network plan.

## Particulate Matter (PM)

Particulate matter (PM) can be emitted directly as primary PM, and it can form in the atmosphere through the reactions of precursors to form secondary PM. Primary PM can be emitted either naturally (windblown dust and wildfires) or from human (anthropogenic) activity: agricultural operations, industrial processes, combustion of wood and fossil fuels, construction and demolition activities, and entrainment of road dust. The resulting ambient PM mixture includes aerosols consisting of components of nitrates, sulfates, elemental carbons, organic carbon compounds, acid aerosols, trace metals, geological materials, etc.

Under current regulations, particulate matter (PM) is differentiated by particle size as opposed to composition. State and federal air quality standards differentiate two size fractions of PM: PM that is 10 microns or less in diameter (PM10) and the smaller subset that is 2.5 microns or less in diameter (PM2.5). The San Joaquin Valley is designated nonattainment for PM2.5. The San Joaquin Valley was recently designated to attainment for PM10, and the District's *2007 PM10 Maintenance Plan,* monitoring for PM10 will continue to assure continued compliance with federal standards.

The Valley's surrounding mountain ranges tend to keep PM within the Valley. Over the summer, long periods with little or no rainfall result in extreme drying of soils, increasing emissions from traffic movement and mechanical disturbance. Winter brings rainfall, but also creates an atmospheric environment that forms more secondary particulates. The Valley's frequent and severe temperature inversions block the normal rising air and traps particulates close to the ground, especially during the winter months.

The Valley's primary particulate study is the California Regional Particulate Air Quality Study (CRPAQS). CRPAQS monitoring occurred between December 1999 and February 2001 through the use of over 70 SPM PM10 sites and 50 SPM PM2.5 sites. CRPAQS analysis is expected to conclude in 2010 or later.

The Valley's PM monitoring network includes Federal Reference Method (FRM) monitors, Federal Equivalent Method (FEM) monitors, Beta Attenuation Monitors (BAM), and Tapered Element Oscillating Microbalance (TEOM). FRM monitors are manual filter-based monitors; samples are collected on an either one-in-six day sampling schedule or a one-in-three day sampling schedule. FRM monitors meet the "Standards/Strategy" objective, helping agencies determine the Valley's attainment status and helping shape the strategies for reaching or maintaining PM attainment. FRM filters can also be analyzed for PM speciation, so they are sometimes used for "Research Support" objectives as well. FRM monitors are sampled one day every three days (1 in 3 day sampling) or one day every 6 days (1 in 6 day sampling).

BAMs and TEOMs are real-time monitors to provide the hourly PM data used in Air Quality Index (AQI) forecasting and reporting as well as in hazard reduction burning allocations and in residential wood burning declarations. As such, these monitors help meet the "Timely/Public" objective.

Not all real-time monitors meet the "Standards/Strategy" objective because they do not meet the rigorous engineering design, quality assurance, and quality control standards necessary for comparison to the NAAQS. An FEM monitor is often a real-time monitor that has been designated by EPA as being equivalent to FRM monitors. FEMs satisfy both the "Standards/Strategy" objective and the "Timely/Public" objective. All of the Valley's TEOMs are FEMs, and some of the Valley's BAMs are FEMs.

Table 8 shows the minimum number of PM10 sites required per MSA, and Table 9 shows the minimum number of PM2.5 sites required per MSA. Table 10 applies the requirements of Tables 8 and 9 to the Valley. Table 11 summarizes the Valley's PM monitoring stations.

**Review of Changes to the PM2.5 Monitoring Network**

The District is required to seek public input whenever proposing to move an existing violating PM2.5 monitor. The District will use the annual Monitoring Network Plan to notify and seek comment from the public of any planned changes to the existing PM2.5 network. The public has 30 days to comment on the Monitoring Network Plan (and any PM2.5 network changes). The plan is posted in the District website, and public notice is published in a newspaper of general

circulation in each CBSA. In the event of unanticipated changes to the PM2.5 network that occur outside the Network Plan process, the District will post public notice in Valley newspapers, post a document describing the proposed changes on its website, and seek public comment.

**Table 8 Minimum PM10 Monitoring Requirements (Table D-4 of Appendix D to Part 58)**
(A range is presented, and the actual number of stations per area is jointly determined by EPA, the State, and the local agency)

| **Population category** | **High concentration:** Ambient concentrations exceed the PM10 NAAQS by 20% or more **(≥180 µg/m³)** | **Medium concentration:** Ambient concentrations exceed 80% of the PM10 NAAQS **(>120 µg/m³)** | **Low concentration:** Ambient concentrations less than 80% of the PM10 NAAQS **(< 120 µg/m³)**, or no design value |
|---|---|---|---|
| > 1,000,000 | 6 – 10 | 4 – 8 | 2 – 4 |
| 500,000 – 1,000,000 | 4 – 8 | 2 – 4 | 1 – 2 |
| 250,000 – 500,000 | 3 – 4 | 1 – 2 | 0 – 1 |
| 100,000 – 250,000 | 1 – 2 | 0 – 1 | 0 |

**Table 9 Minimum PM2.5 Monitoring Requirements (Table D-5 of Appendix D to Part 58)**[1]

| **MSA population** | **Most recent 3-year design value ≥85% of any PM2.5 NAAQS** (equivalent to an annual design value ≥ 12.8 µg/m³ or a 24-hour design value ≥ 29.8 µg/m³) | **Most recent 3-year design value <85% of any PM2.5 NAAQS** (equivalent to an annual design value < 12.8 µg/m³ or a 24-hour design value < 29.8 µg/m³), or no design value |
|---|---|---|
| > 1,000,000 | 3 | 2 |
| 500,000 – 1,000,000 | 2 | 1 |
| 50,000 - < 500,000 | 1 | 0 |

[1] As required by 40 CFR 58 Appendix D, the San Joaquin Valley Air District also operates PM2.5 monitors at Type 2 PAMS sites.

**Table 10 PM Monitoring Requirements for the Valley**

| Metropolitan Statistical Area (MSA) | County | 2008 Population | PM10 | | | PM2.5 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 24-hour 2008 Highest concen-tration in MSA (µg/m³) [1] | Monitors required | Actual # of monitors in MSA | 24-hour 2006-2008 Design Value in MSA (µg/m³) [1] | Annual 2005-2007 Design Value in MSA (µg/m³) | Monitors required | Actual # of monitors in MSA |
| Bakersfield | Kern | 759,654 | 154 | 2 – 4 | 4 FRM<br>1 TEOM | 70 | 20 | 2 | 5 total:<br>3 FRM<br>2 BAM |
| Fresno | Fresno | 928,066 | 132 | 2 – 4 | 3 FRM<br>1 BAM | 57 | 18.3 | 2 | 5 total:<br>3 FRM<br>2 BAM |
| Hanford-Corcoran | Kings | 153,572 | 152 | 0 – 1 | 3 total:<br>2 FRM,<br>1 TEOM | 52 | 18.3 | 1 | 1 FRM,<br>1 BAM |
| Madera | Madera | 150,249 | - | 0 | 1 planned | - | - | 0 | 1 planned |
| Merced | Merced | 253,471 | 94 | 0 | 1 FRM | 47 | - | 1 | 1 FRM |
| Modesto | Stanislaus | 522,313 | 97 | 1 – 2 | 2 FRM | 53 | 14.7 | 2 | 3 total:<br>1 FRM<br>2 BAM |
| Stockton | San Joaquin | 682,316 | 126.8 | 1 – 2 | 2 FRM, | 46 | 13.1 | 2 | 3 total: |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 TEOM | | | | 1 FRM<br>2 BAM |
| Visalia - Porterville | Tulare | 433,764 | 145 | 0 - 1 | 1 FRM | 55 | 20.0 | 1 | 3 total:<br>1 FRM<br>2 BAM |

[1] These data are preliminary. Air quality data may include data influenced by exceptional events and/or data completeness and substitution requirements.

**Table 11 PM monitors in the Valley**

| MSA, County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective | Size Fraction | | Instru-ment type | Sampling Schedule |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PM10 | PM2.5 | | |
| Fresno, Fresno | Fresno Pacific – Winery | 60195025 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day or 1 in 6 day (seasonal) |
| | Fresno Drummond | 60190007 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | Fresno – First Street | 60190008 | ARB | Neighborhood | High Concentration | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | X | | BAM | 1-Hour |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | Daily |
| | Clovis - Villa | 60195001 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM/ FEM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day or 1 in 6 day (seasonal) |
| | Huron | (pending) | SJVAPCD | Neighborhood | Population | Timely/public | | X | BAM | 1-Hour |
| Bakersfield Kern | Oildale | 60290232 | ARB | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | Bakersfield – California Ave | 60290014 | ARB | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM/ | 1-Hour |

| MSA, County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective | Size Fraction | | Instru-ment type | Sampling Schedule |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PM10 | PM2.5 | | |
| | | | | | | | | | FEM | |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | Daily |
| | Bakersfield – Golden | 60290010 | SJVAPCD | Neighborhood | High Concentration | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | X | | TEOM | 1-Hour |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day or 1 in 6 day (seasonal) |
| | Bakersfield – Planz | 60290016 | ARB | Neighborhood | Population | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day |
| | Le Bec | (pending – no data reported in 2008) | SJVAPCD | Neighborhood | Population | Timely/public | | X | BAM | 1-hour |
| Hanford/ Corcoran, Kings | Hanford | 60311004 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | Corcoran – Patterson | 60310004 | SJVAPCD | Neighborhood | High Concentration | Timely/public | X | | TEOM | 1-Hour |
| | | | | | | Standards/strategy, research support | X | | FRM | 1 in 3 day |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day or 1 in 6 day (seasonal) |
| | | | | | | Timely/public | | **X** | BAM | 1-Hour |
| Merced, Merced | Merced – M Street | 60472510 | SJVAPCD | Neighborhood | Representative concentration | Standards/strategy, research support | X | | FRM | 1 in 6 day |

| MSA, County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective | Size Fraction | | Instru-ment type | Sampling Schedule |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PM10 | PM2.5 | | |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day or 1 in 6 day (seasonal) |
| Stockton, San Joaquin | Stockton Hazelton | 60771002 | ARB | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day |
| | Stockton – Wagner – Holt | 60773010 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | Tracy – Airport | 60773005 | SJVAPCD | Neighborhood | Regional transport | Timely/public | X | | TEOM | 1-Hour |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| Modesto, Stanislaus | Modesto | 60990005 | ARB | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day |
| | Turlock | 60990006 | SJVAPCD | Neighborhood | Population | Standards/strategy, research support | X | | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| Visalia - Porterville, Tulare | Ash Mountain (Sequoia National Park) | 61070009 | National Park Service | Regional | Regional transport | Research support | | X[2] | FRM | 1 in 6 day |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | Visalia | 61072002 | ARB | Neighborhood | Population | Standards/strategy, | X | | FRM | 1 in 6 day |

| MSA, County | Site | AIRS Code | Agency | Scale | Site Type | Monitoring Objective | Size Fraction | | Instru-ment type | Sampling Schedule |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PM10 | PM2.5 | | |
| | | | | | | research support | | | | |
| | | | | | | Timely/public | | X | BAM | 1-Hour |
| | | | | | | Standards/strategy, research support | | **X**[1] | FRM | 1 in 3 day |

[1] These PM2.5 FRMs are suitable for comparisons to the NAAQS

[2] The Ash Mountain PM2.5 FRM is not suitable for comparison to the NAAQS because it does not meet EPA siting criteria for NAAQS comparisons

## Carbon Monoxide

Monitoring has shown that the Valley's CO concentrations have not exceeded the NAAQS for over a decade. As noted in section 4.2 of Appendix D of 40 CFR Part 58, there are no minimum requirements of the number of Carbon Monoxide (CO) monitoring sites. The District continues CO monitoring to supplement related meteorological and criteria pollutant data. The District has added a trace-level CO analyzer at Clovis and a trace level CO monitor to the Bakersfield-Golden site. Table 12 summarizes the Valley's CO monitoring sites.

**Table 12 Carbon Monoxide Monitoring Stations in the San Joaquin Valley**

| Site Name | AIRS | Sampling Frequency | Scale | Site Type | Objective | Agency |
|---|---|---|---|---|---|---|
| Bakersfield-Golden | 060290010 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Clovis – Villa | 060175001 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Fresno – Drummond | 060190007 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Fresno – 1st | 060190008 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Fresno – Sky Park | 060190242 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Modesto – 14th Street | 060990005 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Stockton – Hazelton | 060771002 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Turlock - Minaret | 060990006 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |

## Nitrogen Dioxide

As noted in section 4.3 of Appendix D of 40 CFR Part 58, there are no minimum requirements of the number of $NO_2$ monitoring sites. Although the Valley does not exceed federal or state standards for $NO_2$, NOx reductions contribute to air quality improvement for both ozone and PM. NO/NOy measurements are collected within the NCore multipollutant sites and the PAMS program to improve understanding of ozone photochemistry. Table 13 summarizes the Valley's $NO_2$ monitoring sites.

**Table 13 $NO_2$ Monitoring Stations in the San Joaquin Valley**

| Site Name | AIRS | Sampling Frequency | Scale | Site Type | Objective | Agency |
|---|---|---|---|---|---|---|
| Arvin | 060295001 | Continuous | Neighborhood | Population | Standards/ Strategy, Research | ARB |
| Bakersfield – California | 060290014 | Continuous | Neighborhood | Population | Standards/ Strategy, | ARB |
| Bakersfield-Golden | 060290010 | Continuous | Neighborhood | High Concentraton | Standards/ Strategy, Research | SJV APCD |
| Clovis – Villa | 060175001 | Continuous | Neighborhood | High Concentration | Standards/ Strategy, Research | SJV APCD |
| Edison – Johnson Ranch | 060290007 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Fresno – Drummond | 060190007 | Continuous | Neighborhood | High Concentration | Standards/ Strategy | SJV APCD |
| Fresno – 1st | 060190008 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Fresno – Sky Park | 060190242 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Madera – Pump Yard | 060390004 | Continuous | Neighborhood | Population | Standards/ Strategy, Research | SJV APCD |
| Merced – Coffee | 060470003 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Parlier | 060194001 | Continuous | Neighborhood | Population | Standards/ Strategy, Research | SJV APCD |
| Shafter – Walker | 060296001 | Continuous | Neighborhood | Population | Standards/ | ARB |

| | | | | | | |
|---|---|---|---|---|---|---|
| Street | | | | | Strategy, Research | |
| Stockton – Hazelton | 060771002 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |
| Tracy – Airport | 060773005 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Turlock - Minaret | 060990006 | Continuous | Neighborhood | Population | Standards/ Strategy | SJV APCD |
| Visalia - Church | 061072002 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |

**Sulfur Dioxide**

As noted in section 4.4 of Appendix D of 40 CFR Part 58, there are no minimum requirements of the number of $SO_2$ monitoring sites. The Valley does not exceed federal or state standards for $SO_2$. There is just one $SO_2$ monitoring site in the Valley, shown in Table 14.

**Table 14 $SO_2$ Monitoring Station in the San Joaquin Valley**

| Site Name | AIRS | Sampling Frequency | Scale | Site Type | Objective | Agency |
|---|---|---|---|---|---|---|
| Fresno – 1st | 060190008 | Continuous | Neighborhood | Population | Standards/ Strategy | ARB |

**Lead**

EPA revised the lead (Pb) NAAQS and monitoring requirements in the Federal Register on November 12, 2008 (73 FR 66964 - 67062). The revised NAAQS amended 40 CFR 58.10, requiring that a plan for establishing Pb monitoring sites be included in the 2009 annual monitoring network plan. Although the required source-oriented monitors are to be installed and operational in 2009, this requirement is not applicable in the San Joaquin Valley because there are no sources that meet the threshold of 1 ton per year of lead emissions (40 CFR 48 Appendix D, 4.5(a)). Non-source oriented monitors are to be installed and operational by January 1, 2011 (73 FR 67029) in CBSAs that exceed a population of 500,000 (40 CFR 48 Appendix D, 4.5(b)).

As such, the District is required to install Pb monitors in the Stockton, Modesto, Fresno, and Bakersfield CBSAs. The District expects to start lead monitoring at two sites in the first half of

2010, then start lead monitoring at the remaining two sites in the second half of 2010. At this time, the District plans to site lead monitoring at existing PM10 sites.

Lead monitoring requirements can be met one of two ways, either by installing a lead TSP (total suspended particles) monitor and speciating the lead portion of the sample, or by using a PM10 monitor with lead speciation of the PM10 sample. The District has not decided which method to use at this time.

## Toxics

Airborne toxic substances are monitored in the Valley at Bakersfield – California, Fresno – 1st Street, and Stockton – Hazelton. Periodic, 24-hour samples are analyzed for the following gases: benzene, carbon tetrachloride, chloroform, ethylene dibromide, ethylene dichloride, methyl chloroform, methylene chloride, perchloroethylene, toluene, trichloroethylene, and m-, p-, and o-xylene. The samples are also analyzed for the following particulate metals: arsenic and chromium-6. ARB's Integrated NMOC sampling program and the District's PAMS NMOC sampling program also identify and quantify several toxic hydrocarbon species.

## Meteorology

Data for a variety of meteorological variables are collected to aid in daily forecasting for weather conditions and air quality. These forecasting activities help protect public health and have made the public and media more aware of air quality and what can be done to reduce air pollution. See Table 15 for the meteorological parameters measured in the Valley. Forecasting activities include:

- Reporting and forecasting the Air Quality Index (AQI) for ozone, PM2.5, and PM10 for each of the District's eight counties. These forecasts are transferred to EPA's AIRNOW.
- Agricultural burn emissions collection for more than 100 burn-zones.
- Issuance of Public Health Advisories when required.
- Prescribed (controlled) burn planning in consultation with the California Department of Forestry, National Park Service, National Forest Service and local fire districts
- Residential wood burning declarations from November 1 through February 28
- Emergency consultations

**Table 15 Meteorology Monitoring Stations in the San Joaquin Valley**

| Site | Wind Speed | Wind Direction | Outdoor Temperature | Relative Humidity | Barometric Pressure | Solar Radiation |
|---|---|---|---|---|---|---|
| Arvin | X | X | X | X | X | X |
| Bakersfield – California | X | X | X | X | X | X |
| Bakersfield – Golden | X | X | X | X | X | X |
| Clovis – Villa | X | X | X | X | X | X |
| Corcoran – Patterson | X | X | X | | X | |
| Edison – Johnson | X | X | X | | | |
| Fresno – Drummond | X | X | X | | X | |
| Fresno – First | X | X | X | X | X | |
| Fresno – Sky Park | X | X | X | | | |
| Lebec | X | X | X | X | X | X |
| Madera – Pump Yard | X | X | X | X | X | X |
| Maricopa – Stanislaus | X | X | X | | X | |
| Merced – Coffee | X | X | X | | | |
| Modesto – 14th | X | X | X | | X | |
| Oildale – Manor | X | X | X | | | |
| Parlier | X | X | X | X | X | X |
| Sequoia National Park – Ash Mountain | X | X | X | X | | X |
| Sequoia National Park – Kaweah | X | X | X | X | | X |
| Shafter – Walker Street | X | X | X | X | X | X |
| Stockton – Hazelton | X | X | X | X | | |
| Tracy – Airport | X | X | X | | X | |
| Turlock – Minaret | X | X | | | | |
| Visalia – Church | X | X | X | | X | |
| Visalia - Airport | X | X | X | X | X | X |

**Summary of monitoring changes, January 2008 – July 2009**

The Lebec monitoring station was initiated by the Tejon Ranch in 2004, and the District assumed responsibility for this site as of January 2009. This site allows the District to better understand pollution impacts in the southern San Emigdio Mountains. The site measures meteorological parameters and PM2.5. This site will be used for general residential wood burning declarations for the Greater Frazier Park Area in the future. The site is not yet reported on AQS. The District has not decided if this will be an SPM site or a SLAMS site.

The District and ARB operated a temporary PM2.5 monitor (EBAM) in the Frazier Park area starting January 14, 2009 for use in generating residential wood burning declarations for the Greater Frazier Park Area. The monitor was removed after the end of the wood burning season, which ended February 28, 2009. This site was operated as an SPM.

The continuous PM2.5 SPM monitor at the Turlock Air Monitoring Site in the Modesto CBSA was replaced with a continuous PM2.5 FEM (November 19, 2008). This new monitor is part of the SLAMS network and is suitable for comparing to the PM2.5 NAAQS.

In addition to replacing the PM2.5 SPM at Turlock, the District replaced three other older PM2.5 SPM monitors with the newer PM2.5 FEM monitors. The replacements occurred at Corcoran (December 16, 2008), Clovis (November 25, 2008), and Bakersfield-Golden State Avenue (June 4, 2009) sites. In each case, the District is continuing operating these monitors as SPMs. At the Bakersfield-Golden, Clovis, and Corcoran sites, the District is operating both a filter-based FRM and the new continuous FEM; this is to gain an understanding of differences in measurements, if any. If this test goes well, the District will begin replacing most of the filter-based FRMs with these new, more labor-efficient FEMs.

**Summary of changes planned, July 2009 – December 2010**

The Valley air monitoring network is continually being improved. The planned changes are described below.

**Stockton CBSA/MSA**

Stockton CBSA/MSA needs an additional PM2.5 monitor suitable for comparing to the NAAQS. The District is currently looking for an appropriate location for the site. The District hopes to have the location selected and a BAM/FEM PM2.5 monitor installed during the 2009 – 2010 budget year, pending other priority projects. The District will begin monitoring for lead at this site in 2010.

The District meets all other EPA monitoring requirements for the other pollutants in this CBSA.

**Modesto CBSA/MSA**

The District will begin monitoring for lead at this site in 2010.

The District currently meets all EPA monitoring requirements in this CBSA.

The District is considering installing meteorological equipment at the Turlock Air Monitoring Site in the future.

**Merced CBSA/MSA**

The District currently meets all EPA monitoring requirements in this CBSA.

The Merced-Coffee Street site has to be vacated by December 31, 2011. The District is currently looking for a new location for this site that will meet siting criteria for ozone, continuous PM10, and PM2.5. This will allow the District to consolidate the Coffee Street site with the 'M' Street site (currently, the Coffee Street site is sited only for ozone and the 'M' Street site only meets PM siting criteria). The District intends to install a PM2.5 continuous monitor operated as an SPM to aid in forecasting and daily reporting of AQI at the Coffee Street site.

**Madera CBSA/MSA**

Madera CBSA/MSA needs an additional PM10 monitor suitable for comparing to the NAAQS. The District is building a new site in the County facility located at Avenue 14 and Road 28. The site will monitor continuous PM10 and in addition measure ozone, PM2.5, and meteorology. This site's ozone monitor will indicate population exposure, whereas the Madera existing site, Madera-Pump, is a PAMS Type 1 site designed to measure clean air coming into Fresno. If the ozone data for the two Madera sites proves to be similar, the District will seek permission from EPA to consolidate the PAMS site with this new location. The PM2.5 monitor will assist the District in implementation of Wood Burning Curtailment forecasting in Madera County among other purposes.

The District meets all other EPA monitoring requirements for the other pollutants in this CBSA.

**Fresno CBSA/MSA**

The District will begin monitoring for lead at this site in the first half of 2010.

The Tranquility monitoring site is a new monitoring site. This site is intended to be a research site and will be considered as an SPM site. It will measure PM2.5, meteorology, and ozone. This west-Valley site is a good distance from development and industry, so it should provide better understanding of background levels and possibly transport. It will have both 10 meter and 20 meter towers to allow for height comparison, and this will be the only 20 meter ambient air monitoring tower operated by the District. Final installation was delayed due to data connectivity issues, but these issues have been recently resolved with satellite link up. The site should be operational by third quarter 2009.

There had been delays in protocols for personnel access at the Huron monitoring site, but the issues have recently been resolved. The PM2.5 BAM should be operational soon. This will be an SPM site measuring PM2.5 only.

**Hanford-Corcoran CBSA/MSA**

The District currently meets all EPA monitoring requirements in this CBSA.

The Hanford monitoring site is being rebuilt at another location on the same school grounds as the current monitor. The rebuild was prompted by staff safety and structural concerns of the previous shelter. Contracts have been signed and the site is expected to be completed by the end of 2009. The site will house the same pollutants as before: ozone, PM10, NOx and metrological equipment. The PM10 filter-based monitor will be replaced with a continuous PM10 monitor.

Once the replacement site is built at Hanford, the ozone monitor that has been temporally installed in Corcoran will be moved back to the Hanford.

**Visalia-Porterville CBSA/MSA**

The Porterville site is a new monitoring site. Two ozone monitors are required in the Visalia-Porterville CBSA due to its population and ozone concentrations, and the new Porterville site will provide better information on population exposures than the sites at Sequoia National Park. The Porterville site will measure ozone and meteorology. The location has already been selected and most of the infrastructure is installed. The site is expected to be completed by the third quarter of 2009.

At the Visalia-Airport site, the lower air profiler is being upgraded with newer technology. This should be completed by the end of 2009.

The District meets all other EPA monitoring requirements for the other pollutants in this CBSA.

**Bakersfield CBSA/MSA**

The District currently meets all EPA monitoring requirements in this CBSA.

The District will begin monitoring for lead at Bakersfield-Golden in the first half of 2010.

The Bakersfield Golden site is being moved due to highway expansion immediately adjacent to the site. The District has been exploring location options. The site measures PM10, PM2.5, Ozone, NOx, CO, Meteorology and PAMS. The move should be completed by the end of 2010.

**Other PM2.5 changes**

One of the District's ongoing monitoring projects is upgrading the PM2.5 network from filter-based FRM monitors to continuous FEM (BAM-1020s) monitors, where possible, to allow for

both daily AQI reporting and comparisons to the NAAQS. The District may also upgrade the SPM sites to the new continuous FEM monitors. Currently, the District is conducting parallel PM2.5 monitoring at the Bakersfield Golden, Corcoran, and Clovis sites to determine how well the FRM monitors compare to BAM-1020s in the SJV. If the differences between the analyzers are too great, then the District will reevaluate plans to switch to FEM monitors.

**Other PM10 changes**

The District is upgrading the PM10 monitoring network from filter-based monitors to real-time monitors. The upgrade brings improved temporal resolution to the District's rigorous PM10 monitoring program. The upgrade will also result in a cost savings through less staff travel time, less maintenance, and fewer filters to weigh.

**Green House Gases (GHG) Monitoring**

The District will be working with ARB to start monitoring for Green House Gases (GHG) At the Madera – Pump, Tranquility, and Parlier sites.

**Data Submission Requirements**

Precision data are submitted to AQS on an ongoing basis each quarter as the data is uploaded into AQS. The accuracy data is submitted into AQS by ARB based on their scheduled audits.

Annual data certification submitted: To be submitted by July 1, 2009

# Appendix A: Monitoring site descriptions

## Sites operated by the SJVAPCD

### Bakersfield – Golden State Avenue

Bakersfield, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow, pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Bakersfield-Golden monitoring site is operated by the SJVAPCD and is located in the Bakersfield, CA metropolitan area. It began operating in June 1994. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses in an urban area. The site also monitors CO, NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants, which scavenge the ozone. During the winter months, ozone concentrations decrease due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind blown dust events, when the wind can cause PM2.5 to become suspended in the air. On rare occasions, this region of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase and sometimes exceed the NAAQS.

### Clovis – N Villa Avenue

Clovis, CA is located in the central part of the San Joaquin Valley with mountains to the east and northeast. North-south air flow is virtually unobstructed. Pollutant emissions occur locally and are also transported from upwind and nearby locations into the area by the wind. The Clovis-Villa Avenue monitoring site is operated by SJVAPCD and is located in the northeastern portion of the Fresno, CA metropolitan area. It began operating in September 1990. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses in an urban area. The site also monitors CO, NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants, which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Corcoran – Patterson Avenue**
Corcoran, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutant emissions occur locally and also get transported from upwind locations into the area by the wind. The Corcoran-Patterson monitoring site is operated by SJVAPCD and is located 67 miles south of the Fresno, CA metropolitan area. It began operating in October 1996. The purpose of the site is to monitor representative concentrations of PM10 and PM2.5 responses from upwind urban areas. This site also monitors ozone, CO, NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Fresno – Drummond St**
Fresno, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Fresno-Drummond Street monitoring site is operated by SJVAPCD and is located in the Fresno, CA metropolitan area. It began operating in July 1984. The purpose of the site is to monitor representative concentrations of hourly ozone responses in an urban area. The site also monitors PM10, CO, NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures.

**Fresno – Pacific**
Fresno, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Fresno-Pacific monitoring site is operated by SJVAPCD and is located in the Fresno, CA metropolitan area. It began operating in January 2000. The purpose of the site is to monitor representative concentrations of hourly PM2.5 responses in an urban area. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Fresno – Sky Park**
Fresno, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Fresno-Sky Park monitoring site is operated by SJVAPCD and is located in the Fresno, CA metropolitan area. It began operating in July 1986. The purpose of the site is to monitor representative concentrations of hourly ozone responses in an urban area. The site also monitors CO, NO2, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. .

**Hanford – S Irwin St**
Hanford, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Hanford-S Irwin Street monitoring site is operated by SJVAPCD and is located 51 miles south of the Fresno, CA metropolitan area. The site began operating in October 1993 and was decommissioned in October 2007 due to plans to move it to a different part of the S Irwin Street location. It is expected to resume operation by the end of 2009. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses from upwind and nearby urban areas. The PM2.5 and ozone monitors have been temporarily moved to Corcoran during site reconstruction. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Madera – Pump Yard**
Madera, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations. The Madera-Pump Yard Street monitoring site is operated by SJVAPCD and is located in the Madera, CA. It began operating in January 2007. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind and nearby urban areas. The site also monitors CO, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures.

**Maricopa**
Maricopa, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. The Maricopa monitoring site is operated by the SJVAPCD and is located 45 miles southwest of the Bakersfield, CA metropolitan area. It began operating in July 1987. The purpose of the site is to monitor representative concentrations of hourly ozone and responses from upwind urban areas. The site also monitors meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures.

**Merced – Coffee Rd**
Merced, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations. The Merced-Coffee Street monitoring site is operated by SJVAPCD and is located in the Merced, CA. It began operating in October 1991. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind urban areas. The site also monitors NO2 and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures.

**Merced – M St**
Merced, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations. The Merced-M Street monitoring site is operated by SJVAPCD and is located in the Merced, CA. It began operating in April 1999. The purpose of the site is to monitor representative concentrations of PM2.5 and PM10 responses from upwind urban areas. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. Occasionally, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Parlier**
Parlier, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Parlier monitoring site is operated by SJVAPCD and is located 20 miles southeast of the Fresno, CA metropolitan area. It began operating in March 1983. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind urban areas. The site also monitors NO2,

NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures.

**Stockton – Wagner - Holt School**
Stockton, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations or through the Sacramento Delta from the Bay Area. The Stockton-Wagner-Holt School monitoring site is operated by SJVAPCD and is located in the Stockton, CA metropolitan area. It began operating in October 1996. The purpose of the site is to monitor representative concentrations of PM10 responses in an urban area. Occasionally, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Tracy Airport**
Tracy, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations or through the Sacramento Delta from the Bay Area. The Tracy Airport monitoring site is operated by SJVAPCD and is located in Tracy, CA. It began operating in January 2005. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses from upwind and nearby urban areas. The site also monitors NO2 and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. Occasionally, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Turlock – S Minaret St**
Turlock, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations or through the Sacramento Delta from the Bay Area. The Turlock-Minaret Street monitoring site is operated by SJVAPCD and is located in the Turlock, CA. It began operating in April 1992. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses from upwind urban areas. The site also monitors CO, NO2, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the

presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. Occasionally, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Visalia – Airport**
Visalia, CA is located where the central and southern parts of the San Joaquin Valley meet. The Sierra Nevada mountain range is approximately 20 miles east of Visalia. North-south air flow is virtually unobstructed. The Visalia-Airport monitoring site is operated by SJVAPCD and serves as a wind profiler monitoring surface wind speed and wind direction. It also monitors air temperature, and relative humidity at the surface. It began reporting official meteorological data in January 2001. Meteorological parameters have a direct influence on how and where pollutants are transported and how much pollutant concentrations increase or decrease.

CARB Sites

**Arvin**
Arvin, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Arvin monitoring site is operated by the CARB and is located 24 miles southeast of the Bakersfield, CA metropolitan area. It began operating in June 1989. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind urban areas. The site also monitors NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations decrease due to shorter daylight hours and lower temperatures. Pollutants occur locally and also get transported into the area by wind.

**Bakersfield – Airport**
Bakersfield, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Bakersfield-Airport monitoring site is operated by CARB and is located 6 miles north of the Bakersfield, CA metropolitan area. It began operating in September 2000. The purpose of the site is to monitor representative concentrations of hourly PM2.5 responses from upwind and nearby urban areas. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and

atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air.

**Bakersfield – California**
Bakersfield, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Bakersfield-California monitoring site is operated by CARB and is located in the Bakersfield, CA metropolitan area. It began operating in March 1994. The purpose of the site is to monitor representative concentrations of hourly ozone, PM10, and PM2.5 responses in an urban area. The site also monitors NO2 and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air.

**Edison**
Edison, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Edison monitoring site is operated by CARB and is located 9 miles east of the Bakersfield, CA metropolitan area. It began operating in January 1980. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind and nearby urban areas. The site also monitors NO2 and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations decrease due to shorter daylight hours and lower temperatures.

**Fresno – First St**
Fresno, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Fresno-First monitoring site is operated by CARB and is located in the Fresno, CA metropolitan area. It began operating in January 1990. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses in an urban area. The site also monitors CO, NO2, SO2, NMOC, NMHC, toxics, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture

content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Modesto – 14th St**

Modesto, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations or through the Sacramento Delta from the Bay Area. The Modesto-14th Street monitoring site is operated by CARB and is located in the Modesto, CA metropolitan area. It began operating in January 1981. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses in local and upwind urban areas. The site also monitors CO and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. Occasionally, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Oildale**

Oildale, CA is located at the southern end of the San Joaquin Valley with mountains to the east, west, and south. Because the mountains block or slow down air flow pollutants can get trapped and build up in the area. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Oildale monitoring site is operated by CARB and is located 6 miles north of Bakersfield, CA within the metropolitan area. It began operating in January 1980. The purpose of the site is to monitor representative concentrations of hourly ozone responses, and hourly PM10 every 6 days in an urban area. The site also monitors meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. Not only does the metropolitan area generate its own pollution, it is also the recipient of pollutants that get transported by wind. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.

**Parlier – Tuolumne**

Parlier, CA is located in the central part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations into the area by the wind. The Parlier monitoring site is operated by CARB and is located 20 miles southeast of the Fresno, CA metropolitan area. It

began operating in January 2006. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind urban areas. The site also monitors NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures

**Shafter**
Shafter, CA is located at the southern end of the San Joaquin Valley with mountains to the east and west, and 58 miles to the south. Because the mountains to the south are further away, southward air flow is less obstructed through Shafter so pollutant build-up is less pronounced compared to Bakersfield and the towns further south. Pollutants occur locally and wind can transport pollutants into and through Shafter from nearby and upwind areas. The Shafter monitoring site is operated by CARB and is located 18 miles northwest of the Bakersfield, CA metropolitan area. It began operating in January 1989. The purpose of the site is to monitor representative concentrations of hourly ozone responses from upwind urban areas. The site also monitors NO2, NMOC, NMHC, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. Being located upwind of Bakersfield, the Shafter site tends to have lower ozone concentrations than does the metropolitan area to the south.

**Stockton – Hazelton**
Stockton, CA is located in the northern part of the San Joaquin Valley with mountains to the east and west. North-south air flow is virtually unobstructed. Pollutants occur locally but the wind also transports pollutants into the area from upwind locations or through the Sacramento Delta from the Bay Area. The Stockton-Hazelton monitoring site is operated by CARB and is located in the Stockton, CA metropolitan area. It began operating in June 1976. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses in an urban area. The site also monitors CO, NO2, toxics, and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

**Visalia – Church**
Visalia, CA is located where the central and southern parts of the San Joaquin Valley meet. The Sierra Nevada mountain range is approximately 20 miles east of Visalia. North-south air flow is virtually unobstructed. Pollutants occur locally and also get transported from upwind locations

into the area by the wind. The Visalia monitoring site is operated by SJVAPCD. It began operating in July 1979. The purpose of the site is to monitor representative concentrations of hourly ozone, PM2.5, and PM10 responses from upwind and nearby urban areas. The site also monitors NO2 and meteorology. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. During the winter months, ozone concentrations tend to be lower due to shorter daylight hours and lower temperatures. Elevated PM2.5 concentrations are possible year round, but concentrations tend to be highest during the winter months due to moisture content in the air, wood burning activities, other anthropogenic activities, and atmospheric chemistry. PM2.5 concentrations can also increase during wind events because the wind can cause PM2.5 to become suspended in the air. On rare occasions, wind will carry dust across the city and cause PM10 concentrations to increase, but PM10 exceedances are rare.

Special Purpose Monitoring Sites

**Sequoia National Park – Ash Mountain**
The Ash Mountain monitoring station is operated by Sequoia National Forest and is located at the southern entrance of Sequoia National Park at a 1,500-foot elevation. It began operating in January 2000. The site demonstrates the hourly ozone response in a rural area. The site also monitors PM2.5 and meteorology. On summer days, ozone and precursors can be transported to Ash Mountain from other locations. At this location, there are significantly lower hourly emissions of NOx as compared to urban areas such as Bakersfield, or Fresno, CA. The amount of available NOx at Ash Mountain to scavenge the ozone is much lower. Because the ozone scavenging at Ash Mountain is much less than the ozone scavenging in urban areas, Ash Mountain can experience elevated ozone concentrations for a 24-hour period during ozone episodes. Since the ozone concentration is already fairly high at dawn, only a relatively small amount of additional ozone can cause levels in the atmosphere to exceed federal standards.

**Sequoia National Park – Lower Kaweah**
The Lower Kaweah monitoring station is operated by Sequoia National Forest and is located at the southern entrance of Sequoia National Park at a 1,937-foot elevation. It began operating in April 1987. The site demonstrates the hourly ozone response in a rural area. The site also monitors meteorology. On summer days, ozone and precursors can be transported to Ash Mountain from other locations. At this location, there are significantly lower hourly emissions of NOx as compared to urban areas such as Bakersfield, or Fresno, CA. The amount of available NOx at Lower Kaweah to scavenge the ozone is much lower. Because the ozone scavenging at Lower Kaweah is much less than the ozone scavenging in urban areas, Lower Kaweah can experience elevated ozone concentrations for a 24-hour period during ozone episodes. Since the ozone concentration is already fairly high at dawn, only a relatively small amount of additional ozone can cause levels in the atmosphere to exceed federal standards.

**Sequoia National Forest – Springville and Pinehurst**
The Springville and Pinehurst monitoring stations are permanent sites operated by Sequoia National Forest. They are located at the southern end of the Sierra Nevada at 1,432-foot and

4,985 foot elevations respectively. Sequoia National Forest also operates nine additional portable monitors that are moved to different locations as needed. The Springville and Pinehurst sites demonstrate hourly ozone and PM2.5 responses in rural areas. The SJVAPCD uses these sites for informational purposes when smoke impacts are occurring in communities due to wildfires or prescribed burning projects.

Other Sites

**Santa Rosa Rancheria**

Santa Rosa Rancheria is Tribal land located in the central portion of the San Joaquin Valley in Lemoore, CA. It is 13 miles southwest of Hanford, CA and 39 miles south of the Fresno, CA metropolitan area. The Diablo Mountain Range is approximately 27 miles east of Santa Rosa Rancheria. North-south air flow is virtually unobstructed. Pollutants occur locally and wind transports pollutants into and through the site from nearby and upwind urban areas as well. The Santa Rosa Rancheria monitoring site is operated by the Tachi-Yokut tribe. It began operating in August 2006. The purpose of the site is to monitor representative concentrations of hourly ozone and PM10 responses from upwind and nearby urban areas. During the summer months, high temperatures and longer daylight hours contribute to increases in ozone during the day. In contrast, ozone concentrations decrease at night with the absence of sunlight and the presence of NOx pollutants which scavenge the ozone. On rare occasions, this area of the San Joaquin Valley experiences wind events that can carry dust into the area or lift local dust particles into the air. Such events can cause PM10 concentrations to increase.