The Health and Related Economic Benefits of Attaining Healthful Air in the San Joaquin Valley

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SJV Air Quality Status

- **Ozone**
  - Ozone NAAQS Exceedances are frequent
  - SJV is classified as a “Serious” Nonattainment Area for 8-hr NAAQS
  - New Air Quality Management Plan, due in 2007, will try to achieve compliance by 2013
  - Major Issue – No downward trend in recent years
Days Above the Federal 8-hr Ozone Standard in the San Joaquin Valley Air Basin

Source: SJVUAPCD
SJV Air Quality Status

• PM
  • Daily and Annual PM2.5 NAAQS are exceeded in the SJV
  • Area is classified as “Serious” Nonattainment for PM2.5
  • New Air Quality Management Plan, due in 2008, will try to achieve compliance by 2013
  • Compliance with the PM2.5 NAAQS will be more difficult than with the PM10 standards
Annual Average PM2.5 in SJV

The bar chart shows the annual average PM2.5 concentrations (in μg/m³) at various locations in the San Joaquin Valley (SJV) over the years 2002, 2003, and 2004. The locations include Stockton, Modesto, Merced, Clovis, Fresno - 1st St., Fresno - Hamilton, Visalia, Corcoran, Bakersfield - Golden St., Bakersfield - Calif. Ave, and Bakersfield - Planz.

The chart indicates that the concentrations are below the NAAQS (National Ambient Air Quality Standards) levels. The concentrations are significantly higher in Bakersfield compared to the other locations. The data suggests a need for further investigation and potential interventions to lower PM2.5 levels in the region.
98th Percentile 24-hour average PM2.5 Concentrations

[Bar chart showing PM2.5 concentrations at various locations with NAAQS marked.]
Exposure Approach

Baseline Air Quality

- 2002-2004 Measurement Data in and Around SJV Air Basin
- Create Spatial Maps of Ambient Air Quality Data
  - Hourly Ozone Maps
  - Daily and annual PM2.5 Maps
Exposure Approach

Future Air Quality
- Determine Design Values (3 yr averages)
- Project future year concentrations that comply with standards using Rollback

Population
- 2000 census data gridded and adjusted to reflect the 2004 population
- Grid, county, age and race/ethnicity breakdown
## NAAQS Reduction Requirements

<table>
<thead>
<tr>
<th>NAAQS</th>
<th>Background</th>
<th>Design Value</th>
<th>Future Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone 8-hr (ppb)</td>
<td>40</td>
<td>116.7</td>
<td>85</td>
</tr>
<tr>
<td>PM$_{2.5}$ Annual (µg/m$^3$)</td>
<td>6</td>
<td>20.6</td>
<td>15.5</td>
</tr>
<tr>
<td>PM$_{2.5}$ 24-hr (µg/m$^3$)</td>
<td>6</td>
<td>73.2</td>
<td>35.5</td>
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<tr>
<td>PM$_{2.5}$ 24-hr –Previous</td>
<td>6</td>
<td>73.2</td>
<td>65.5</td>
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</tbody>
</table>
Ambient Air Quality Monitor Locations

Ozone

Legend
- O3 Site Location
- 5km Grid
- Air Basin Boundary
- County Boundary

PM2.5

Legend
- PM2.5 Site Location
- 5km Grid
- Air Basin Boundary
- County Boundary
Spatially Mapped Annual Average PM2.5 Concentrations for 2002
Regional Human Exposure (REHEX) Model

- Computes frequencies of population exposures on a spatial grid
- These REHEX simulation are for ambient exposures. They do not account for the modifying effects of buildings and vehicles, indoor sources, or human time-activity patterns on personal exposures.
- Results computed for averaging times associated with exposure-response functions
  - 1-hr daily maximum
  - 5-hr daily maximum
  - 8-hr daily maximum
  - 10 AM – 6 PM
  - 24-hr average
  - Annual average
Persons-days per Year of Exposure to 8-hr Ozone Above Various Concentration Thresholds

- 2002 - 2004 Baseline
- Future 8-hr NAAQS Attainment

8-hr Daily Maximum Ozone Concentration Threshold (ppb)

- 8-hr Ozone NAAQS
Persons-days per Year of Exposure to 24-hr PM2.5 Above Various Concentration Thresholds

24-hr Average PM2.5 Concentration Threshold (ug/m3)

Person-days per year above threshold

2002 - 2004 Baseline
Future 24-hr NAAQS Attainment

24-hr PM2.5 NAAQS
Persons Exposed to Annual Average PM2.5 above Various Concentration Thresholds

- 2002 - 2004 Baseline
- --- Future Annual NAAQS Attainment

Annual PM2.5 NAAQS
Person-days per Year of Population Exposure to 8-hour Daily Maximum Ozone Concentrations above 85 ppb

2002 – 2004 Baseline

Future NAAQS Attainment
Person-days per Year of Population Exposure to 24-hour PM2.5 concentrations above 35 µg/m³

2002 – 2004 Baseline

Future NAAQS Attainment
Persons Exposed To Annual Average PM2.5 Concentrations Above 15 µg/m³

2002 – 2004 Baseline

Future NAAQS Attainment
Person-days of Exposure to 8-hr Ozone above 85 ppb (in millions per year)

<table>
<thead>
<tr>
<th>Region</th>
<th>2002 – 2004 Baseline</th>
<th>With NAAQS Attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJV Air Basin</td>
<td>69</td>
<td>0.29</td>
</tr>
<tr>
<td>Fresno County</td>
<td>25.5</td>
<td>0.21</td>
</tr>
<tr>
<td>Kern County</td>
<td>19.7</td>
<td>0.04</td>
</tr>
<tr>
<td>Tulare County</td>
<td>10.8</td>
<td>0</td>
</tr>
<tr>
<td>Merced County</td>
<td>4.6</td>
<td>0</td>
</tr>
<tr>
<td>Madera County</td>
<td>3.4</td>
<td>0.04</td>
</tr>
<tr>
<td>Kings County</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>Stanislaus County</td>
<td>2.1</td>
<td>0</td>
</tr>
<tr>
<td>San Joaquin County</td>
<td>0.3</td>
<td>0</td>
</tr>
</tbody>
</table>
### Person-days of Exposure to 24-hr PM2.5 above 35 µg/m³ (in millions per year)

<table>
<thead>
<tr>
<th>Region</th>
<th>2002 – 2004 Baseline</th>
<th>With NAAQS Attainment</th>
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</thead>
<tbody>
<tr>
<td>SJV Air Basin</td>
<td>126.6</td>
<td>3.59</td>
</tr>
<tr>
<td>Fresno County</td>
<td>36.3</td>
<td>1.23</td>
</tr>
<tr>
<td>Kern County</td>
<td>31.4</td>
<td>1.37</td>
</tr>
<tr>
<td>Tulare County</td>
<td>14.8</td>
<td>0.10</td>
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<tr>
<td>Merced County</td>
<td>6.6</td>
<td>0</td>
</tr>
<tr>
<td>Madera County</td>
<td>5.9</td>
<td>0.02</td>
</tr>
<tr>
<td>Kings County</td>
<td>5.6</td>
<td>0.03</td>
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<tr>
<td>Stanislaus County</td>
<td>15.3</td>
<td>0.83</td>
</tr>
<tr>
<td>San Joaquin County</td>
<td>10.7</td>
<td>0.01</td>
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### Persons Exposed to Annual Average PM2.5 above 15 µg/m³ (in thousands)

<table>
<thead>
<tr>
<th>Region</th>
<th>2002 – 2004 Baseline</th>
<th>With NAAQS Attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJV Air Basin</td>
<td>2,486</td>
<td>521</td>
</tr>
<tr>
<td>Fresno County</td>
<td>785</td>
<td>183</td>
</tr>
<tr>
<td>Kern County</td>
<td>584</td>
<td>194</td>
</tr>
<tr>
<td>Tulare County</td>
<td>364</td>
<td>102</td>
</tr>
<tr>
<td>Merced County</td>
<td>148</td>
<td>0</td>
</tr>
<tr>
<td>Madera County</td>
<td>135</td>
<td>0</td>
</tr>
<tr>
<td>Kings County</td>
<td>134</td>
<td>41</td>
</tr>
<tr>
<td>Stanislaus County</td>
<td>155</td>
<td>0</td>
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<tr>
<td>San Joaquin County</td>
<td>180</td>
<td>0</td>
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</table>
Days per year Above Concentration in 2002-2004 by Racial/Ethnic Group

![Bar chart showing days per year above concentration for ozone and PM2.5 by racial/ethnic group.](chart.png)
Days per year Above Concentration in 2002-2004 by Age Group

- 8-hr O3 > 85 ppb
- 24-hr PM2.5 > 35 ug/m3

Days per Year Above Concentration

- Ozone
- PM2.5

- All Ages
- Children <1 yrs
- Children 1 yr
- Children 2-4 Yrs
- Children 5-17 Yrs
- Children 18-21 Yrs
- Adults 22-29 Yrs
- Adults 30-64 Yrs
- Adults >64 Yrs
Days per year Above Concentration in 2002-2004 by County

SJV Air Basin
San Joaquin County
Stanislaus County
Merced County
Madera County
Fresno County
Kern County

8-hr O3 > 85 ppb
24-hr PM2.5 > 35 ug/m3