

**San Joaquin Valley Air Pollution Control District
Town Hall Meeting: Ozone Plan
Discussion Paper
July 2006**

INTRODUCTION

This document provides background information on the current state of air quality in the San Joaquin Valley and the future challenges involved in reaching new federal health-based standards for air quality. The Valley's air quality problems present a unique opportunity for the Valley to excel. Building on our past efforts, the Valley can become a place where ingenuity and hard work on air quality will be a source of pride for all Valley residents.

Continued success will require:

- bold, innovative actions by the Air District;
- the general public's willingness to make air-friendly behavioral changes;
- sound land-use policies and community design to minimize vehicle travel; and
- continued investment by Valley businesses in technology and pollution control.

Also, more than ever, the state and federal government must do their fair share for the Valley by providing funding and regulatory assistance to reduce emissions from cars, trucks and locomotives.

Fortunately, the Valley has a history of success when battling air quality challenges. Over the past 20 years, substantial improvements have been made in Valley air quality, and the hard work and financial and personal investments by industries and individuals are producing real and tangible results.

Yet, cleaning the Valley's air further and reaching new health-based air quality standards is a monumental challenge unmatched by any other area in the nation. The climate and geography, the same characteristics that make the Valley the world's most fertile agricultural region and a beautiful place to live, create optimal conditions for creating and trapping air pollution. Stagnant weather patterns, hot summers, and foggy winters make the Valley very vulnerable to forming air pollution and impede the region's ability to disperse it.

With the Valley's natural low capacity for pollution, attaining the tough, new federal health-based standards may require an additional 60-percent reduction in smog-causing pollutants. Achieving these enormous reductions in the timelines required by federal law will be a daunting task. To put this in perspective, we would not meet this goal if we in the Valley undertook any one of the following actions: shutting down all businesses, shutting down agriculture, removing all truck traffic, or removing all passenger cars. Of course, these are extreme and unrealistic measures offered only to illustrate the

magnitude of our problem. Our ultimate strategy will require investment and participation from many sectors.

This document will aid attendees as they participate in a series of Town Hall meetings held by the San Joaquin Valley Air Pollution Control District to set the path for continued air quality improvement in the Valley. The purpose of these meetings is to discuss ways the Valley can work collectively to reach the tough new federal health-based air quality standard referred to as the “8-hour ozone standard.”

This “Introduction” includes a brief overview of the Valley’s current air quality, the health and economic impacts of air pollution, and the federal requirements surrounding air quality. The “Challenges” section outlines the scope of the ozone problem in the San Joaquin Valley. The third and final section, “Strategies,” presents the District’s proposed four-faceted approach and solicits specific suggestions from the public on how the San Joaquin Valley can reach attainment of the federal 8-hour ozone standard.

Current State of Valley Air Quality

Air quality plays an important role in our lives because it relates directly to our health, our quality of life, and our economic prosperity. The Environmental Protection Agency (EPA), the federal organization responsible for regulating air quality, sets certain pollution standards or attainment levels that must be met to protect the health of residents.

The Valley struggles primarily with two types of air pollution: ozone and particulate matter (PM). Ozone is primarily a summertime problem and is commonly referred to as smog, while PM is a wintertime problem. While air quality has significantly improved with regard to these pollutants, the Valley does not yet meet all of the applicable federal health-based standards.

Unlike other pollutants, ozone¹ is not typically emitted directly from human activities and equipment. It forms when emissions from vehicles, factories, and other human activities react in the presence of heat and sunlight (as illustrated in Figure 1).

¹ Ozone, O₃, is composed of three oxygen atoms. Ozone occurs naturally in the upper atmosphere and protects living organisms from the sun’s damaging ultraviolet rays, but it also occurs as ground-level ozone, the main ingredient of urban smog. Ground level ozone is detrimental to human health, ecosystems, crops, and forests, and can damage materials.

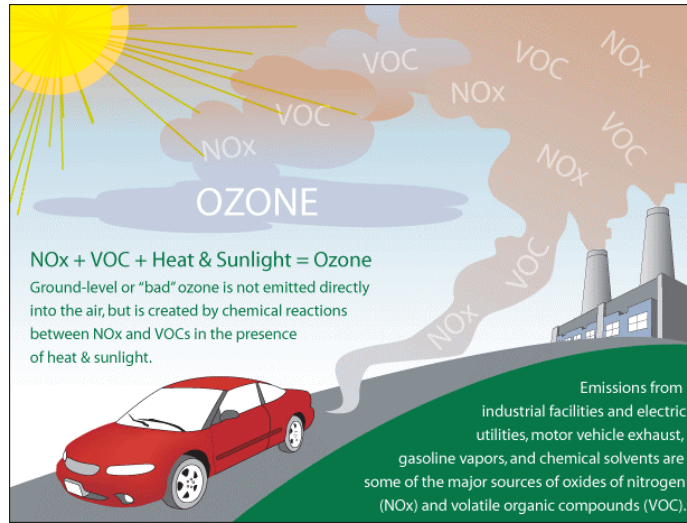


Figure 1 Ozone Formation

Source: AirNow, <http://airnow.gov/index.cfm?action=jump.jump_ozone>

Although the San Joaquin Valley’s peak ozone levels are not as high as areas such as Los Angeles or Houston, Texas; the Valley experiences more days over the federal health-based standards. So while the Valley’s ozone levels don’t reach the record highs of Los Angeles, we experience high levels more often.

The Valley’s ozone attainment strategy, a roadmap for bringing pollution levels into the federally mandated healthy range, is designed primarily to reduce the number of days over the standard. As shown in the table below (Table 1), the Valley is seeing an improvement in air quality as it relates to ozone. The number of days the Valley exceeded the federal standards has declined significantly since 1990, and the Valley’s ozone peak levels have also declined, although not as dramatically.

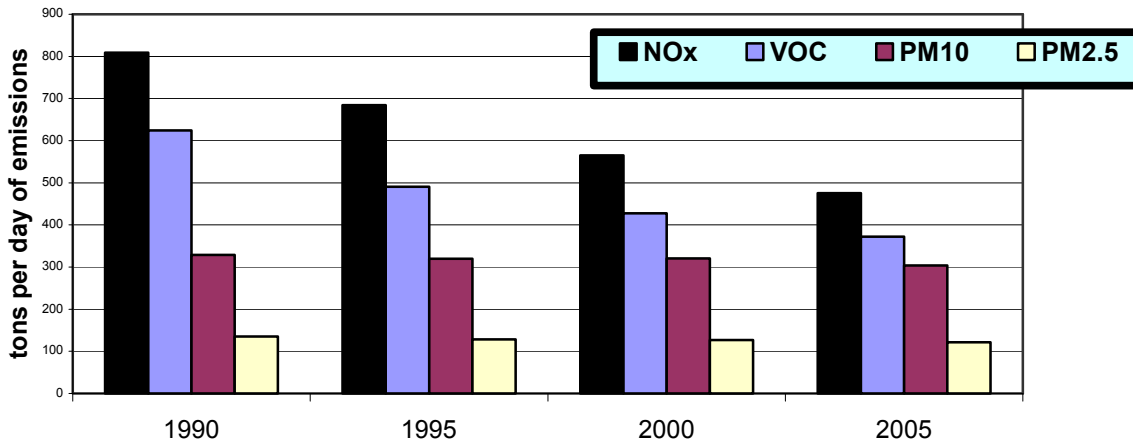
Table 1 Ozone in the San Joaquin Valley

Ozone in the San Joaquin Valley	1990	2005	Percent change
Number of days over the 8-hour ozone standard, 3-year average	126	105	-16%
Number of days over the 1-hour ozone standard, 3-year average	58	18	-69%
8-hour ozone peak reading (design value), percent over standard	49%	41%	-15%
1-hour ozone peak reading (design value), percent over standard	33%	24%	-28%

The improvements in ozone levels are the result of the reduction of two major pollutants, Nitrogen Oxide (NOx) and Volatile Organic Compounds (VOC). Emission reductions achieved by Valley businesses and citizens and the programs and controls put in place by the San Joaquin Valley Air Pollution Control District (District), the California Air Resources Board (ARB), the U.S. Environmental Protection Agency (EPA), and local agencies have led the way toward these significant improvements in air quality. As of 2005, total NOx emissions have decreased 41% from their 1990 levels, and total VOC emissions have decreased 40% from their 1990 levels. From

sources under the jurisdiction of the District, between 1990 and 2005, NOx emissions have been reduced by 52% and VOC emissions have been reduced by 32%.

Figure 2 Emissions in San Joaquin Valley, 1990-2005



Similarly, particulate matter² air quality has also been improving. On July 6, 2006, EPA proposed to find that the San Joaquin Valley attained the federal health-based standard for PM10, the larger classification of particulate matter. This milestone represents a historic achievement for the Valley and is extraordinary news for Valley residents. It confirms that these challenging health-based standards established by the federal government can indeed be reached through innovation and hard work.

Furthermore, PM2.5 concentrations, the smaller classification of particulate matter, have also improved since monitoring began in 1999. As shown in the table below (Table 2), the total number of exceedance days per year and the annual averages have both decreased.

PM10 and PM2.5 can be directly emitted into the air or formed when NOx and other compounds combine. As shown in the graph above (Figure 2), between 1990 and 2005, direct PM10 emissions decreased by 13%, and direct PM2.5 emissions decreased by 10%. These emissions reductions, as well as reductions in NOx and other compounds, have caused significant improvement in air quality.

Table 2 PM2.5 in the San Joaquin Valley

PM2.5 in the San Joaquin Valley	1999	2005	Percent change
PM2.5 24-hr standard, estimated number of exceedance days	35-38	>12%	-66%
PM2.5 Annual Average, percent over standard	87%	33%	-62%

² Particulate Matter includes PM10 (PM that is 10 microns or less in diameter) and PM2.5 (PM that is 2.5 microns or less in diameter).

Health and Economic Costs of Ozone

There are many costs to ozone pollution, including human health impacts and economic costs. Pursuant to the federal Clean Air Act, the EPA sets air quality standards to protect public health; achieving those standards improves public health and reduces the region's health care costs.

The human health cost of ozone includes chest pain, coughing, throat irritation, and congestion. Breathing ozone can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. Other symptoms triggered by ozone include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. Unfortunately, children are most at risk from exposure to ozone, because their respiratory systems are still developing. Studies have linked rising hospital admissions and emergency room visits to higher ozone levels. By reaching the federal health-based standards for ozone, we will greatly reduce the negative health impact of this pollutant.

These health impacts carry economic costs as well. In *The Health and Related Economic Benefits of Attaining Healthful Air in the San Joaquin Valley*, researchers Jane V. Hall, Victor Brajer, and Frederick Lurmann report that the economic benefits of meeting the federal standards for both PM_{2.5} and ozone could save an average of nearly \$1,000 per person per year Valley-wide for a total of more than \$3 billion annually (2005 dollars). They report that attaining both standards may result in fewer premature deaths, fewer asthma attacks, fewer cases of bronchitis, and fewer hospital admissions. These effects are attributed to attaining both the PM_{2.5} and ozone standards, not just the 8-hour ozone standard; many of the potential health impacts in Hall's study may be linked to diesel particulates (a component of PM_{2.5}), though reducing unhealthy ozone concentrations will reduce some these costs to the Valley. Hall's study is the first of its kind for the San Joaquin Valley. Future studies will improve our understanding of air pollution effects and costs and affirm the importance of programs that bring the Valley into attainment of federal air quality standards.

In addition to health impacts, ozone affects Valley ecosystems. Ozone reduces agricultural yields for many economically important crops, such as soybeans, kidney beans, wheat, and cotton. Ground-level ozone interferes with the ability of plants to produce and store food, which makes them more susceptible to disease, insects, other pollutants, and harsh weather. Ozone damages the leaves of trees and other plants, damaging the appearance of cities, national parks, forests, and recreational areas.

Federal Air Quality Standards and Planning Requirements

Meeting federal air pollution health-based standards, formally known as National Ambient Air Quality Standards (NAAQS), for pollutants such as PM_{2.5} and ozone helps protect public health and improves the quality of life for Valley residents.

When the federal government sets these standards, they present a comprehensive review of the best available health studies in a formal report known as a “criteria document.” The federal government uses these health-based studies to ensure that air quality is set at levels that protect public health. Once the federal government sets a standard, states and air districts adopt plans, rules, and programs that reduce emissions.

The plans are the first step in the process. They are a recipe outlining the rules and program that need to be put into place to reach the health-based standards outlined by the federal government. The rules and programs are then implemented to reduce the emissions that go into the air. By reducing emissions, the rules and programs also reduce unhealthful concentrations of air pollutants and help areas reach the health-based standards set by the federal government.

A state with an area that does not meet a specific health-based standard must satisfy several requirements in their State Implementation Plan (SIP). A SIP is the recipe of rules and programs that will be implemented over time to ensure that an area meets the health-based standards.

All areas required to submit a SIP, or their recipe for air-quality success, must put together this very detailed and complex document by a certain deadline. This submittal deadline is the same for all of the areas needing to submit SIPs.

Requirements and deadlines outlined in the SIP are based on the severity of the nonattainment area’s air pollution problem. In simpler terms, the timeline for following the specific steps in the air quality recipe depends on how bad the pollution is in that given area.

The San Joaquin Valley is currently classified as a “serious nonattainment area” for 8-hour ozone, and our Town Hall Meetings are focused on generating ideas to include in our 8-hour ozone SIP. Table 3 summarizes the timelines and requirements for areas classified serious or higher. Notice that all four classifications must submit a SIP by June 15, 2007, but the compliance and attainment date vary between the classifications.

Table 3 Timelines and Requirements

Requirement	Serious Areas	Severe-15 Areas	Severe-17 Areas	Extreme Areas
Attainment demonstration, RFP, and NSR SIP submission	6/15/07	6/15/07	6/15/07	6/15/07
Compliance Date: Achieve all emissions reductions needed for attainment	By start of the 2012 ozone season	By start of the 2018 ozone season	By start of the 2020 ozone season	By the start of the 2023 ozone season
Attainment date	6/15/2013	6/15/2019	6/15/2021	6/15/2024

The June 15, 2007 deadline for submittal of the SIP requires bringing a plan before the District Governing Board for public hearing and adoption on March 15, 2007 so that the plan can then go to California Air Resource Board (ARB) for approval and finally to the Environmental Protection Agency (EPA). A complete plan must be presented to the Governing Board on February 15, 2007. Workshops on drafts of the ozone plan will be held in fall 2006. This is a relatively short period of time to gather ideas and information regarding all the possible ingredients the businesses, communities, and individuals of the San Joaquin Valley can contribute to our plan or our air quality recipe.

While the challenge is great, success is possible, and the benefits of reaching the federal health-based standards for air-quality in the Valley cannot be minimized. But success can only come through collaboration, innovation, and dedication to the huge task put before this community.

CHALLENGES

Attaining the 8-hour ozone standard will be a significant challenge for the San Joaquin Valley for the coming years. In spite of significant progress in reducing the number of ozone exceedances each year, the Valley's 8-hour ozone design values have not changed significantly since 1990. Design values, which are calculated based on federal requirements for the "form of the standard," indicate the severity of the ozone problem and are used for air quality planning. The Valley's highest design values are hovering around 0.11 ppm (parts per million), whereas the current standard for 8-hour ozone is 0.08 ppm.

Ideal Climate for Ozone Formation

The topography and climate in the San Joaquin Valley create ideal conditions for generating and trapping ozone precursors, and then creating and retaining pollution. To illustrate the Valley's natural propensity for forming ozone, the San Joaquin Valley has far lower emissions per square mile ("emission density") than other regions in California that have equivalent or less severe ozone problems. The combined VOC and NO_x emissions per square mile projected for the Valley are far lower than the "emission density" values of South Coast and the Bay Area air basins (see Figure 3).

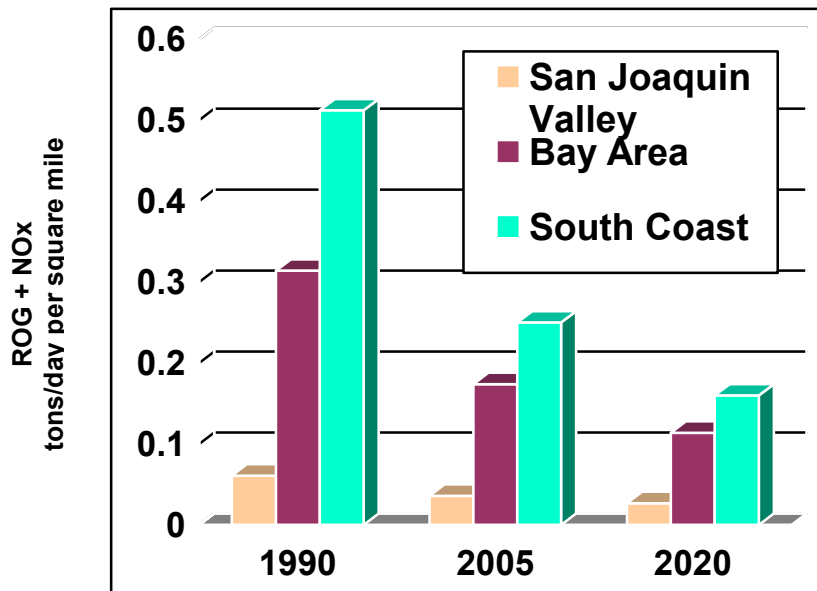


Figure 3 ROG + NOx per Square Mile in the SJV and Other Areas in California

Carrying capacity

Ozone “carrying capacity” is the maximum amount of NOx and VOC emissions that would provide for ozone attainment. Preliminary modeling conducted by ARB indicates that the Valley’s carrying capacity is approximately 40% of the total emission inventory projected for 2012, or about 300 tons per day of combined NOx and VOC. This means that attainment of the 8-hour ozone standard may require a 60% reduction in both NOx and VOC emissions for the year 2012 in the San Joaquin Valley. These reductions are beyond what is already being achieved by current regulations, but this preliminary estimate does account for the significant growth that will occur over the coming years. The 2000 population for the San Joaquin Valley was about 3.2 million, the 2010 population is estimated to be 4.0 million, and the 2020 population is projected to be about 4.8 million.

Jurisdictional Puzzle

Not all of the Valley’s emissions can be legally controlled by the Valley Air District. This District has primary responsibility for stationary sources (non-mobile sources tracked by site), such as power plants and manufacturing facilities, as well as some area sources (non-mobile sources that are not tracked individually, but as sources spread over an area), such as agriculture. The EPA is responsible for regulating emissions from locomotives, aircraft, heavy-duty trucks used in interstate commerce, and other sources, such as off-road engines that are either preempted from state control or best regulated at the national level. Under state authority, ARB establishes emission standards for on-road motor vehicles, some off-road sources, and consumer products. ARB also establishes fuel specifications for California. Local governments such as cities and

counties can influence emissions generation from vehicles in their land use and transportation planning processes and projects.

Approximately 31% of the total NO_x inventory for the San Joaquin Valley is under the District's jurisdiction, and approximately 52% of the total VOC inventory for the San Joaquin Valley is under the District's jurisdiction. If all of the emissions from sources under the District's jurisdiction were lowered to zero, it would not be enough to reach attainment of the 8-hour ozone standard. There is no simple solution for attaining the 8-hour ozone standard, and it will require all sectors to contribute significantly to the effort.

STRATEGIES

Meeting the challenge of attaining the 8-hour ozone standard in the San Joaquin Valley, with its meteorological and topographic disadvantages as well as its growth rate and automobile-dependent land use patterns, will require an innovative approach that involves every person and business in the Valley. The centerpiece of the District's upcoming *2007 Ozone Plan* is the control strategy, the measures that the District and others will put in place to control ozone precursor emissions in an effort to decrease concentrations of ozone so that the San Joaquin Valley can attain the federal standards. ARB has conducted preliminary modeling suggesting both NO_x and VOC emissions for the SJVAB for the year 2012 will have to decrease by 60% beyond control measures currently in place.

To achieve this, the District is considering a four-faceted control strategy:

- Regulatory component - The regulatory component will consist of traditional "command-and-control" regulations, like most current rules in the District's Rulebook section titled, "Regulation IV – Prohibitions."
- Incentive-based strategies - Incentive-based strategies will build on the District's current grant programs, which use a combination of state and local funds. These programs have expanded in funding and increased in sophistication over the years.
- Alternative compliance - Alternative compliance programs allow sources to achieve reductions from alternative emissions sources, provided those reductions are equivalent to those required, thus allowing a source to choose the most economically viable method of achieving the necessary reductions.
- Local, State, and Federal sources/partnerships - This component of the Valley's control strategy acknowledges that local, State, and Federal agencies must each reduce emissions from the sources under their jurisdiction to reach the 60% VOC and NO_x reductions needed.

Each facet of the four-part control strategy will consist of a number of emission control measures, each of which will address specific source categories. Tables 4 and 5 list the largest source categories in the emissions inventory for the San Joaquin Valley, based on preliminary estimates³ for summer emissions, subject to change. However, at this

³ Reflects emissions reductions adopted by the District through May 2005. See footnote for Tables 4 and 5.

point in the SIP development process, these do not necessarily reflect the most likely control measures. The control measure implementation schedule, which will be designed to reduce emissions as expeditiously and as practically as possible, will be developed with input from stakeholders.

Table 4 Top 25 Emission Inventory Categories for VOC⁴

(in tons per day, based on preliminary estimates)

Source Category	2005	2015
Livestock waste (dairy cattle)	39.4	52.4
Light duty passenger cars	69.4	38.1
Consumer products	23.3	27.1
Oil and gas production (evaporative losses)	27.9	25.2
Pesticides	24.0	22.3
Prescribed burning	20.7	20.0
Off-road recreational vehicles	15.9	16.2
Coatings (paints and thinners – non architectural)	12.1	16.0
Recreational boats	16.1	12.7
Petroleum Marketing (gasoline evaporative losses)	10.8	12.6
Food and agriculture (crop processing and wineries)	11.4	12.3
Architectural coatings (paints and thinners)	9.4	10.3
Livestock waste (broilers)	8.4	8.4
Heavy duty trucks	12.7	8.2
Ag burning	8.4	8.2
Heavy duty diesel trucks	13.5	8.0
Livestock waste (range cattle)	7.3	7.3
Aircraft	6.4	6.7
Livestock waste (feedlot cattle)	5.0	5.0
Other (cleaning and surface coatings)	3.4	4.5
Motorcycles	5.5	4.4
Residential Fuel Combustion	5.9	4.2
Off-road equipment (lawn and garden)	5.9	4.1
Adhesives and Sealants	3.2	3.8
Farm equipment (tractors)	6.9	3.3

Table 5 Top 25 Emission Inventory Categories for NOx⁴

(in tons per day, based on preliminary estimates)

Source Category	2005	2015
Heavy duty diesel trucks	225.3	116.7
Manufacturing and industrial (boilers, IC engines)	32.2	37.7
Light duty passenger cars	65.0	30.8
Farm equipment (tractors)	50.6	28.1
Trains	23.6	20.8
Off-road equipment (construction and mining)	36.5	16.1
Off-road equipment (other)	20.6	13.3
Agricultural irrigation pumps	16.6	12.3
Oil and gas production (combustion)	11.2	9.7
Glass and related products	9.4	9.3
Food and agriculture (crop processing and wineries)	9.2	8.9
Service and commercial (boilers, IC engines)	7.7	8.1
Heavy duty gas trucks	10.0	7.8
Cogeneration (electricity generation and heat recovery)	10.0	7.5
Residential fuel combustion	6.3	5.8
Ag burning	4.0	3.9
Recreational boats	3.9	3.4
Electric utilities	3.3	3.2
Mineral processes (mining, cement manufacturing)	2.3	2.8
Air craft	2.3	2.4
Heavy duty urban buses	2.4	2.3
School buses	2.1	2.2
Prescribed burning	1.8	1.8
Ships and commercial boats	1.2	1.3
Motorcycles	1.3	1.3

⁴ The emissions data presented above reflect District rules and regulations adopted through May 2005. Rules and regulations adopted by the District since May 2005, as well as those that will be developed as part of the 8-hour ozone plan, are not reflected in the above tables. Inclusion of additional emissions reductions will change the content and ranking of the "Top 25 lists"

Town Hall Meetings

With the great challenge ahead of the San Joaquin Valley, the District is soliciting ideas from the public and other agencies. The goal of the District's series of town hall meetings on July 26, 27, and 28, 2006 is to generate and record ideas from Valley residents and other concerned parties on how to attain the federal 8-hour ozone standard in the SJVAB. We invite attendees to address the following questions:

- What is your opinion of the District's four-faceted control strategy?
- What top three control measures would you suggest, including source categories, the details of the controls, and the timing of the measures?
- How would you like to see incentive funding used?
- What are potential ways to increase incentive funding?
- What is your opinion of alternative compliance?
- What specific recommendations do you have for control strategies on sources under the jurisdiction of state, federal, and local governments?
- What opportunities for research and innovation do you see?

Attendees will be given opportunities to respond to these questions during the town hall meetings. The town hall meetings will begin with an overview of air pollution health impacts, challenges for the San Joaquin Valley, and District strategies. Then, attendees of the town hall meetings will be invited to give their responses. Written suggestions will be accepted until August 11th and may be addressed to:

Jessica Hafer
San Joaquin Valley Air Pollution Control District
1990 E. Gettysburg Ave
Fresno, CA 93726

District staff will evaluate comments received from the Town Hall meetings for potential inclusion in the District's *2007 Plan for 8-hour Ozone*. A draft plan will be available for and presented in public workshops this fall. Further public involvement will be possible at that time.

Sources Sited:

Hall, Jane V; Brajer, Victor; Lurmann, Frederick W. (March 2006). "The Health and Related Economic Benefits of Attaining Healthful Air in the San Joaquin Valley." Institute for Economic and Environmental Studies, California State University – Fullerton.