



Executive Summary



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The San Joaquin Valley (Valley) faces unique and unprecedented air quality challenges, and this plan is a continuation of the San Joaquin Valley Air Pollution Control District's mission to improve the Valley's air quality. Building on the *2007 Ozone Plan* and *2008 PM2.5 Plan*, this plan utilizes the latest science and best available information to lay out a strategy for demonstrating attainment of the newest federal standard for fine particulate matter (PM2.5) as expeditiously as possible. This *2012 PM2.5 Plan* was developed through an extensive public process, and will involve both Valley businesses and residents in making the efforts necessary to ultimately achieve clean air in the Valley.

Plan includes comprehensive strategy that builds on existing strategies and involves all Valley sectors

The District's *2012 PM2.5 Plan* is a multifaceted strategy that utilizes a combination of conventional and innovative control strategies to reduce emissions of PM2.5 and other pollutants that form PM2.5. The Valley's successes in adopting regulations and other strategies that have improved the Valley's air quality provide the foundation for this plan. In developing this plan, the District has left "no stone unturned" in evaluating all sources of emissions for potential strategies to reduce emissions (see Appendix D). In addition to reducing direct emissions of PM2.5, this plan focuses on reducing oxides of nitrogen (NOx) emissions, which is a predominant pollutant not only in the formation of PM2.5 in the Valley, but is also the focus of the District's ozone reduction strategies. This overlapping significance and emphasis on reducing NOx emissions helps to address both of the Valley's biggest air quality challenges, PM2.5 and ozone. Along with comprehensive efforts at the local level to reduce emissions, reducing mobile source emissions that are not under the direct authority of the District are critical to attaining the standard, and this plan includes state and federal measures that will provide significant new emissions reductions in the coming years. As outlined below, this plan's comprehensive control strategy includes regulatory actions, incentive programs, technology advancement, policy and legislative positions, public outreach, participation and communication, and additional strategies (see Chapter 10).

Overview of 2012 PM2.5 Plan Strategy

Local (District) Strategy:

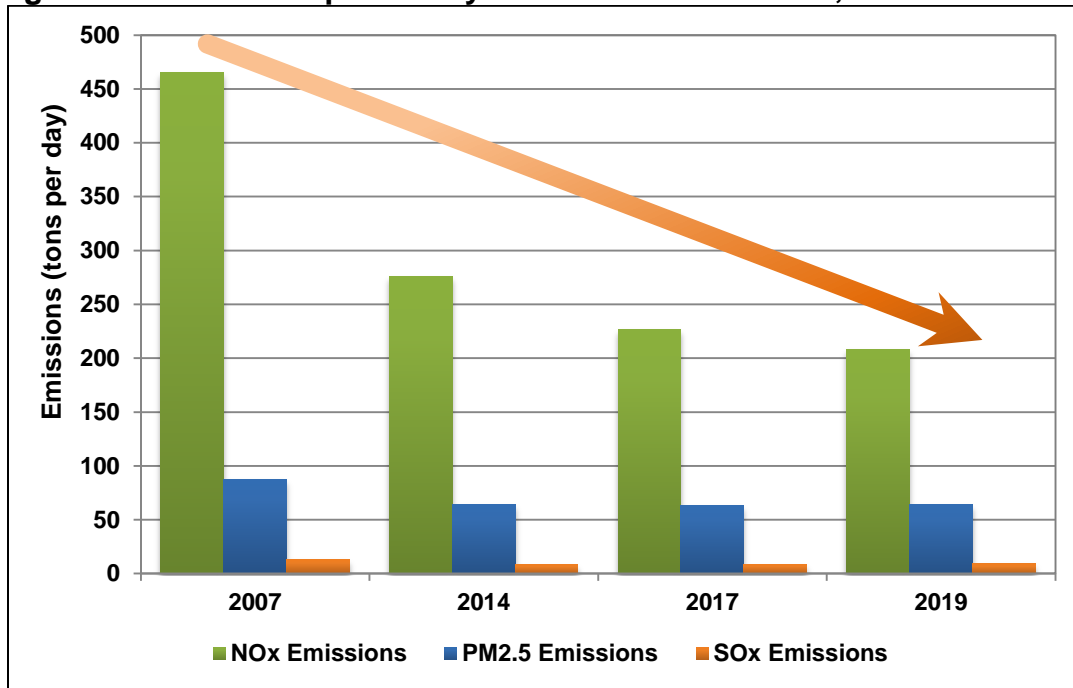
- Wide-ranging regulations that reduce emissions from various Valley industries (stationary sources) and the general public. These regulations address stationary source emissions from boilers and steam generators, internal combustion engines, glass melting furnaces, turbines, and other sources. Additionally, the general public, employers, and small businesses are also involved in reducing emissions by complying with regulations that focus on residential wood burning, employer commuting, commercial cooking, and other sources.

- Risk-based approach that prioritizes measures that expedite attainment of the standard and provide the greatest public health benefits.
- Incentive programs that target cost-effective mobile sources not under the direct jurisdiction of the District, including on and off-road vehicles and equipment.
- Technology advancement efforts that assist in the development of new zero and near zero-emissions technologies critical to addressing increasingly difficult air quality standards.
- Research/Further studies that will continue to develop policy-relevant air quality science and additional potential opportunities for clean air strategies.
- Policy and legislative efforts that assist in shaping new legislation and policies at the local, state, and federal levels that promote emission reduction efforts.
- Outreach efforts that assist in educating and empowering the public in getting involved in efforts to reduce emissions and improve the Valley's air quality.

State/Federal Strategy:

- Regulations that reduce emissions from the variety of mobile and other sources under state and federal jurisdiction, including on-road sources such as passenger vehicles and heavy duty trucks, and off-road sources such as construction equipment.
- Incentive funding and programs that assist the District in our effort to accelerate reductions from mobile sources.
- Technology advancement efforts including funding and collaborative support in the development of new zero and near zero-emissions technologies.

Through this comprehensive attainment strategy, the Valley will achieve attainment of the federal PM_{2.5} standard by 2019 (see Figure ES-1), reducing NO_x emissions, the predominant pollutant leading to the formation of PM_{2.5}, by 55% over this period. In addition to these much-needed NO_x reductions, the District's strategy also reduces direct PM_{2.5} emissions that not only assist the Valley in attaining the standard as fast as possible, but also reduce the PM_{2.5} emissions that pose the greatest health impacts to Valley residents. These strategies, including new measures to further reduce emissions from residential wood burning and commercial charbroilers, reduce highly health-impactful PM_{2.5} emissions where and when they matter most in Valley neighborhoods, and provide health benefits beyond simply attaining the federal standard.

Figure ES-1 San Joaquin Valley Emissions Reductions, 2012 PM_{2.5} Plan

Plan builds on successful strategies that have improved the Valley's air quality

The Valley's success in reducing its emissions through decades of clean-air efforts provides the foundation for this plan. This success provides assurance that similar strategies employed in the future will provide the desired results in helping to improve the Valley's air quality. This plan includes a comprehensive control strategy that builds on this past success, and identifies opportunities for reducing emissions from all Valley sectors, including the Valley's diverse range of businesses as well as the general public.

The District has a history of success in reducing particulate and ozone-forming emissions through a variety of ground-breaking rules and strategies. These innovative strategies, such as the first-of-its-kind Indirect Source Review regulation that addresses emissions from residential and commercial development, have proven to be highly effective, as evidenced by the steady rate of improvement in the Valley's air quality. The District's incentive program has become an increasingly important and effective strategy for reducing mobile source emissions that the District does not have direct regulatory authority over, with an expenditure of \$481 million reducing over 94,000 tons of emissions since 1992. The District's landmark Conservation Management Practice rule proved critical in assisting the Valley to eliminate exceedances of the federal PM₁₀ standard and reach attainment of the standard in 2005 (based on 2003-2005 data; see Figure ES-2). In addition to reducing emissions from the Valley's various industries and businesses, significant reductions in emissions have also been achieved by the general public, such as through the residential wood burning curtailment efforts that have been critical in helping to reduce PM_{2.5} concentrations. Based on the California Air Resources Board (ARB) 2006 almanac of emissions, from 1990 through 2005, the

Valley saw NOx emissions reduced by 41%, VOC emissions reduced by 38%, and SOx emissions reduced by 75% (see Figure ES-3).

Figure ES-2 Exceedances of PM10 Standard Eliminated

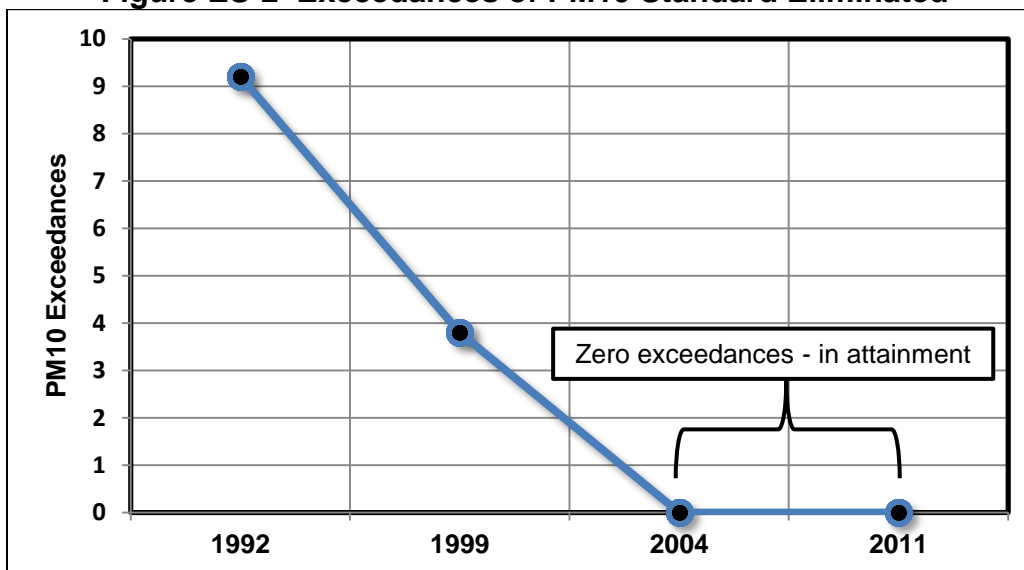
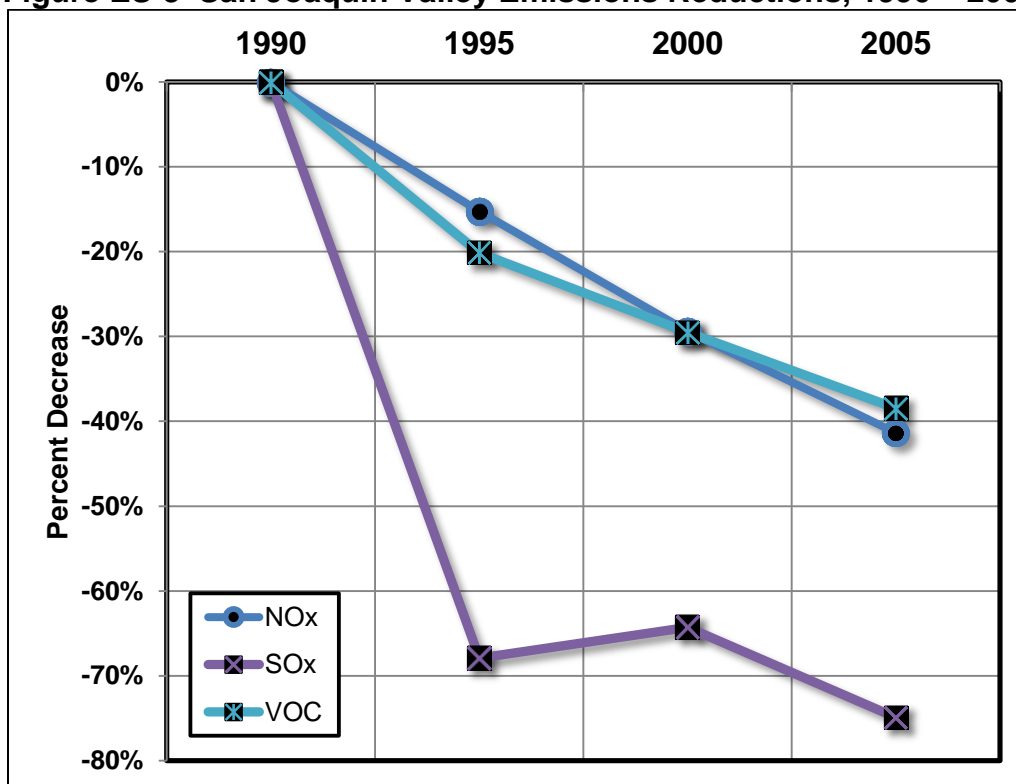


Figure ES-3 San Joaquin Valley Emissions Reductions, 1990 – 2005



These efforts to reduce emissions in the Valley have resulted in real and significant improvements in the Valley’s air quality. The Valley’s 24-hour PM2.5 “design values” used to measure progress relative to the federal standard have dropped by 40% since

2001, and are now below the 1997 federal 24-hour PM_{2.5} standard of 65 µg/m³ (see Figure ES-4). With regard to ozone (commonly known as smog), exceedances of the 1997 and 2008 federal 8-hour ozone standards have dropped by 42% and 30% since 1992, respectively (see Figure ES-5). With respect to the Air Quality Index (AQI), in the winter season, during which the Valley sees its highest PM_{2.5} concentrations, the number of “good” AQI days has increased by 18%, while the number of “unhealthy” AQI days has decreased by 80% since 2000 (see Figure ES-6).

Figure ES-4 San Joaquin Valley PM_{2.5} Design Value Trends

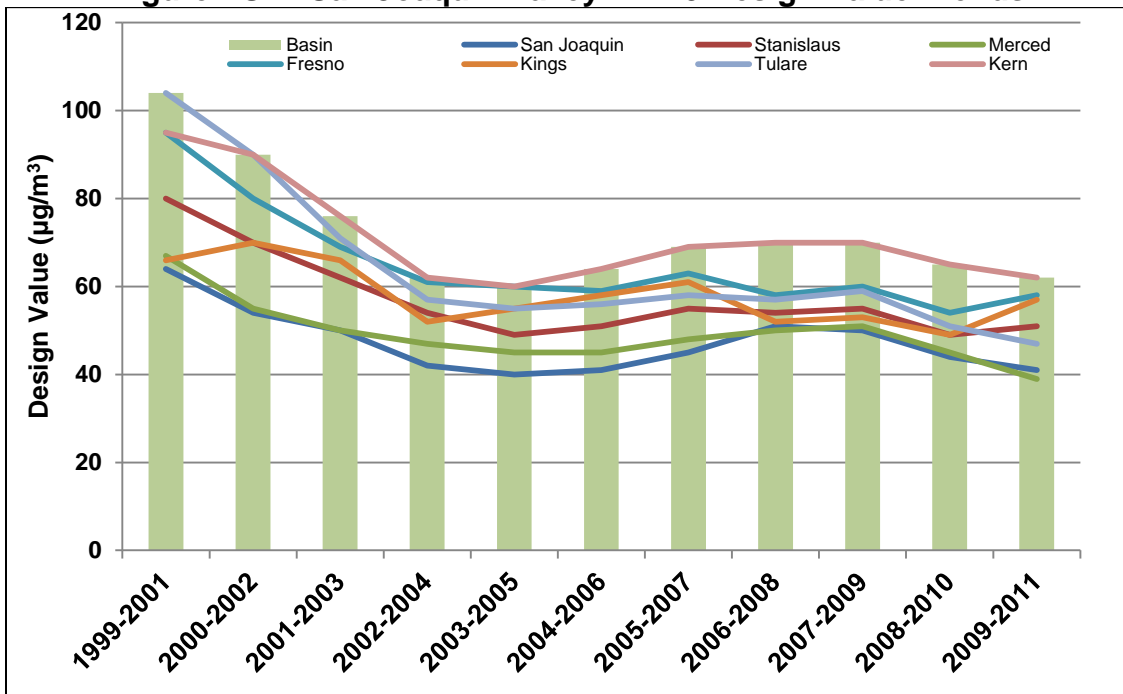


Figure ES-5 San Joaquin Valley Ozone Trends

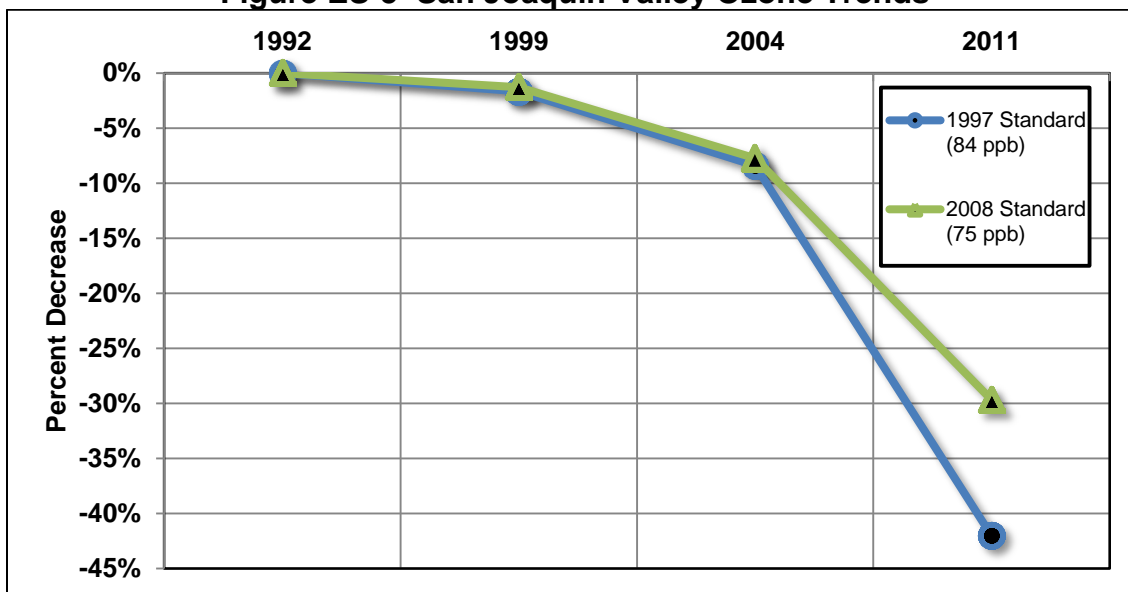
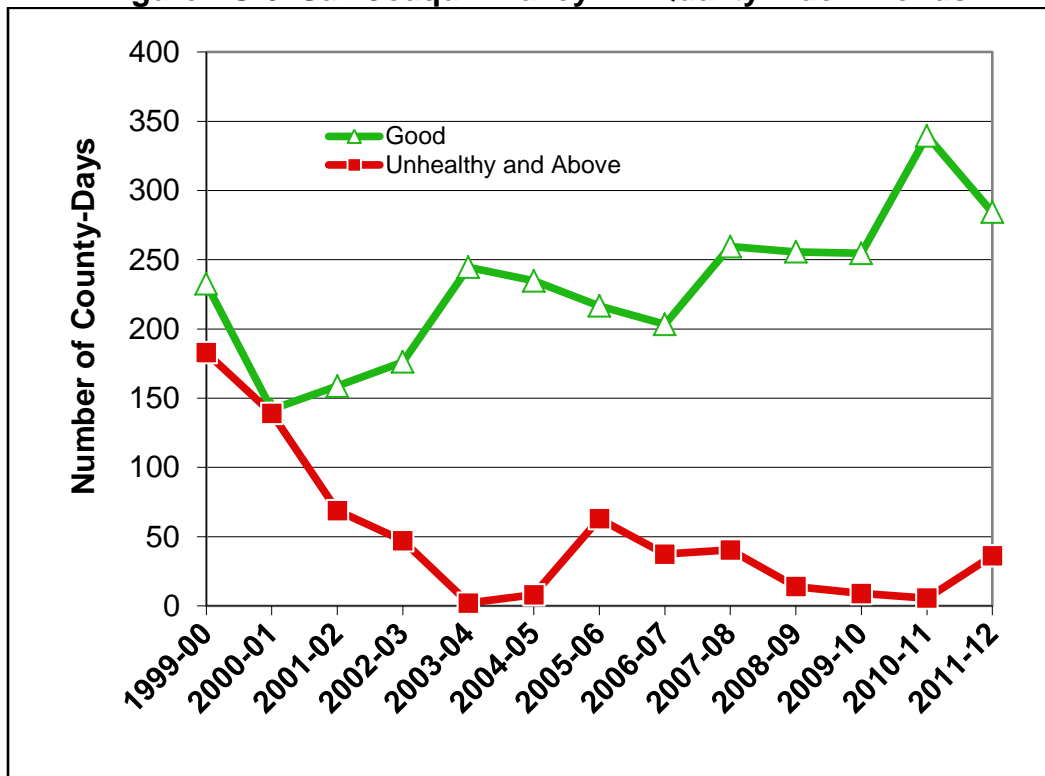


Figure ES-6 San Joaquin Valley Air Quality Index Trends



Plan prepared with extensive public input

The 2012 PM_{2.5} Plan was prepared over the course of one year through an extensive public process that provided numerous opportunities for the general public and interested stakeholders to offer suggestions and comments for improving and strengthening the plan. The District has worked closely with these various stakeholders, including its partner agencies ARB and the Environmental Protection Agency (EPA), environmental and community advocacy groups, and business representatives to share information regarding the plan, and to receive comments and suggestions.

The District held numerous public workshops this past year that have outlined the air quality challenge faced by the Valley, and potential strategies for responding to the challenge. Workshops were held throughout 2012 in April, June, and October at the District's offices in Modesto, Fresno, and Bakersfield and by webcast, with many participants attending and providing feedback during these workshops. Discussions were held monthly during the District's public Governing Board hearings, where the public was invited to provide feedback. The plan was also frequently discussed with the District's Citizen's Advisory Committee and Environmental Justice Advisory Group.

In addition to meetings and workshops outlining the District's perspective and approach for developing this plan, the District collaborated with ARB to hold several public workshops that provided information about the scientific foundation of the plan, and

provided additional opportunities for the public to ask questions and provide input. The District met with interested advocacy and industry representatives throughout the plan development process to address specific questions and comments, and solicit further suggestions for control strategies.

All of these workshops and meetings have provided opportunities for the public to provide verbal comments, and written comments have also been accepted throughout development of this plan. These comments have been integral to development of this plan, and have been incorporated as appropriate. All significant comments and responses are summarized and posted on the District's website.

Why has this plan been prepared?

The U.S. EPA set the first PM_{2.5} standard in 1997 and in 2005 designated the San Joaquin Valley (Valley) as nonattainment for the 1997 standard. The 1997 standard has two limits of attainment: an annual average of 15 µg/m³ and a 24-hour average of 65 µg/m³. The District adopted the *2008 PM_{2.5} Plan* in April 2008 to demonstrate how the Valley would come into attainment of the 1997 PM_{2.5} standard by no later than April 2015. EPA subsequently lowered the 24-hour standard to 35 µg/m³ in 2006 and re-issued the nonattainment designation for the Valley in 2009. Through continued implementation of the *2008 PM_{2.5} Plan*, the Valley will be in attainment of the 1997 annual standard by 2015.

This *2012 PM_{2.5} Plan* demonstrates attainment of the newer 2006 24-hour PM_{2.5} standard by the federal attainment deadline of 2019, with the majority of the Valley actually experiencing attainment ahead of 2019. The District, in collaboration with ARB, based this attainment demonstration on comprehensive analysis, careful evaluation, and a sound scientific foundation. Using the District Governing Board's guiding principles adopted in February 2012, this plan emphasizes public health as the number one priority in meeting federal ambient air quality standards (NAAQS).

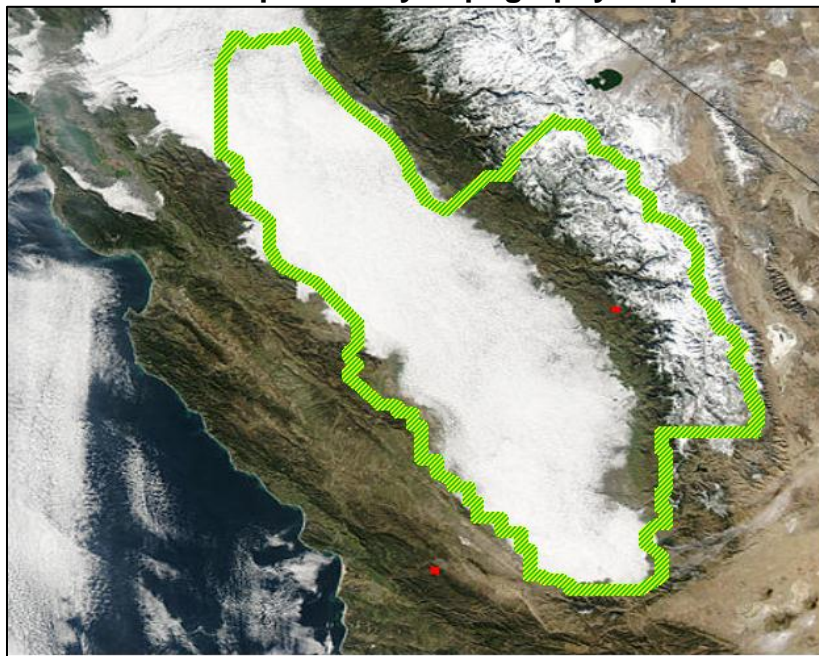
Plan is supported by strong scientific foundation and extensive modeling

In developing this plan, the District and ARB took full advantage of the extensive scientific research and knowledge that has been developed to characterize the Valley's unique air quality chemistry and challenge. The District, through the San Joaquin Valleywide Air Pollution Study Agency, participated in and contributed to the expenditure of nearly \$30 million to support the California Regional Particulate Air Quality Study (CRPAQS). This study, and the subsequent research built on its foundation, has shed light on the complexity of PM_{2.5} in the Valley. Additionally, recent health studies highlight the associated risks inherent in the complex components of PM_{2.5}. Acknowledgement and understanding of this complexity is central to the *2012 PM_{2.5} Plan* and was used to form the scientific foundation of this plan, including the modeling.

Using the extensive body of knowledge regarding formation of PM_{2.5} in the Valley, ARB performed extensive modeling to predict future PM_{2.5} concentrations throughout the Valley. This modeling was performed consistent with EPA guidance, and involved thousands of hours of sophisticated computer modeling and review by a team of technical staff, including close coordination with the District. The modeling approach was reviewed and vetted through a technical advisory process that involved researchers and EPA, who provided valuable input that was integrated into the modeling. In addition to the modeling by ARB, the District has also performed extensive analysis that provides additional supporting evidence that the plan will effectively bring the Valley into attainment. Overall, the modeling and supporting technical analysis demonstrate that the emissions reductions achieved through the plan's control strategy bring the entire Valley into attainment of the 2006 federal PM_{2.5} standard by 2019, with most of the Valley reaching attainment earlier than 2019, and Bakersfield being the last portion of the Valley reaching attainment in 2019.

Why does the Valley face such a unique air quality challenge?

The Valley's natural environment supports one of the most productive agricultural regions in the country: the Sierra Nevada provides the necessary water for growing an abundance of crops, and a temperate climate provides a long growing season. However, these same natural factors present significant challenges for air quality: the surrounding mountains trap pollution and block air flow, and the mild climate keeps pollutant-scouring winds at bay most of the year. Temperature inversions, while present to some degree throughout the year, can last for days during the winter, holding in nighttime accumulations of pollutants, including wood smoke. It is during the winter that these days of stagnant weather lead to the most Valley exceedances of PM_{2.5} concentrations.

Figure ES-7 San Joaquin Valley Topography Traps Air Pollution

The Valley's natural challenge in cleaning out accumulated pollutants requires that the District and Valley industry and residents take greater efforts to meet the challenging federal PM_{2.5} standard and reduce significant amounts of wintertime emissions. The episodic and seasonal nature of high PM_{2.5} concentrations may help to narrow the focus of emissions reductions, but also limits the number of months that strategies are most effective in reducing peak PM_{2.5} concentrations.

Through strong controls developed in previous attainment plans and successful incentive programs, the Valley has seen significant progress in reducing PM_{2.5} concentrations. The *2008 PM_{2.5} Plan* laid the groundwork for controlling PM_{2.5} emissions; as a result, wintertime PM_{2.5} 24-hour annual concentrations have decreased by approximately 40% since 1999, with significant reductions seen after the implementation of wood-burning curtailments. Likewise, implementation of the *2007 Ozone Plan* reduced, and continues to reduce, PM_{2.5} precursors, NO_x and VOC, not only to the benefit of reduced ozone, but reduced PM_{2.5} during the winter. Despite the progress, there is still work to be done, and the *2012 PM_{2.5} Plan* lays out the strategy for meeting the 2006 PM_{2.5} NAAQS with a strong emphasis on public health through scientific understanding.

Plan brings the Valley into attainment as expeditiously as possible

Attaining federal health-based standards is an important milestone for improving public health. Through the strategy outlined in this plan, the Valley as a whole will attain the federal 24-hour PM_{2.5} standard in 2019. Under federal regulation, while every region must be demonstrated to attain the standard in order for the entire Valley to be considered in attainment, the majority of Valley residents will actually see attainment much sooner than the projected date of 2019, with Bakersfield/Kern County being the

last region within the Valley to ultimately reach attainment. In addition, as outlined in Appendix A, there are a variety of metrics for evaluating air quality progress. Even where areas have not yet attained the standard, there will be continuous air quality improvements.

Figure ES-8 illustratively shows the Valley’s journey to attainment under this plan. As emissions are reduced through the plan’s control strategy, 53% of the Valley’s population will quickly experience PM_{2.5} concentrations below the federal standard by 2014, 85% of the population by 2016, 94% of the population by 2017. Figure ES-9 maps monitoring sites throughout the Valley, showing their progress to attainment through 2019, and, similarly articulating the significant progress to be made in bringing the majority of the Valley below the federal standard before 2019.

Figure ES-8 Percent of Valley Population Living in Attainment Areas through Implementation of 2012 PM_{2.5} Plan

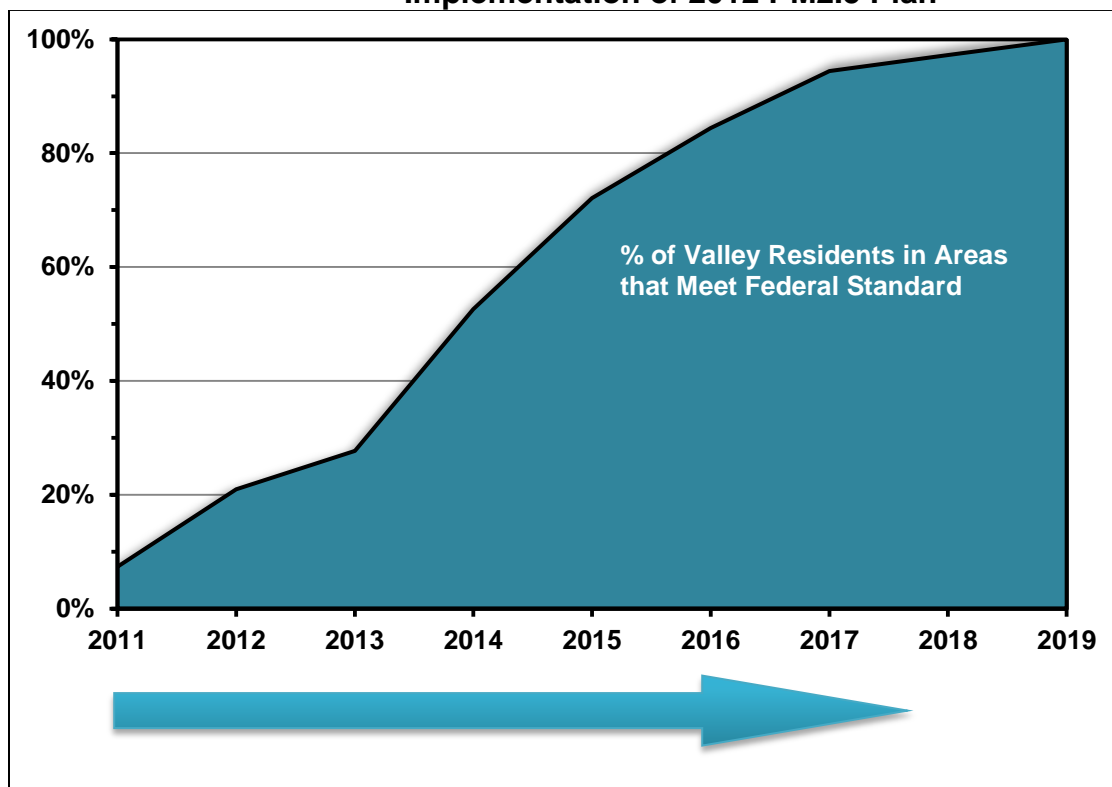
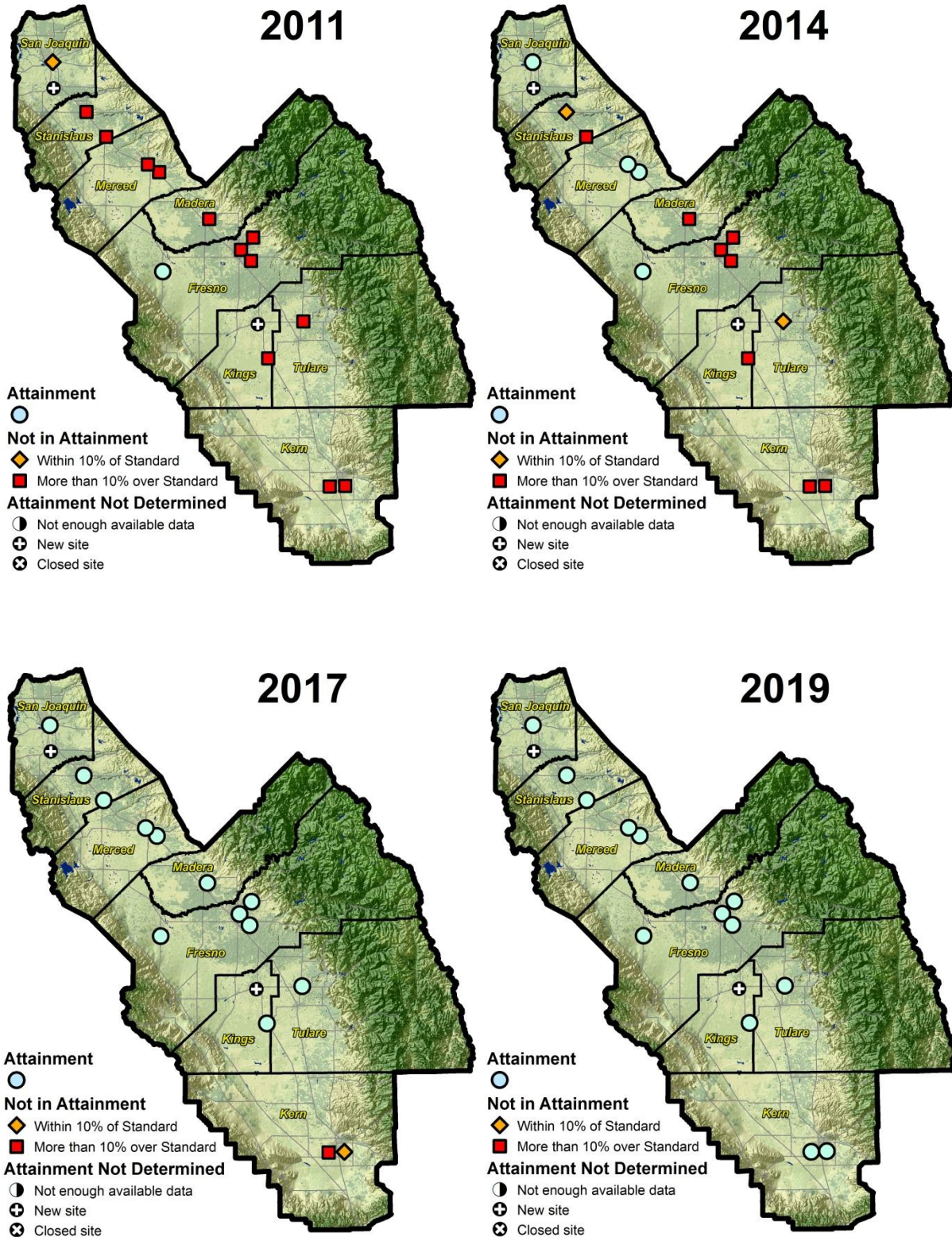


Figure ES-9 The Valley's Journey to Attainment



Plan achieves significant health benefits for Valley residents

In addition to demonstrating how the Valley will reach attainment of the federal PM_{2.5} standard as expeditiously as possible, the District has also estimated the fundamental metric associated with implementation of the *2012 PM_{2.5} Plan* – the health benefits resulting from implementation of this strategy. As presented below and described in more detail in Chapter 2 and Appendix E of the plan, the District utilized an EPA-developed model to estimate the annual reductions in morbidity (disease) and mortality (premature death) attributable to improved air quality due to the *2012 PM_{2.5} Plan* in the attainment year of 2019.

Through implementation of the comprehensive control strategy included in this plan and the resulting reductions in PM_{2.5} concentrations throughout the Valley, the District estimates the following health benefits:

Table ES-1 Health Benefits Achieved Through Implementation of 2012 PM_{2.5} Plan

Health Impact	Health Benefit (reduction in health impact)
Premature Death	671
Acute Myocardial Infarction, Hospital Admissions	93
Asthma Age 0-19, Hospital Admissions	131
Cardiovascular, Hospital Admissions	175
Asthma Age 20-99, Hospital Admissions	246
Asthma Age 20-99, Emergency Room Visits	407
Asthma Age 0-19, Emergency Room Visits	699
Acute Bronchitis	1,498
Upper Respiratory Symptoms	15,523
Lower Respiratory Symptoms	19,011
Asthma Exacerbation	114,376
Work Loss Days	125,138

In addition to quantifying reductions in disease and premature death based on improvements in county-level PM 2.5 concentrations, tools can also be used to quantify the economic value associated with health benefits. While assigning economic values to health impacts is difficult given the tremendous social values associated with these impacts, an existing body of literature attempts to connect health impacts to hard costs such as lost wages, or, in the case of premature death, a social value of \$7.99 million per incidence. Using this model, the District estimates that implementation of the plan will achieve an annual Valley-wide savings of \$102 million in health costs in 2019. Additionally, and more significantly, a social benefit of \$5.36 billion is estimated for the 671 avoided premature deaths.

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