

Chapter 2

Meeting Federal Requirements

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Chapter 2: Meeting Federal Requirements

2.1 INTRODUCTION

Pursuant to the federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) sets primary air quality standards to protect public health and secondary standards to protect welfare. Achieving the primary federal standards improves public health and reduces the region's health care costs. Meeting federal air quality standards helps protect public health and improves the quality of life for Valley residents. This chapter describes some of the health effects of ozone, EPA's process for setting health-based standards, and how the San Joaquin Valley meets federal requirements for attaining those standards.

2.2 HEALTH EFFECTS

The human health impacts of ozone include 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. Studies have linked rising hospital admissions and emergency room visits to higher ozone levels.

Children are most at risk from exposure to ozone. Children breathe more air per pound of body weight than adults. Because children's respiratory systems are still developing, they are more susceptible to environmental threats. Also, ground-level ozone is highest in the summertime, when children are outside playing and exercising at summer camps, playgrounds, neighborhood parks, and in backyards. In fact, anyone who spends time outdoors in the summer, including outdoor workers and people exercising, may be impacted.

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 in the valley 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 of these costs to the Valley. In Table V-1 of the Hall's study, the total cost of health impacts from ozone is estimated at \$32.64 million annually, and Table V-2 shows the total cost of health

impacts from PM_{2.5} to be approximately \$3.2 billion annually (Hall 2006). The cost of PM_{2.5} health effects is almost 100 times higher than the cost of ozone health effects. The deadline to attain the PM_{2.5} standard is 2015, so the total health cost of air pollution will decrease dramatically by 2015 to no more than \$32.62 million annually. 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.

Health Effects of Ozone

- Considerable research over the past 35 years has investigated the responses of humans to ozone inhalation. These studies have consistently shown that ozone can lead to inflammation and irritation of the airway tissues.
- Symptoms and responses to ozone exposure vary widely among individuals. Typical symptoms include cough, chest tightness, shortness of breath, pain when taking a deep breath, and increased asthma symptoms. In persons with asthma, ozone can worsen asthma symptoms.
- Ozone in sufficient doses can also increase the permeability ("leakiness") of lung cells, making them more susceptible to environmental toxins and infection caused by microorganisms such as viruses and bacteria.
- In epidemiologic studies, ozone exposure has been associated with an increase in hospital admissions and emergency room visits, particularly for causes related to the lungs, such as asthma and chronic obstructive pulmonary disease (COPD).
- Ozone exposure also has been associated with increased premature death in elderly people with chronic diseases of the lungs and circulatory system.
- A recent study of a large number of school-aged children living in twelve different Southern California communities, the ARB-funded Children's Health Study (CHS), found that ozone is associated with increased school absences. The CHS also indicated that ozone may contribute to the development of asthma in children who played sports outdoors.
- People who exercise or work outdoors are at greater risk of experiencing adverse health effects from ozone exposure because they inhale more ozone. This is because effects are related to the inhaled dose of ozone, which is related to the ozone concentration in the air, a person's breathing rate, and the length of their exposure, and because ozone concentrations are generally higher outdoors than indoors (unless there is a significant indoor source of ozone).
- When there is an indoor source of ozone, particularly in the home, there is also a risk of increased dose, because the concentration of ozone is elevated and the duration of exposure is long. In addition, young children are at greater risk because they spend more time in the home than adults, and inhale more ozone per pound of body weight than do adults because they breathe more rapidly than adults.

Source: ARB, 2006

2.2.1 Other Effects of Ozone

In addition to human health impacts, ozone affects Valley ecosystems and crops. Ozone damages plant cells and deteriorates leaf tissue, which reduces the plants' ability to photosynthesize and produce their own food. Plants respond by growing more leaves, which depletes carbohydrates stored in roots and stems. This weakens plants

and makes them susceptible to disease, pests, cold, and drought. Ozone reduces agricultural yields for many economically important crops, such as grapes, soybeans and cotton, and damages the leaves of trees and other plants, marring the appearance of cities, national parks, forests, and recreational areas.

Ozone can cause substantial damage to a variety of materials such as rubber, plastics, fabrics, paint, and metals. Over time, ozone exposure progressively damages both the functional and aesthetic qualities of materials and products. The resulting increases in maintenance, upkeep, and replacement of materials can accumulate to significant economic losses.

2.3 HEALTH-BASED STANDARDS

Based on human health and environmental considerations, both the state and the federal government set ambient air quality standards for ozone. The federal government's "primary standards" are set to protect public health and are set at levels that include a margin of safety, while "secondary standards" are established to protect public welfare in issues such as crop damage, material degradation, haze, and environmental effects.

California standards are set to protect public health. The California ambient air quality standards are considerably more stringent than the federal standards and are more protective of human health. ARB approved a 1-hour ozone standard of 0.09 ppm in 1987. In 2005, ARB approved an 8-hour ozone standard allowing no concentrations above 0.07 ppm. ARB retained the previously adopted 1-hour standard. California has no mandated timelines for attaining state air quality standards. The current California and national ambient air quality standards for ozone are listed in Table 2-1.

When EPA reviews the NAAQS for a pollutant such as ozone, it develops a "criteria document," a compilation and scientific assessment of health and environmental effects studies. EPA develops a staff paper on the information available that is compiled by technical staff who interpret the most relevant information in the criteria document to be used in making policy decisions. The staff paper also contains staff recommendations to the EPA Administrator regarding any revisions to the standards needed to protect public health and welfare.¹

Both the criteria document and staff paper are based on thousands of peer-reviewed scientific studies and are part of an extensive scientific assessment process that includes rigorous scientific peer review and public comment. Before these documents become the basis for policy decisions, they undergo repeated, detailed reviews by the scientific community, industry, public interest groups, the general public, and the Clean Air Scientific Advisory Committee (CASAC), a Congressionally mandated group of

¹ On December 7, 2006, EPA announced changes to the NAAQS review process, replacing the criteria document with the more concise Integrated Science Assessment (ISA) document.

Table 2-1 Federal and State Ambient Air Quality Standards for Ozone

	Averaging Time		Form
	8-hour ozone	1-hour ozone	
Federal	0.08 ppm ^a	NA ^b	3-year average of annual 4 th highest daily maximum 8-hr ozone concentrations (for the 8-hr standard only)
California	0.07 ppm	0.09 ppm	No exceedances

^a ppm stands for parts per million

^b The federal 1-hour ozone standard was revoked, effective June 15, 2005. On December 22, 2006, the United States Court of Appeals for the District of Columbia Circuit Court vacated the rule containing this revocation. On March 22, 2007, EPA requested rehearing. Further developments are expected in 2007.

independent scientific and technical experts.² As part of its mandate, the Clean Air Scientific Advisory Committee also makes recommendations to EPA on the adequacy of the standards. By reaching the federal health-based standards for ozone, we will greatly reduce the negative health impacts of this pollutant.

EPA promulgated the 8-hour ozone standard in July 1997 and finalized Phase 1 of the ozone implementation rule in April 2004 (69 *FR* 23857-23951). Phase 1 set forth the nonattainment area classification scheme and upheld specific 1-hour ozone obligations. On November 9, 2005, EPA released the Phase 2 rule (70 *FR* 71611-71705), which outlines emission controls and implementation plan requirements, including RFP and RACT. Attainment plans must be submitted to EPA by June 15, 2007. EPA also revoked the 1-hr ozone standard, for which the Valley's attainment year was 2010.³

This plan addresses the federal 8-hour ozone standard. Appendix E, "California Clean Air Act Triennial Progress Report and Plan Revision," satisfies state 1-hour ozone planning requirements.

2.4 CLASSIFICATIONS AND REQUIREMENTS

On April 15, 2004, EPA designated and classified the SJVAB as serious nonattainment for the federal 8-hour ozone standard, effective June 15, 2004. As a serious area, the valley is to attain the standard as expeditiously as practicable, but no later than June 15, 2013. The *2007 Ozone Plan*, the first 8-hour ozone plan for the SJVAB, is due to EPA by June 15, 2007. Following receipt of a Plan, the EPA must find the Plan complete within six months of receipt. The EPA must approve, disapprove, partially approve, or conditionally approve the plan within one year of finding the plan complete [CAA Section 110(k)]. Table 2-2 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, as well as other requirements, vary among the classifications.

² EPA's December 7, 2006 changes to the NAAQS review process modified the role of CASAC in the standard-setting process.

³ On December 22, 2006, the United States Court of Appeals for the District of Columbia Circuit Court vacated the rule containing this revocation. On March 22, 2007, EPA requested rehearing. Further developments are expected in 2007.

Table 2-2 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

Although this is the first plan for 8-hour ozone in the Valley, the District Governing Board has adopted ozone plans in the past, culminating with the *Extreme Ozone Attainment Demonstration Plan* for the 1-hour ozone standard on October 8, 2004 and adopted amendments on October 20, 2005. On June 15, 2005, EPA revoked the federal 1-hour ozone standard. As such, transportation conformity and de minimis thresholds for 1-hour ozone no longer apply, contingency measures are not needed, and EPA will not make a finding of a failure to attain. However, other requirements still apply, including anti-backsliding provisions, rate of progress reductions, reasonably available control technology (RACT) controls, black box measures (provisions of an Extreme Area's implementation plan that anticipate development of new control techniques or improvement of existing control technologies).⁴ Control measures cannot be removed from the SIP solely because of revocation, and the measures included in the 1-hour ozone plan will also contribute to the District's 8-hour ozone strategy.

Once the federal government sets a standard, states and air districts with nonattainment areas are required to adopt plans, rules, and programs that reduce emissions to bring the area into attainment of the standard. In California, air pollution control districts and/or air quality management districts are responsible for developing the overall attainment strategy in their respective geographic areas. Plans, such as the *2007 Ozone Plan*, are the first step in the process. To develop a plan, areas evaluate air quality data, emissions inventory data, and computer modeling results to determine the rules and programs that are needed to reach the federal standards by the deadlines specified in the CAA. The CAA contains several SIP requirements for areas classified as an extreme nonattainment area for 8-hour ozone. Table 2-3 outlines these requirements. The rules and programs in a plan are then implemented over time to reduce the emissions that go into the air, reducing unhealthy concentrations of air pollutants and helping areas reach federal air quality standards.

The state compiles all of the air quality plans for the state's nonattainment areas into a SIP. During the regional planning process, ARB develops air quality models, conducts

⁴ On December 22, 2006, the United States Court of Appeals for the District of Columbia Circuit Court vacated the rule containing this revocation. On March 22, 2007, EPA requested rehearing. Further developments are expected in 2007.

and funds air quality research, develops emissions inventories, develops statewide emission control measures, and provides other assistance to local air districts. Once nonattainment areas adopt their plans, ARB is responsible for preparing and submitting the California SIP to the EPA.

Periodic plan revisions may be necessary to ensure reasonable further progress and to reflect the latest science. Once an area's ambient air quality data meets the federal standard, the area will request a finding of attainment. Then a maintenance plan and other requirements must be met before an area can be officially redesignated to attainment.

Table 2-3 Federal Requirements for Extreme 8-hour Ozone Nonattainment Areas

Requirements	Federal CAA	Description
General Requirements	110 and 172(c)	Includes RACM, RFP, emissions inventory requirements, need for permits, contingency measures, enforcement, adequate resources, etc.
Severe Area Requirements ¹	182(e)	Extreme areas must meet all severe area requirements (i.e., de minimis, RACT, RFP, and contingency provisions) except as modified by Section 182(e).
Major Stationary Source	182(e)	Include any stationary source or group of sources located within a contiguous area and under common control that emits, or has the potential to emit, at least 10 tons per year of VOCs. ²
Offset requirement	182(e)(1)	The ratio of total VOC emission reductions to total increased VOC emissions shall be at least 1.5 to 1, unless all existing major sources are required to use BACT, in which case the ratio shall be at least 1.2 to 1.
Modifications	182(e)(2)	Any change (besides changes made to comply with the offset requirement) at a major stationary source that results in emissions increases shall be considered a modification, unless the operator offsets the increase of at least 1.3 to 1.
Clean fuels at electric utilities and industrial & commercial boilers	182(e)(3)	Such sources that emit more than 25 tons per year of NOx must burn specified primary fuels or use advanced control technologies.
Traffic control measures during heavy traffic hours	182(e)(4)	SIPs may contain provisions establishing traffic control measures applicable during heavy traffic hours to reduce use of high polluting vehicles or heavy-duty vehicles.
New technologies	182(e)(5)	Allows for provisions in an Extreme SIP that anticipate development of new control techniques or improvement of existing control technologies (i.e. black box). State must demonstrate that such provisions are not necessary for the first ten years [182(e)(5)(A)] and that the SIP includes enforceable commitments to develop and adopt contingency measures [182(e)(5)(A)].
Nonattainment Fee	185	If an extreme area fails to attain the standard by June 15, 2024, major stationary sources of VOCs in the area shall pay a fee to the state of \$5000/ton of VOC emissions per calendar year in excess of 80% of a baseline defined as the actual or allowable emissions.

¹ Also includes requirements for serious areas (182(c)) and moderate areas (182(b)), except as modified by higher classifications.

² Plan provisions required for major sources of VOCs also apply to major sources of NOx subject to EPA review [Section 182(f)].

2.5 FEDERAL CAA PLANNING REQUIREMENTS ADDRESSED BY THE 2007 OZONE PLAN

This 2007 Ozone Plan meets federal requirements for extreme areas, as discussed in the following paragraphs and in Appendix M.

2.5.1 Reasonably Available Control Technologies (RACT)

Section 172(c)(1) of the federal Clean Air Act requires air quality plans for nonattainment areas to “provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards.”

EPA’s *Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 2* (70 FR 71707) modified 40 CFR 51.912 to require nonattainment areas to submit a SIP revision that meets the NOx and VOC RACT requirements in Sections 182(b) and 182(f) of the federal Clean Air Act no later than 27 months after designation for the 8-hr ozone NAAQS (which equates to September 15, 2006). The District prepared this RACT SIP through a public process, and adopted it on August 17, 2006. The RACT SIP analysis showed that the District’s rules meet or exceed RACT requirements for all applicable EPA source categories. The District submitted this RACT SIP to ARB in August 2006 for review and transmittal to EPA by the September 15, 2006 deadline. ARB transmitted the SJV RACT SIP and other districts’ RACT SIPs to EPA on January 31, 2007.

For areas designated as extreme non-attainment for the 8-hr ozone NAAQS, RACT control measures would apply to sources with emissions greater than 10 tons per year. The SJVAB was classified as extreme nonattainment for the 1-hr ozone NAAQS that EPA revoked effective June 15, 2005, and EPA’s *Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase I* (69 FR 23858) contains anti-backsliding provisions that require former 1-hr ozone nonattainment areas to keep the RACT applicability thresholds for their prior classification, even though the standard was revoked.⁵ The District has amended applicable rules to ensure compliance with this rulemaking’s anti-backsliding provisions for RACT applicability thresholds.

2.5.2 Attainment Demonstration

Section 182(c)(2)(A) of the federal CAA requires nonattainment areas to demonstrate, using federally-approved photochemical modeling, that the plan will provide for

⁵ On December 22, 2006 the United States Court of Appeals for the District of Columbia Circuit Court vacated the Phase I rule and remanded the rule to EPA for revision. On March 22, 2007, EPA requested rehearing.

attainment of the standard by the applicable date. As discussed in Chapter 3 and Appendix F, ARB used federally approved models in conducting the modeling for this *Draft 2007 Ozone Plan*. These federally-approved models were further enhanced using field data, analysis studies, and other findings of the \$30+ million air pollution studies conducted in the San Joaquin Valley. Thus the ARB modeling done for this plan reflects state-of-the-science understanding of ozone formation in the Valley.

2.5.3 Reasonable Further Progress (RFP) Demonstration

Section 182(c)(2)(B) requires nonattainment areas to show that the plan will result in VOC and NO_x emission reductions as specified in the federal CAA. Chapter 10 of the *2007 Ozone Plan* shows that the Valley meets these requirements with emission control measures already adopted for all milestone years.

2.5.4 Contingency Provisions

Sections 172 and 182 of the federal CAA require nonattainment areas to have in place emission reductions that will go into effect without further action by the State or EPA if the nonattainment area fails to meet a milestone for RFP or attainment. Section 10.4 of this plan shows that the Valley has the required magnitude of contingency emission reductions for all years with adopted measures.

2.5.5 Major Stationary Source Threshold

The District revised its new source review (NSR) rule (Rule 2201) on April 20, 2005 to reflect the extreme classification (10 ton per year major source threshold) under the federal 1-hour ozone standard and submitted those revisions to ARB for transmittal to EPA. The District's NSR rule revisions were to take effect immediately upon EPA approval into the SIP. Before this approval occurred, EPA's revocation of the 1-hour ozone standard became effective, which effectively eliminated the need to reclassify to the extreme major source thresholds under the 1-hour ozone new source review.⁶ The Valley's major source threshold has since remained at 25 tons per year, as dictated by the California Health and safety Code (Section 42504).

For the extreme classification under the federal 8-hr ozone standard, the District commits to submitting the revised NSR rule to EPA within one year of the date of the District's adoption of the *2007 Ozone Plan*. The lower thresholds in this rule would apply on the effective date of EPA's final approval of the revised rule into the SIP. The threshold could also be revised in response to the District of Columbia Circuit Court

⁶ On December 22, 2006 the United States Court of Appeals for the District of Columbia Circuit Court vacated the Phase I rule and remanded the rule to EPA for revision. On March 22, 2007, EPA requested rehearing.

ruling⁷, depending on the government's response to the ruling and on any subsequent court findings.

2.5.6 Offset Requirements

After EPA's approval of the extreme classification NSR rule, the SJVAB's offset ratio would change to the higher level of 1.5 to 1, with the option of a 1.2 to 1 ratio if the District is able to demonstrate use of best available control technology on all major sources. District revisions to the rule implementing these requirements would be done on the same schedule as described in the previous section.

2.5.7 New Technologies

Section 182(e)(5) of the federal CAA allows for provisions in an Extreme SIP that anticipate development of new control techniques or improvement of existing control technologies (i.e. "black box"). More information is available in Chapter 11.

2.5.8 Clean Fuels

Section 182(e)(3) of the federal Clean Air Act directs extreme nonattainment areas to require: "that each new, modified, and existing electric utility and industrial and commercial boiler which emits more than 25 tons per year of oxides of nitrogen -

- (A) burn as its primary fuel natural gas, methanol, or ethanol (or comparable low polluting fuel), or
- (B) use advanced technology (such as catalytic control technology or other comparably effective control methods) for reduction of emissions of nitrogen"

District Rules 4305, 4306, and 4352 address NOx emission limits for the boilers in this category. Most of the boilers under Rules 4305 and 4306 are fired on natural gas and therefore satisfy the requirement of paragraph (A) above. Liquid-fuel fired boilers are also addressed by those rules and the applicable NOx emission limits satisfy the requirement of paragraph (B) above. Solid-fuel fired boilers are addressed by Rule 4352 and the applicable NOx emission limits satisfy the requirement of paragraph (B) above.

Therefore, the District already complies with this requirement and there is no need to include additional control measures in this plan to satisfy the section of the federal Clean Air Act.

2.5.9 Other Requirements

The District generally meets all federal monitoring requirements. As Valley population increases and other factors trigger the need for new monitors or other changes to the network, the District will revise the network as needed. The District continues to

⁷ On December 22, 2006 the United States Court of Appeals for the District of Columbia Circuit Court vacated the Phase I rule and remanded the rule to EPA for revision. On March 22, 2007, EPA requested rehearing.

conduct annual enhanced ozone monitoring. The most recent District enhanced monitoring information may be found at <http://www.arb.ca.gov/aagm/mldaqsbldamn.htm>. Special ozone air studies conducted in the Valley in the past are summarized in the 2004 EOADP. The Central California Ozone Study (CCOS) is ongoing and will continue to provide information for future plans and plan updates. More information may be found at <http://www.arb.ca.gov/airways/CCOS/CCOS.htm#recent>.

The traffic control measures [Section 182(e)(4)] are optional. These are likely to have minimal benefit for the Valley due to the relatively short durations of “heavy traffic hours” in the metropolitan areas of the Valley. Chapter 11 describes the use of “new technologies” provisions. Lastly, the District adopted a rule on May 16, 2002 implementing a nonattainment fee of \$5000 per ton of emissions, and submitted the rule through ARB to EPA for approval. EPA has not yet taken final action on the rule, which was written to apply to either a severe or extreme nonattainment area.

Ambient air quality data and design values are included in Chapter 1 and Appendix A. The emissions inventory is discussed in Chapter 1 and Appendix B. Control measures are included in Chapters 6, 7, 8, and 9 as well as Appendices H and I. Modeling appears in Chapter 3 and Appendix F. RACM is in Chapter 9 and Appendix C. The *2007 Ozone Plan* satisfies federal requirements for implementation plans (see Appendix M).

References

Hall, Jane V; Brajer, Victor; and 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.