# AVAQMD
# Federal 8-Hour Ozone Attainment Plan
# (Western Mojave Desert Non-attainment Area)

Adopted on:
May 20, 2008

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This document was prepared by the AVAQMD Planning, Rule-making and Grants section, with input from the entire AVAQMD staff. Significant portions of this document were prepared by, or are based on work done by, the California Air Resources Board and the South Coast Air Quality Management District staffs. The AVAQMD staff greatly appreciates the assistance of those agencies in the preparation of this document.

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## Abbreviations and Acronyms

AQAP..... Air Quality Attainment Plan
AQMA ..... Air Quality Management Area
AQMP..... Air Quality Management Plan
AVAPCD ..... Antelope Valley Air Pollution Control District
AVAQMD..... Antelope Valley Air Quality Management District
CAAQS..... California Ambient Air Quality Standard
CALGRID..... California Photochemical Grid Model
CARB..... California Air Resources Board
CCAA ..... California Clean Air Act
CO..... Carbon Monoxide
ERC..... Emission Reduction Credit
FCAA..... Federal Clean Air Act
FMVCP..... Federal Motor Vehicle Control Program
FONA..... Federal Ozone Non-attainment Area
MDAQMD..... Mojave Desert Air Quality Management District
MPR..... Model Performance Ratio
NAAQS..... National Ambient Air Quality Standard
$NO_X$..... Oxides of Nitrogen
NSR..... New Source Review
$O_3$ ..... Ozone
RACT..... Reasonably Available Control Technology
ROG..... Reactive Organic Gases
ROP..... Rate of Progress
RRF..... Relative Reduction Factor
SBCAPCD ..... San Bernardino County Air Pollution Control District
SCAB..... South Coast Air Basin
SCAG..... Southern California Association of Governments
SCAQMD ..... South Coast Air Quality Management District
SCAQS87..... 1987 Southern California Air Quality Study
SCOS97..... 1997 Southern California Ozone Study
SDMAQMA..... Southeast Desert Modified Air Quality Management Area
SSAB..... Salton Sea Air Basin
tpaad..... Tons per Annual Average Day
tposd..... Tons per Ozone Seasonal Day
UAM ..... Urban Airshed Model
USEPA..... United States Environmental Protection Agency
VMT..... Vehicle Miles Traveled
VOC ..... Volatile Organic Compounds
WMDONA..... Western Mojave Desert Ozone Non-attainment Area

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# Executive Summary

The United States Environmental Protection Agency (USEPA) designated the Western Mojave Desert non-attainment area as non-attainment for the 8-hour ozone National Ambient Air Quality Standard (NAAQS) pursuant to the provisions of the Federal Clean Air Act (FCAA). The Antelope Valley Air Quality Management District (AVAQMD) is included in the Western Mojave Desert non-attainment area. The AVAQMD has adopted State and Federal attainment plans for the region within its jurisdiction. The most recent such plan that was approved by USEPA is the AVAQMD 2004 Ozone Attainment Plan adopted in 2004.

The AVAQMD has reviewed and updated all elements of the ozone plan. The AVAQMD will be in attainment of the 8-hour NAAQS for ozone by 2021.

This document includes the latest planning assumptions regarding population, vehicle activity and industrial activity. This document addresses all existing and forecast ozone precursor-producing activities within the Antelope Valley through the year 2020. This document includes all necessary information to allow general and transportation conformity findings to be made within the Antelope Valley.

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# CHAPTER 1 – Introduction and Background

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# INTRODUCTION

## Purpose

The Western Mojave Desert non-attainment area (as defined in 40 CFR 81.305) was designated non-attainment for the NAAQS for ozone by USEPA on April 15, 2004. The Western Mojave Desert Ozone Non-attainment Area (WMDONA) includes part of the San Bernardino County portion of the MDAQMD, as well as the Antelope Valley portion of Los Angeles County. The AVAQMD has experienced ambient ozone concentrations in excess of the 8-hour ozone NAAQS. This document: (1) demonstrates that the AVAQMD will meet the primary required federal ozone planning milestones, attainment of the 8-hour ozone NAAQS by June 2021; (2) presents the progress the AVAQMD will make towards meeting all required ozone planning milestones; and (3) discusses the newest 0.075 part per million 8-hour ozone NAAQS, preparatory to an expected non-attainment designation for the new NAAQS. This document satisfies 42 U.S.C. §§7410, 7502, 7504 and 7511a (FCAA §§110, 172, 174, and 182) regarding implementation plans, non-attainment plan provisions, planning procedures, and ozone plan submissions and requirements for the 8-hour NAAQS.

# BACKGROUND

## Regulatory History

The USEPA designated the desert part of Los Angeles County as non-attainment and classified it as Moderate for the 8-hour standard. This area was classified based on an ozone design value calculated from 2001 through 2003 concentrations in the region. The Moderate classification requires attainment of the 8-hour ozone NAAQS by June 2010, six years after the date of designation.

The desert portion of Los Angeles County was established as it's own air district as of July 1, 1997, the Antelope Valley Air Pollution Control District (AVAPCD), pursuant to former Health & Safety Code (H&SC) §40106 (Statutes 1996 ch 542, Repealed Statutes 2001 ch. 163). This air district was replaced by the AVAQMD on January 1, 2002, pursuant to H&SC §41300 et seq (Statutes 2001 ch. 163). As a successor district to the SCAQMD, the AVAQMD assumes the authorities and duties of the SCAQMD for the Antelope Valley (H&SC §41302).

The SCAQMD addressed the desert portion of Los Angeles County in the 1991 AQMP, the 1994 AQMP, and the 1997 AQMP. The 1994 AQMP is the most recent ozone attainment plan for the desert portion of Los Angeles County that has been approved by USEPA. The USEPA has approved a revision to the 1997 AQMP that was adopted after the formation of the AVAPCD. The AVAQMD adopted the AVAQMD 2004 Ozone Attainment Plan on April 20, 2004. This document replaces or updates all previously submitted federal ozone plans.

## Regional Ozone Planning Chronology

1989 - CARB designates SEDAB as non-attainment for ozone CAAQS
1990 - CARB classifies the SEDAB as moderate ozone non-attainment
November, 1990 - Adoption of Federal Clean Air Act Amendments
September 9, 1994 – SCAQMD adopts 1994 AQMP
November 15, 1994 – SCAQMD submits 1994 AQMP to CARB
July 10, 1996 – CARB submits 1994 AQMP to USEPA
1996 - SEDAB is subdivided into the Mojave Desert Air Basin (MDAB) and the Salton Sea Air Basin (SSAB)
November 15, 1996 – SCAQMD adopts 1997 AQMP
January 8, 1997 – USEPA approves 1994 AQMP into State Implementation Plan (63 FR 1150)
February 5, 1997 – CARB submits 1997 AQMP to USEPA
July 1, 1997 – AVAPCD is formed
April 21, 1998 – USEPA approves CO portion of 1997 AQMP for SCAB (63 FR 19661)
July 24, 1998 – USEPA approves $NO_2$ portion of 1997 AQMP for SCAB (63 FR 39747)
January 12, 1999 – USEPA proposed limited approval/disapproval for remainder of 1997 AQMP, approving emission inventories but disapproving attainment demonstration, reasonable further progress, milestones and proposed control measures (64 FR 1770)
December 10, 1999 – SCAQMD adopts update to 1997 AQMP that fixes problems identified in January 12, 1999 USEPA action
February 4, 2000 – CARB submits revised 1997 AQMP to USEPA
April 10, 2000 – USEPA approves 1997 AQMP
January 1, 2002 – AVAPCD changed to AVAQMD
April 20, 2004 - Adoption of AVAQMD 2004 Ozone Attainment Plan

## Statement of Issues

The Antelope Valley is downwind of the Los Angeles basin, and to a lesser extent, is downwind of the San Joaquin Valley. Prevailing winds transport ozone and ozone precursors from both regions into and through the Antelope Valley during the summer ozone season. These transport couplings have been officially recognized by CARB.[1] Local Antelope Valley emissions contribute to exceedances of both the NAAQS and CAAQS for ozone, but the Antelope Valley would be in attainment of both standards without the influence of this transported air pollution from upwind regions.

## Federal Legal Requirements

The AVAQMD must adopt a plan that provides for the implementation, maintenance and enforcement of the NAAQS within three years after promulgation of the NAAQS. The plan is to include enforceable emission limitations, provide for a monitoring program, provide for a permit program (including a new source review program), contingency measures, and air quality

[1] "Ozone Transport: 2001 Review," April 2001, CARB identifies the South Coast Air Basin as having an overwhelming and significant impact on the Mojave Desert Air Basin (which includes the Antelope Valley) and the San Joaquin Valley as having an overwhelming impact on the MDAB.

modeling (42 U.S.C. §7410(a); FCAA §110(a)). The SCAQMD met this requirement with their 1991 Air Quality Management Plan and its 1994 update. This document represents an update to the Antelope Valley portion of that plan. The AVAQMD has adopted enforceable emission limitations, has a monitoring program in place (at Lancaster), maintains a permit program (including a New Source Review program with an ambient air quality modeling requirement), and has performed an attainment demonstration using air quality modeling. This document does not include any contingency measures, as any such contingent reductions must occur in the upwind areas that are responsible for the Antelope Valley's ozone NAAQS exceedances.

This document incorporates all reasonably available control measures (all such measures have already been adopted for the Antelope Valley). This document includes a comprehensive, accurate and current inventory of actual emissions (42 U.S.C. §7502(c)(3), 7511a(a)(1); FCAA §§172(c)(3), 182(a)(1)).

This document discusses reasonable further progress (42 U.S.C. §§7502(c)(2), 7511a(b)(1); FCAA §§172(c)(2), 182(b)(1)) for the applicable periodic milestone dates (2002, 2005 and 2007) (42 U.S.C. §7511a(g); FCAA §182(g)). The Antelope Valley is not capable of meeting the reasonable further progress milestones on its own; the target levels would require reductions in source categories that are not under the jurisdiction of the AVAQMD (specifically mobile sources).

This document has been coordinated with the transportation planning process (42 U.S.C. §7504; FCAA §174). The document includes an on-road mobile source emission budget for the Antelope Valley, and also includes the on-road mobile source emission budget for the entire Southeast Desert Modified AQMA as an appendix.

This document updates the Antelope Valley emissions inventory (42 U.S.C. 7511a(a)(1); FCAA §182(a)(1)). The SCAQMD met the original inventory requirement with their 1991 Air Quality Management Plan and subsequent updates.

The AVAQMD has an enhanced non-attainment pollutant monitoring program, requires reasonably available control technology, has an enhanced vehicle inspection and maintenance program, a De Minimis rule, and a gasoline vapor recovery rule. The District participates in the state's Clean-Fuel Vehicle Program, and performs periodic transportation activity consistency demonstrations in conjunction with the Southern California Association of Governments (including a review of vehicle miles traveled growth). The AVAQMD controls oxides of nitrogen ($NO_x$) in addition to Volatile Organic Compounds (VOC), and is addressing both pollutants in this document. The AVAQMD new source review program defines sources emitting 25 tons per year or more as major and requires offsets at a 1.3 to 1 ratio (42 U.S.C. §§7511a(d), 7511a(d)(2); FCAA §§182(d) 182(d)(2)). Employer trip rules (42 U.S.C. §7511a(d)(1); FCAA §182(d)(1)) have been shown to be not cost-effective for the AVAQMD due to low population density.

## Pollutant Description and Health Effects

Ozone (or $O_3$) is a colorless gas that is a highly reactive form of oxygen. It has a strong odor when highly concentrated. Ozone can occur naturally but can also be formed from other compounds through photochemistry, a complex system of reactions with hydrocarbons and oxides of nitrogen in the presence of sunlight (ultraviolet). The MDAB experiences ozone concentrations in excess of the State and Federal ambient air quality standards.

Ozone can cause respiratory irritation and discomfort, making breathing more difficult during exercise. Ozone can reduce the respiratory system's ability to remove inhaled particles, increase pulse rate, decrease blood pressure and reduce the body's ability to fight infection. After six hours of exposure a healthy person can have significant reduction of lung function. It is an irritant towards the skin, eyes, upper respiratory system, and mucous membranes, although symptoms disappear after exposure. It may also be a carcinogen.

## Setting

The Antelope Valley is the desert portion of Los Angeles County. The AVAQMD has been designated non-attainment for the 8-hour ozone NAAQS by USEPA as a portion of the Western Mojave Desert non-attainment area in 40 CFR 81.305. The ozone design value classifies the area as a Moderate non-attainment area with 2010 as the required attainment year (42 U.S.C. 7511(a)(2); FCAA §181(a)(2)).

The Antelope Valley covers 1300 square miles and included 219,628 persons as of the 1990 census (approximately 400,000 in 2002), centered within the cities of Lancaster and Palmdale. The region is characterized by a wide, arid valley little precipitation. Air Force Plant 42 and a portion of Edwards Air Force Base are located in the area.

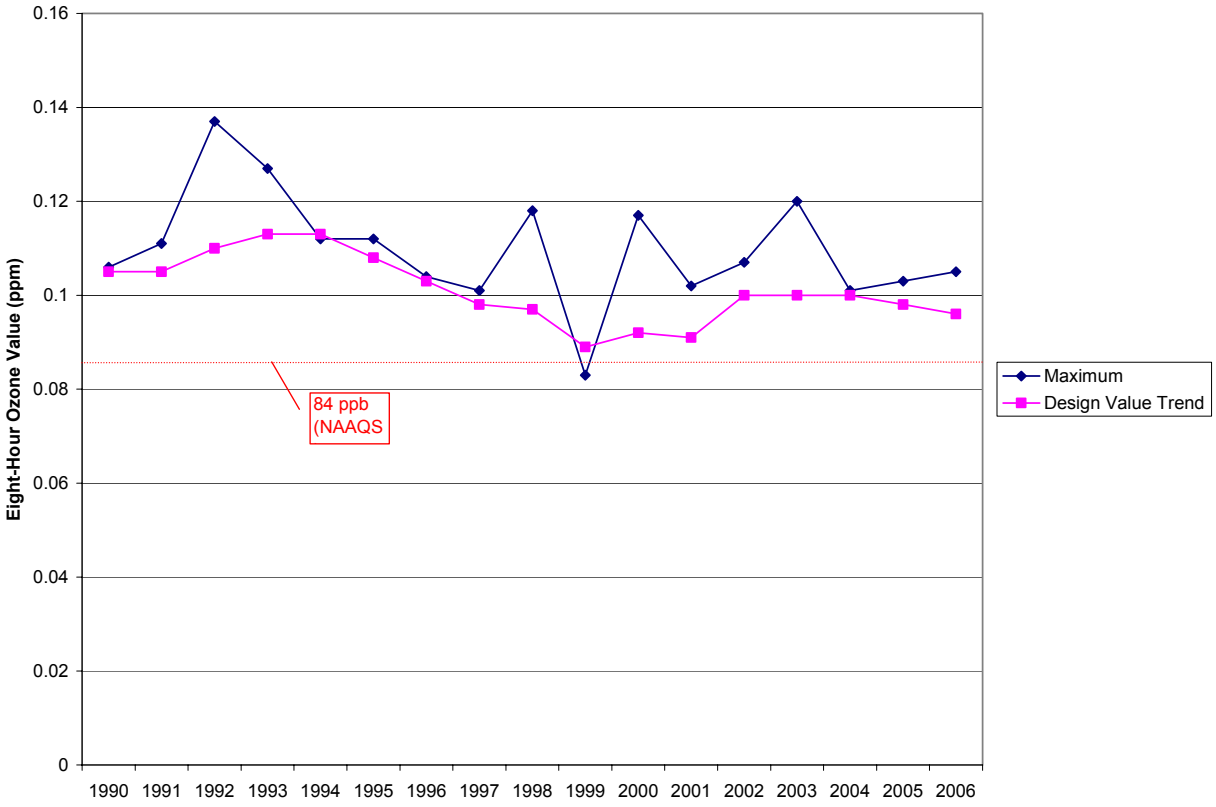
The primary roadways in the Antelope Valley are State Route 14 and State Route 18. Both of these arterials carry a substantial amount of daily commute traffic from the region into the Greater Los Angeles Basin.

The Antelope Valley is primarily a bedroom community, but does have significant aerospace development and manufacturing on Plant 42 (Boeing, Lockheed Martin and Northrop Grumman all lease facilities on the base from the Air Force).

## Ozone Trend

The Antelope Valley has experienced some improvement in 8-hour average ozone, as displayed in Figure 1 (the superimposed line is the three-year average trend line). Note the significant change from 1998 to 1999 - 1998 was a hot year, and 1999 a cool year.

**Figure 1 - Federal 8-Hour Ozone Design Value Trend**



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# CHAPTER 2 – Emission Inventories

General
Modeled Emission Inventory
Base Year
Future Years

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## General

Ozone planning requirements call for the use of seasonal inventories representing emissions during a typical summer day (since ozone concentrations are typically highest under summer weather conditions). This document includes ozone seasonal day inventories, in units of tons per ozone seasonal day (or tons per os day, or tposd), unless otherwise indicated. All emissions presented in this document have been adjusted or calculated in terms of ozone seasonal day emissions.

Federal ozone planning requirements call for emissions in terms of Volatile Organic Compounds (VOC), while State ozone planning requirements call for emissions in terms of Reactive Organic Gases (ROG). Due to changes in each definition, there is no effective difference between the two terms (for example, ethane is now excluded from both definitions). For purposes of this document and attainment planning, the District considers these terms interchangeable.

## Modeled Emission Inventory

The emission inventory for the AVAQMD is provided in Appendix A of this document. Complete documentation for Los Angeles County emissions, including emission inventory calculation methodologies, are available from the following web address:

http://www.arb.ca.gov/ei/maps/basins/abmdmap.htm

## Federal Ozone Non-Attainment Area Base Year Emission Inventory

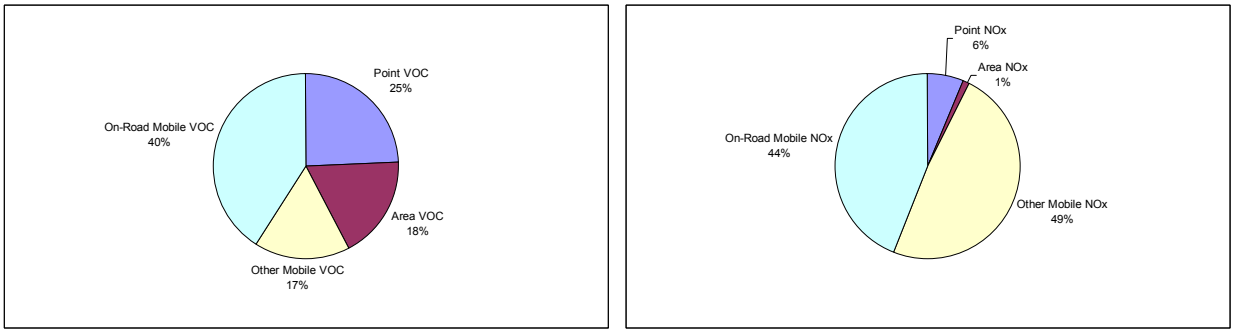
The initial Federal base year for emission inventory purposes is 2002. 2002 is used as the base year inventory for all growth scenarios in this document. The base year emission inventory is presented in Appendix A; a summary is presented in Table 1 below. Figure 2 presents the base year source category contributions in basic pie chart format (VOC on the left, $NO_x$ on the right). Mobile sources were the primary emitters in the Antelope Valley in 2002.

**Table 1 - 2002 Base Year Summary**

| | 2002 VOC | 2002 NOx |
|---|---|---|
| Point | 6.04 | 2.03 |
| Area | 4.38 | 0.37 |
| Other Mobile | 4.09 | 15.21 |
| On-Road Mobile | 10.11 | 13.99 |
| Totals: | 24.62 | 31.60 |

(tons per ozone seasonal day)

**Figure 2 - 2002 Base Year Pie Charts (FONA)**




## Future Year Emission Inventories

Future year or forecasted emission inventories are estimated by multiplying a base year value for each category by a 'growth code' for a given future year. The 'growth code' is indexed to the base year (2002 for this document), so that its value for the base year is 1.00. This allows the growth code to estimate future activity in terms of emissions; if the growth code for the year 2007 is 1.50, activity in that category (and resulting emissions) is expected to be 50 percent greater than in 2002. The growth codes used to forecast point sources are available from CARB. Forecasted VOC and $NO_x$ inventory summaries for each year of interest are presented in Figures 3 and 4 respectively (the base year is included in each figure for reference). Future year emission inventories are presented in Appendix B.

**Figure 3 - Forecasted VOC Emission Inventories**

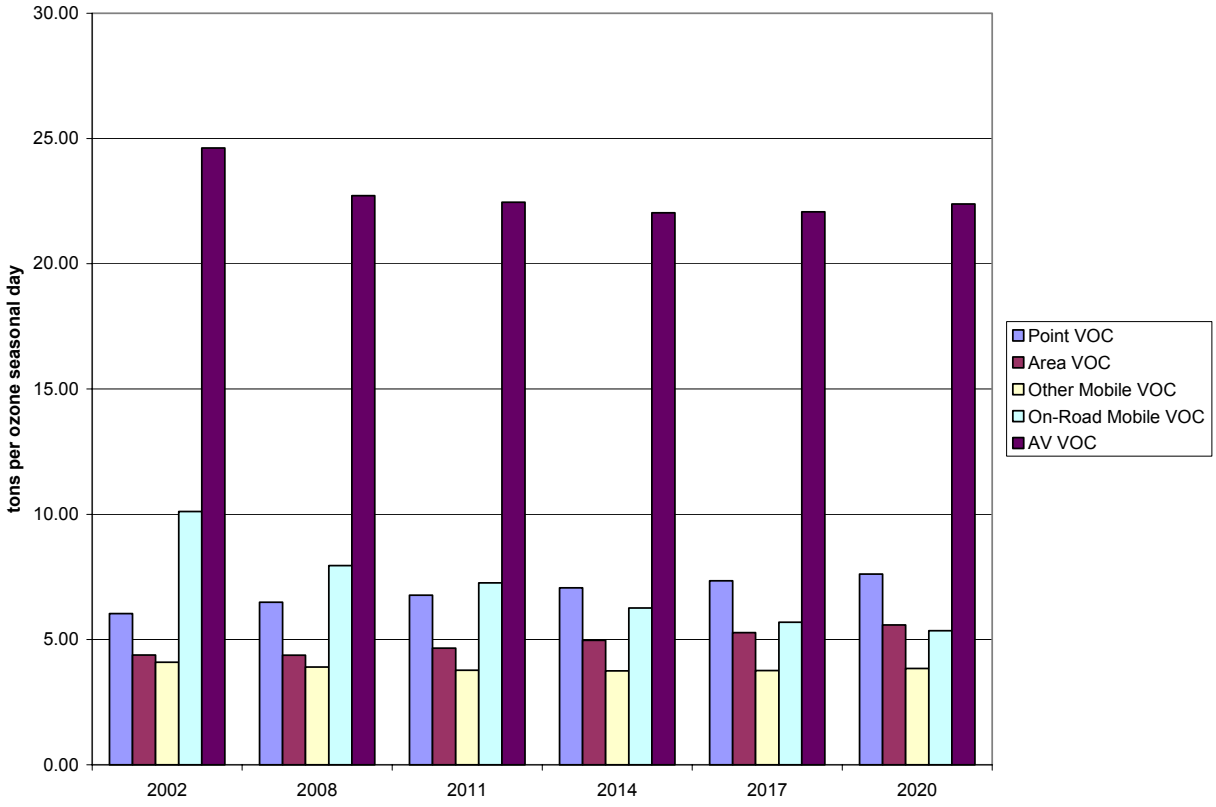
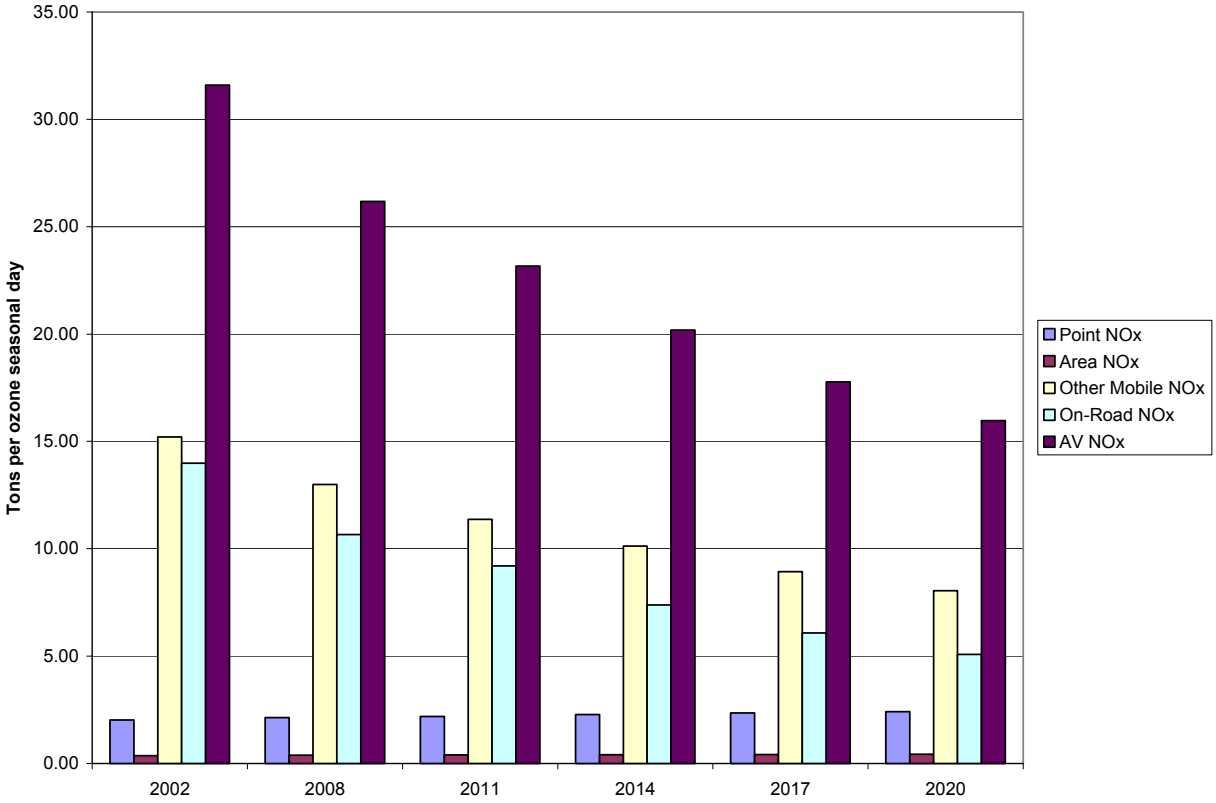


**Figure 4 - Forecasted $NO_x$ Emission Inventories**



# CHAPTER 3 – Control and Contingency Measures

Existing Control Measures
Proposed Control Measures
Rule Adoption Schedule
Contingency Measures
Required Progress
Controlled Emission Inventories
Conformity Budgets

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## Existing Control Measures

The current AVAQMD set of rules and regulations represents a broad set of control measures for AVAQMD sources. The AVAQMD has in place Reasonably Available Control Technology (RACT) requirements for the majority of sources (including gasoline dispensing vapor control), as well as a New Source Review program with a 25 ton per year major source level and a 1.3:1 offset ratio requirement. In 2006, the AVAQMD committed to taking action on several Federal RACT categories.[2] The AVAQMD has recently adopted a Federal RACT rule for aerospace coating.[3] The AVAQMD had committed to adopting an additional RACT rule by the end of 2007 (see below) – the AVAQMD will update the adoption schedule for these actions.

## Proposed Control Measures

The AVAQMD is not proposing to adopt any additional control measures for direct ozone precursor reduction purposes. However, the AVAQMD is committed to having all applicable Federal RACT rules, and is currently performing analyses on the feasibility of adopting additional rules under the State of California "all feasible measures" mandate. In addition, the AVAQMD will experience additional future emission reductions resulting from existing and proposed Federal and State control measures affecting mobile and area sources (see below).

## State Control Measures

The California Air Resources Board (CARB or ARB) is the State agency responsible for ensuring clean air in California. Under State law, ARB has the responsibility to develop State Implementation Plan strategies for mobile sources and consumer products, to coordinate SIP strategies with the Bureau of Automotive Repair (BAR) and Department of Pesticide Regulation (DPR), and to review local plans for attaining the State and Federal ambient air quality standards.

ARB adopted a State Strategy for California's 2007 SIP in September, 2007. The State Strategy is comprehensive; it is designed to enable local districts attain federal air quality standards through a combination of technologically feasible, cost-effective, and far reaching measures for motor vehicles and other statewide sources. The 2007 State Strategy is also the first to address the federal 8-hour ozone standard – it represents a transition from the less stringent 1-hour standard that was the benchmark for previous SIPs. The State Strategy also includes measures that will contribute to attainment of the federal standard for fine particulates ($PM_{2.5}$) by the 2014 $PM_{2.5}$ deadline. The South Coast Air Basin (SCAB) and the San Joaquin Valley are designated nonattainment for the federal $PM_{2.5}$ standard.

California first enacted passenger car exhaust standards in 1973. Today the State's mobile source control program addresses a wide variety of on- and off-road vehicles and engines, gasoline and diesel fuel standards, and engine maintenance requirements. The existing program

[2] "8-Hour Reasonably Available Control Technology – State Implementation Plan Analysis (RACT SIP Analysis)," August, 2006

[3] "Rule 1124 – *Aerospace Assembly and Component Manufacturing Operations*," adopted March 20, 2007

is projected to reduce emissions from passenger vehicles and heavy-duty trucks by approximately 1/3 between 2006 and 2014. The State Strategy ARB adopted in 2007 will result in a greater than 50 percent reduction in emissions from all mobile sources in the South Coast Air Basin by 2014. Most of the controls in the State Strategy will be implemented statewide, and directly benefit the entire state. Some will uniquely target the South Coast and San Joaquin Valley Air Basins, directly reducing emissions in the State's most polluted areas, and indirectly improving air quality in downwind areas including Ventura, Antelope Valley, the Mojave Desert area, and the Coachella Valley.

The State Strategy addresses three key mobile source issues: the need to clean up the legacy diesel fleets, the national and international nature of many diesel fleets, and limitations on SIP credit for unsecured funding.

The total emission reductions and the obligation to propose specific measures for Board consideration would become enforceable upon approval by U.S. EPA of the State Strategy and each district's attainment plan. While the State Strategy includes estimates of the emission reductions from each of the individual new measures, it is important to note that the State's commitment is to achieve the aggregate emission reductions identified for the adopted State Strategy, from the baseline emissions identified in the SIP. Therefore, if a particular measure does not achieve its expected emission reductions, the State still commits to achieving the total aggregate emission reductions, whether this is realized through additional reductions from the new measures, or from alternative control measures or incentive programs. If actual emission decreases occur that exceed the projections reflected in the emission inventories and the State Strategy, the actual emission decreases may be counted toward meeting ARB's total emission reduction commitments.

ARB's emission reduction commitments may be achieved through a combination of actions including but not limited to the implementation of control measures; the expenditure of local, state or federal incentive funds; or through other enforceable measures.

Because ARB scientists determined that reducing emissions of one pollutant, oxides of nitrogen ($NO_x$), is the most beneficial in reducing levels of both ozone and $PM_{2.5}$, the state plan focuses on curbing pollution from the sources that produce nearly 90 percent of the state's $NO_x$. These sources include cars, heavy duty trucks, large off-road equipment, ships and locomotives. The baseline emission inventories used to develop the 2007 and 2008 federal plans throughout the state incorporate reductions from control measures adopted through 2006. The State Strategy identifies new measures to be adopted through 2014; ARB has already acted on some of these measures.

The 2007 State Strategy includes the control measures identified below. Table 2 identifies the timeframe for adoption and implementation of these programs.

Smog Check Improvements The following changes are being developed to improve the effectiveness of the smog check program:

- A new low pressure evaporative test to examine passenger vehicles for leaks in fuel tanks and vapor lines that cause smog-forming emissions;
- More stringent inspection standards (cutpoints), which are used to determine if a vehicle passes or fails;
- Annual inspections for older and high use vehicles to shorten the time they are emitting excess emissions prior to being repaired;
- The addition of a visible smoke test; and,
- The addition of inspection requirements for diesel passenger cars and trucks and motorcycles, which are currently exempt from Smog Check.

Expanded Passenger Vehicle Retirement Incentives and other programs retire more high-emitting passenger vehicles, especially "off-cycle" vehicles – cars and light trucks that are between smog checks inspections.

Reformulated Gasoline Modifications Modifications to California's reformulated gasoline program will eliminate or offset permeation emissions resulting from the addition of ethanol to gasoline blends.

Cleaner In-Use Heavy-Duty Trucks Modernize diesel trucks and reduce emissions by requiring replacement or cleanup of the dirtiest trucks on the road. This critical regulation, which is expected to be considered for adoption in 2008, will also include a program for out-of-state trucks doing business in California.

Goods Movement Sources The 2007 State Strategy takes aim at emissions from ships, trucks, harbor craft and other sources associated with the growing goods movement sector. ARB has already adopted several goods movement emission reduction controls.

- Harborcraft In November 2007 ARB approved a measure that requires owners of commercial harbor craft to either replace old engines with newer, cleaner versions or add control technologies to clean up exhaust.
- Cold Ironing In December 2007, ARB approved a regulation to provide alternative power supplies at ports so that ships can use clean fuels, including electricity, instead of diesel-fueled auxiliary engines while at dock.
- Port Trucks In December 2007 ARB approved a measure requiring retrofit or replacement of older heavy-duty diesel trucks that service ports or deliver containers from ports to nearby transfer facilities.
- Ship Engines ARB staff is developing a regulation that would require ocean-going vessels to use cleaner fuels in ship main and auxiliary engines when they are operating near the California coast.
- Locomotives The State Strategy also calls for reducing emissions from line-haul locomotives by replacing and rebuilding existing engines beginning in 2012. This measure relies in part on U.S. EPA action to ensure that clean engines are available to meet this schedule.

Construction and Mining Equipment In July 2007, the Board approved a measure which regulates existing construction and other industrial equipment. The regulation establishes fleet average emission limits and requires older, dirtier engines to be replaced by current models or retrofitted with emission control devices. Accelerated clean-up provisions are available to local

districts that provide financial assistance to sources that would be subject to the more stringent requirements.

Agricultural Equipment ARB staff is evaluating the options for modernizing and reducing emissions from agricultural equipment, and ARB is expected to consider a regulation in 2009.

Recreational Boats Existing ARB regulations establish new emission limits for recreational boats beginning in 2009. The 2007 State Strategy calls for a more stringent, catalyst-based exhaust standard to be phased in by 2013.

Off-Road Recreational Vehicles The State Strategy includes expanded emission standards for off-road recreational vehicles that would reduce exhaust emissions from new vehicles by 50 percent beginning in 2012, using proven automotive and on-road motorcycle exhaust emission reduction technologies.

Fuel Storage ARB adopted enhanced vapor recovery for above ground storage tanks in June 2007. Additional evaporative emission standards are proposed for portable outboard marine tank engines and refueling gasoline tanks that are usually mounted on a vehicle and used to refuel other vehicles.

Consumer Products ARB staff will consider new approaches such as alternative, market-based mechanisms, multi-media labeling programs, and public education as it develops ways to meet the State Strategy commitment to further reduce ROG emissions from consumer products.

Greenhouse Gas Reduction Co-Benefits The California Global Warming Solutions Act of 2006 (AB 32) requires the adoption of a comprehensive program to reduce greenhouse gas emissions. ARB has already started to adopt regulations in response to this requirement. Although the AB 32 regulations will not directly reduce ozone precursors, many of these regulations are expected to have criteria pollutant "co-benefits."

Pesticides The Department of Pesticide Regulation's 2008 Pesticide Plan includes strategies to reduce ROG emissions from pesticides through regulation of fumigant pesticide use, regulatory standards for registration of liquid pesticides, and strategic partnership agreements implementing pest management practices and technologies that use less pesticide product.

**Table 2 - Expected Emission Reductions from Proposed New SIP Measures**

**Antelope Valley Non Attainment Area -- 2020**

| Proposed New SIP Measures | NOx | ROG | Direct PM2.5 | SOx |
|---|---|---|---|---|
| **Passenger Vehicles** | **0.2644** | **0.4306** | **0** | **--** |
| Smog Check Improvements (BAR) | 0.3 | 0.3 | 0 | -- |
| Expanded Vehicle Retirement | 0 | 0 | 0 | -- |
| Modifications to Reformulated Gasoline Program | -- | 0.1 | -- | -- |
| **Heavy-Duty Trucks** | **0.6** | **0** | **0** | **--** |
| Cleaner In-Use Heavy-Duty Trucks | 0.6 | 0 | 0 | -- |
| **Goods Movement Sources** | **1.4** | **0.2** | **0.1** | **--** |
| Auxiliary Ship Engine Cold Ironing & Clean Technology | -- | -- | -- | -- |
| Cleaner Main Ship Engines and Fuel | -- | -- | -- | -- |
| Port Truck Modernization | -- | -- | -- | -- |
| Accelerated Intro. of Cleaner Line-Haul Locomotives | 1.4 | 0.2 | 0.1 | -- |
| Clean Up Existing Harbor Craft | -- | -- | -- | -- |
| **Off-Road Equipment** | **1.5** | **0.2** | **0.1** | **--** |
| Cleaner In-Use Off-Road Equipment (over 25hp) | 1.5 | 0.2 | 0.1 | -- |
| Cleaner In-Use Agricultural Equipment | NYQ | NYQ | NYQ | -- |
| **Other Off-Road Sources** | **0** | **0.4** | **--** | **--** |
| New Emission Standards for Recreational Boats | 0 | 0 | -- | -- |
| Expanded Off-Road Rec. Vehicle Emission Standards | -- | 0.4 | -- | -- |
| Additional Evaporative Emission Standards | -- | NYQ | -- | -- |
| Vapor Recovery for Above Ground Storage Tanks | -- | NYQ | -- | -- |
| **Areaswide Sources** | **--** | **0.4** | **--** | **--** |
| Consumer Products Program | -- | 0.4 | -- | -- |
| Pesticides: DPR 2008 Pesticide Plan | -- | NYQ | -- | -- |
| **Emission Reductions from Proposed New Measures** | **3.7** | **1.6** | **0.2** | **--** |

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation
Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.
Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

## Local Rule Adoption Schedule

The rule actions identified in Table 3 below are expected to have some (currently unquantified) positive effect on ozone precursor emissions. The State all feasible measures actions are analyses that may result in a rule adoption action depending on the outcome of the feasibility analysis – the specified date is for completion of the feasibility analysis.

**Table 3 - AVAQMD Rule Adoption Schedule**

| Rule Title | Rule Nature | Adoption Date |
|---|---|---|
| Internal Combustion Engines | Federal RACT | 1/2009 |
| Fugitive Dust | Federal RACT | 3/2009 |
| Agricultural Operations | Federal RACT | 12/16/2008 |

| Rule Title | Rule Nature | Adoption Date |
|---|---|---|
| Usage of Solvents | State All Feasible Measures | 12/16/2008 |
| Boilers, Steam Generators and Process Heaters | State All Feasible Measures | 12/16/2008 |
| Turbines | State All Feasible Measures | 12/16/2008 |
| Residential Water Heaters | State All Feasible Measures | 12/16/2008 |
| Commercial Charboilers | State All Feasible Measures | 12/16/2008 |
| Graphic Arts | State All Feasible Measures | 12/16/2008 |
| Metal Parts and Product Coatings | State All Feasible Measures | 12/16/2008 |
| Spray Booths | State All Feasible Measures | 12/16/2008 |
| Wood Flat Stock Coatings | State All Feasible Measures | 12/16/2008 |
| Soil Decontamination | State All Feasible Measures | 12/16/2008 |
| Solid Waste Landfills | State All Feasible Measures | 12/16/2008 |
| Woodworking Operations | State All Feasible Measures | 12/16/2008 |
| Composting Operations | State All Feasible Measures | 12/16/2008 |
| Residential Wood Burning | State All Feasible Measures | 12/16/2008 |

## Contingency Measures

Failure to attain or make appropriate progress in attaining any ozone standard would not be due to local emissions, but would be due to insufficient ozone precursor reductions in the upwind regions (primarily the SCAQMD). California's adopted motor vehicle emission reduction program will continue to reduce emissions in the Antelope Valley and upwind regions beyond 2007, and serves as a contingency measure for this plan.

## Required Progress

Federal law specifies that each ozone non-attainment area must demonstrate ongoing emission reductions relative to the base year (2002). Federal law requires a three percent (3%) per year reduction in VOC emissions, and does not allow credit to be taken for certain federal motor vehicle control programs (FMVCP). Where both VOC and $NO_x$ emissions have been shown to contribute to high ozone levels, the Clean Air Act allows $NO_x$ emission reductions to be used to augment VOC emission reductions in order to demonstrate reasonable further progress. In non-attainment areas that are impacted by transport from other regions, the Federal Clear Air Act also allows emissions and emission reduction from those regions to be taken into account when assessing reasonable further progress. Air quality modeling, described in Chapter 4, demonstrates that emissions from the SCAB contribute to violations of the NAAQS in both the Antelope Valley and Mojave Desert portions of the federal non-attainment area (the WMDONA)

Table 4 demonstrates that the rate of progress projected for the WMDONA meets Federal Clean Air Act requirements. The required rate of progress is met in part by substituting $NO_x$ reductions for VOC reductions at the rate of 1.6 tons of $NO_x$ per ton of VOC shortfall. The WMDONA consists of the Antelope Valley in Los Angeles County and the Mojave and Victor Valley portions of San Bernardino County. The reasonable further progress assessment takes into account projected emissions for upwind areas within 100 kilometers of the WMDONA (specifically Orange County and the SCAB portions of Los Angeles and San Bernardino Counties) as allowed by USEPA guidance.

## Table 4 - Reasonable Further Progress for the WMDONA

**Western Mojave Desert & Antelope Valley (with transport from Orange, San Bernardino-SCAB and LA-SCAB), summer planning, tons per day**

| | 2002 | 2008 | 2011 | 2014 | 2017 | 2020 |
|---|---|---|---|---|---|---|
| Baseline ROG | 882.5 | 651.1 | 601.9 | 570.3 | 551.9 | 543.5 |
| CA MVCP/RVP Adjustment | 0.0 | 54.4 | 71.0 | 84.5 | 91.5 | 96.0 |
| RACT Corrections | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjusted 2002 Baseline ROG in milestone year | 882.5 | 828.1 | 811.4 | 798.0 | 791.0 | 786.5 |
| RFP commitment for ROG reductions from new measures | | 0 | 0 | 0 | 0 | 0 |
| Required % change since previous milestone year (ROG or NOx) compared to 2002 | | 15% | 9% | 9% | 9% | 9% |
| Required % change since 2002 (ROG or NOx)[1] | | 15% | 24% | 33% | 42% | 51% |
| Target ROG levels | | 703.9 | 616.7 | 534.6 | 458.8 | 385.4 |
| Apparent shortfall in ROG | | -52.78 | -14.73 | 35.68 | 93.17 | 158.17 |
| Apparent shortfall in ROG, % | | -6.4% | -1.8% | 4.5% | 11.8% | 20.1% |
| ROG shortfall previously provided by NOx substitution, % | | 0.0% | 0.0% | 0.0% | 4.5% | 11.8% |
| Actual ROG shortfall, % | | -6.4% | -1.8% | 4.5% | 7.3% | 8.3% |
| | | | | | | |
| Baseline NOx | 1123.7 | 905.0 | 789.0 | 696.9 | 622.9 | 574.2 |
| CA MVCP Adjustment | 0.0 | 64.8 | 80.8 | 93.2 | 98.7 | 102.8 |
| Adjusted 2002 Baseline NOx in milestone year | 1123.7 | 1058.8 | 1042.9 | 1030.4 | 1025.0 | 1020.8 |
| RFP commitment for NOx reductions from new measures | 0 | 0 | 0 | 0 | 0 | 0 |
| Change in NOx since 2002 | | 153.8 | 253.8 | 333.6 | 402.1 | 446.6 |
| Change in NOx since 2002, % | | 14.5% | 24.3% | 32.4% | 39.2% | 43.8% |
| NOx reductions since 2002 already used for RFP substitution and contingency through last milestone year, % | | 0.0% | 3.0% | 3.0% | 7.5% | 14.8% |
| NOx reductions since 2002 available for RFP substitution and contingency in this milestone year, % | | 14.5% | 21.3% | 29.4% | 31.8% | 29.0% |
| Change in NOx since 2002 used for ROG substitution in this milestone year, % | | 0.0% | 0.0% | 4.5% | 7.3% | 8.3% |
| Change in NOx since 2002 available for contingency in this milestone year, % | | 3.0% | 3.0% | 3.0% | 3.0% | 3.0% |
| Change in NOx since 2002 surplus after meeting substitution and contingency needs in this milestone year, % | | 11.5% | 21.3% | 24.9% | 24.4% | 20.6% |
| RFP shortfall, if any | | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| RFP Met? | | YES | YES | YES | YES | YES |
| Contingency Met? | | YES | YES | YES | YES | YES |

[1] 15% ROG only reduction required from 2002-2008

## Controlled Emission Inventories

As the AVAQMD is not proposing any additional local control measures with quantified emission reductions, the controlled emission inventory is identical to the forecasted emission inventory.

## Conformity Budgets

The forecasted emission inventories presented in this document are the emission budgets for general conformity purposes, as no additional control measures with quantified emission reductions are proposed. A project subject to the general conformity test must be demonstrated to conform with the applicable portion of the forecasted emission inventory. For a project that falls between forecasted years, a linearly interpolated inventory may be calculated. For a project that falls after 2020, use 2020.

The forecasted on-road mobile source inventory represents the emission budget for transportation conformity purposes, as no transportation control measures are proposed. A

project subject to the transportation conformity test must be demonstrated to conform with the forecasted on-road mobile source inventory. The WMDONA on-road mobile source inventory is presented below, in addition to the appendices. The portion presented in Table 5 is for information only - the AVAQMD is officially adopting the transportation budget for the entire Western Mojave Desert ozone non-attainment area as presented in Appendix C.

**Table 5 - Transportation Conformity Budget (AV portion of WMDONA)**

(tons per ozone seasonal day)

| | 2002 | 2008 | 2011 | 2014 | 2017 | 2020 |
|---|---|---|---|---|---|---|
| On-Road Mobile VOC | 10.11 | 7.96 | 7.27 | 6.26 | 5.70 | 5.35 |
| On-Road Mobile NOx | 13.99 | 10.67 | 9.20 | 7.39 | 6.08 | 5.08 |

# CHAPTER 4 – Attainment Demonstration

Modeling Approach Overview
Modeling Domain
Model Inputs
Modeling Results
ARB Weight of Evidence Assessment

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# ATTAINMENT DEMONSTRATION

This chapter paraphrases and reiterates information from the most recent SCAQMD/CARB ozone model runs, the runs performed for the 2007 SCAQMD AQMP. For further information, please refer to Appendix V of that document.[4]

The Federal Clean Air Act (FCAA) required the use of photochemical air quality modeling to evaluate whether a proposed control strategy will result in attainment of the applicable ozone standard. Recognizing the uncertainty inherent in large-scale air quality models, recent federal guidance has also required an evaluation of supplementary data, known as a weight of evidence analysis. A weight of evidence analysis can also be used to support an attainment demonstration if photochemical modeling indicates that the control strategy will result in future ozone concentration that will approach but not quite reach the standard.

## Modeling Approach Overview

The Western Mojave Desert ozone non-attainment area, which includes the AVAQMD, is a small portion of the complex greater Southern California airshed. Ozone and ozone precursors are known to flow (or be transported), under the influence of winds, throughout Southern California. The most technically accurate method of evaluating ozone concentrations, ozone emissions, and future ozone behavior is through a large modeling project that includes all of the affected areas in Southern California (and a portion of northern Mexico). The modeling effort has been performed as a joint project by all of the air districts in the region and CARB, with SCAQMD and CARB staff and resources doing the primary work. This regional modeling effort has allowed the most accurate understanding and prediction of future ozone concentrations for Southern California.

The modeled attainment demonstration in this plan was prepared using photochemical dispersion and meteorological tools developed in response to USEPA modeling guidelines, and recommendations from air quality modeling experts. The Urban Airshed Model (UAM) is the regional modeling system preferred by USEPA and CARB for analyzing ozone non-attainment areas. The UAM predicts future ambient ozone concentrations under historical conditions that led to high ambient ozone concentrations. These conditions are typically multi-day 'episodes' in which the State and Federal ozone standards were exceeded. The UAM also evaluates ozone precursor emissions, local and regional meteorology, and regional topography to calculate ozone concentrations. These calculations are performed on an hourly basis throughout the modeled episode, thus allowing the UAM to stimulate changing conditions (i.e. night, day and wind).

Meteorological fields were generated using the MM5 prognostic meteorological model, and the required modeling emissions inventories were developed by CARB and SCAQMD staff. The ozone air quality modeling utilized the Comprehensive Air Quality Model with Extensions (CAMx) model, with initial and boundary conditions based on estimates of clean-air concentrations. Analysis of the model outputs included the estimation of 1-hour and 8-hour ozone concentrations for each ozone monitoring site within the domain, as well as statistical

[4] "Final 2007 Appendix V - Modeling and Attainment Demonstrations," SCAQMD, June 2007

measures comparing observed and stimulated ozone concentrations. These analyses were used to evaluate model performance by sub-region within the domain.

## Modeling Domain

The modeling domain is based on the domain defined for the 1997 Southern California Ozone Study and includes the South Coast Air Basin and the surrounding coastal, desert and mountain areas, including the AVAQMD. This model domain includes the upwind sources within SCAQMD, which are responsible for the overwhelming ozone transport into the AVAQMD. The northern boundary of the model extends into Santa Barbara and Kern counties, while the southern boundary extends in Mexico. The eastern boundary of the modeling domain extends into the desert portions of San Bernardino and Riverside counties, while the western boundary extends into the Pacific Ocean. The domain horizontal grid is 116 by 80 cells, with a cell resolution of five kilometers.

## Model Inputs

SCAQMD performed the UAM attainment demonstration using data maintained by CARB and AVAQMD. The emissions inventory used for the UAM is consistent with the emissions inventory presented in the appendices to this document.

## Modeling Results

Future years are simulated twice using the UAM: first, using the uncontrolled emissions inventory; and second, using a reduced emissions inventory controlled by the proposed ozone control strategy. Comparing the uncontrolled and controlled ambient ozone concentrations identifies the effectiveness of the proposed ozone control strategy. Attainment year ambient ozone concentrations using the reduced emissions inventory controlled by the proposed ozone control strategy should achieve the ozone standard.

As required by federal guidance, a relative reduction factor (RRF) approach was used in projecting future design values. The RRF reflects the ratio between the future year model prediction (in this case the end of 2020) and the reference year model prediction (in this case 2002). A reference or base year design value is then multiplied by the RRF to project a future year design value. The modeling satisfies the minimum five episode requirement for use in developing a site-specific RRF for most sites, as recommended by the USEPA guidance for modeling 8-hour ozone design values.

Table 6 presents the photochemical ozone modeling results for the FONA, including the AVAQMD site.

**Table 6 - 2020 Federal Ozone Attainment Demonstration**

*(all values ozone in ppb)*

| | | Modeled | | |
|---|---|---|---|---|
| | **Baseline (2001-2003)** | **2012** | **2017** | **2020** |
| Lancaster | 100.7 | 86.5 | 79.7 | 74.0 |
| Phelan | 104.7 | 92.6 | 86.7 | 80.5 |
| Victorville | 98.3 | 88.0 | 77.0 | 74.4 |
| Hesperia | 106.3 | 95.7 | 88.7 | 76.5 |
| Barstow | 87.6 | 79.7 | 73.2 | 79.5 |
| Twentynine Palms | 86.7 | 77.3 | 65.8 | 82.2 |

The modeling results show that the AVAQMD will not attain the 8-hour ozone NAAQS (84 ppb) by the 2012 attainment deadline for Serious ozone non-attainment areas, but that the AVAQMD will attain by the 2020 deadline for Severe-17 non-attainment areas.

## ARB Weight of Evidence Assessment

Federal modeling guidelines also require non-attainment areas to determine whether other evidence, such as evaluations of air quality and emission trends, support the modeled attainment demonstration. USEPA's ozone modeling guidance also indicates that when photochemical modeling projects attainment year concentrations of between 0.082 and 0.087 ppm, the State may conduct further analyses of the model outcomes and consider other evidence such as emissions and air quality trends data. If the weight of this evidence supports a finding that the proposed control program will result in attainment by the statutory deadline, the State may consider this evidence in determining whether the proposed control program will result in attainment.

CARB has performed a detailed weight of evidence assessment for the attainment demonstration of the AVAQMD portion of the Western Mojave Desert federal ozone nonattainment area. This analysis supports the determination that the AVAQMD portion will attain the Federal 8-hour ozone standard by the 2020 deadline for Severe-17 areas on the basis of reduced transported air pollution from upwind areas. Because the photochemical modeling projected a high value of 88.7 ppm in 2017, the weight of evidence analysis cannot be used to support a projection of attainment by 2017. The ARB Weight of Evidence assessment is presented in Appendix F.

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# Appendices

A - Base Year Emission Inventory
B - Future Year Emission Inventories
C - Transportation Conformity Budgets
D - Annual Ambient Monitoring Data Summary
E - ARB Weight of Evidence Assessment

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# APPENDIX A - BASE YEAR EMISSION INVENTORY

*All emissions are presented in tons per ozone seasonal day for the 2002 base year*

| SUBCATEGORY | NOx | VOC |
|---|---|---|
| **Stationary** | | |
| MANUFACTURING AND INDUSTRIAL | 1.13 | 0.07 |
| SERVICE AND COMMERCIAL | 0.37 | 0.05 |
| OTHER (FUEL COMBUSTION) | 0.20 | 0.02 |
| LANDFILLS | 0.00 | 0.02 |
| OTHER (WASTE DISPOSAL) | 0.00 | 0.02 |
| LAUNDERING | 0.00 | 0.00 |
| DEGREASING | 0.00 | 2.28 |
| COATINGS AND RELATED PROCESS SOLVENTS | 0.00 | 0.80 |
| ADHESIVES AND SEALANTS | 0.00 | 0.06 |
| OTHER (CLEANING AND SURFACE COATINGS) | 0.00 | 0.00 |
| PETROLEUM REFINING | 0.00 | 0.00 |
| PETROLEUM MARKETING | 0.00 | 2.58 |
| OTHER (PETROLEUM PRODUCTION AND MARKETING) | 0.00 | 0.00 |
| CHEMICAL | 0.00 | 0.00 |
| FOOD AND AGRICULTURE | 0.00 | 0.01 |
| MINERAL PROCESSES | 0.13 | 0.05 |
| METAL PROCESSES | 0.00 | 0.00 |
| WOOD AND PAPER | 0.00 | 0.00 |
| OTHER (INDUSTRIAL PROCESSES) | 0.19 | 0.08 |
| *Stationary Subtotal* | *2.03* | *6.04* |
| **Area-Wide** | | |
| CONSUMER PRODUCTS | 0.00 | 2.31 |
| ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS | 0.00 | 1.26 |
| PESTICIDES/FERTILIZERS | 0.00 | 0.20 |
| ASPHALT PAVING / ROOFING | 0.00 | 0.09 |
| RESIDENTIAL FUEL COMBUSTION | 0.25 | 0.04 |
| FARMING OPERATIONS | 0.00 | 0.13 |
| CONSTRUCTION AND DEMOLITION | 0.00 | 0.00 |
| PAVED ROAD DUST | 0.00 | 0.00 |
| UNPAVED ROAD DUST | 0.00 | 0.00 |
| FUGITIVE WINDBLOWN DUST | 0.00 | 0.00 |
| FIRES | 0.00 | 0.01 |
| MANAGED BURNING AND DISPOSAL | 0.12 | 0.31 |
| COOKING | 0.00 | 0.05 |
| *Area-Wide Subtotal* | *0.37* | *4.38* |
| **On-Road Mobile** | | |
| LIGHT DUTY PASSENGER (LDA) | 3.03 | 4.64 |
| LIGHT DUTY TRUCKS - 1 (LDT1) | 0.89 | 1.16 |
| LIGHT DUTY TRUCKS - 2 (LDT2) | 2.22 | 1.78 |
| MEDIUM DUTY TRUCKS (MDV) | 1.39 | 1.02 |
| LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1) | 0.57 | 0.39 |
| LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2) | 0.04 | 0.05 |
| MEDIUM HEAVY DUTY GAS TRUCKS (MHDV) | 0.07 | 0.09 |
| HEAVY HEAVY DUTY GAS TRUCKS (HHDV) | 0.09 | 0.03 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1) | 0.01 | 0.00 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2) | 0.16 | 0.00 |
| MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV) | 0.47 | 0.01 |
| HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV) | 4.46 | 0.29 |
| MOTORCYCLES (MCY) | 0.09 | 0.58 |
| HEAVY DUTY DIESEL URBAN BUSES (UB) | 0.07 | 0.00 |
| HEAVY DUTY GAS URBAN BUSES (UB) | 0.00 | 0.00 |
| SCHOOL BUSES (SB) | 0.21 | 0.02 |
| OTHER BUSES (OB) | 0.06 | 0.01 |
| MOTOR HOMES (MH) | 0.16 | 0.04 |
| *On-Road Subtotal* | *13.99* | *10.11* |
| **Other Mobile** | | |
| AIRCRAFT | 0.60 | 0.71 |
| TRAINS | 2.34 | 0.18 |
| RECREATIONAL BOATS | 0.03 | 0.23 |
| OFF-ROAD RECREATIONAL VEHICLES | 0.01 | 0.35 |
| OFF-ROAD EQUIPMENT | 12.18 | 2.13 |
| FARM EQUIPMENT | 0.05 | 0.01 |
| FUEL STORAGE AND HANDLING | 0.00 | 0.48 |
| SHIPS AND COMMERCIAL BOATS | 0.00 | 0.00 |
| *Other Mobile Subtotal* | *15.21* | *4.09* |
| **Grand Total** | **31.60** | **24.62** |

*Detailed Point Sources for 2002 (all emissions in tons per year)*

| **Source** | **VOC** | **NOx** |
|---|---|---|
| Boeing NASA (Aerospace) | 2.6 | 0.6 |
| Lockheed Martin (Aerospace) | 22.9 | 10.1 |
| Northrop Grumman (Aerospace) | 12.7 | 82 |
| Antelope Valley Aggregate (Batch Plant) | 3.7 | 46.0 |
| Asphalt Construction Co (Batch Plant) | 0.8 | 1.5 |
| Calmat Vulcan 6851 Ave T (Batch Plant) | 4.5 | 52.0 |
| Calmat Vulcan 7107 Ave T (Batch Plant) | 0.9 | 1.9 |
| Granite Construction (Batch Plant) | 0.0 | 0.1 |
| Hi-Grade Materials Ave T (Batch Plant) | 0.1 | 0.0 |
| Rexhall Industries (Fiberglass) | 20.0 | 0.0 |
| Antelope Valley Healthcare System (Institution) | 3.5 | 3.4 |
| Ca State Prison - Los Angeles County (Institution) | 0.4 | 0.2 |
| LA County Sheriff W 60$^{th}$ (Institution) | 0.2 | 2.6 |
| Magna Color (Misc Coating/Manuf) | 0.7 | 0.0 |
| Mountain High Combined (Misc Diesel Use) | 9.6 | 48.0 |
| Verizon (Misc Diesel Use) | 0.0 | 0.6 |
| LA County Palmdale Water Reclamation Plant | 0.6 | 1.2 |
| LA County Sanitation District #14 | 3.5 | 1.0 |
| Lancaster Landfill, Waste Management | 0.5 | 0.1 |
| *Total Point Sources 2002 (tons per year):* | *87.2* | *251.3* |
| *Total Point Sources 2002 (tons per day):* | *0.24* | *0.69* |

# APPENDIX B - FUTURE YEAR EMISSION INVENTORIES

(all emissions in tons per ozone seasonal day unless otherwise indicated)

VOC:

| ROG - Antelope Valley - SUMMER PLANNING INVENTORY -- ADJUSTED FOR MEASURES THROUGH 31 DEC 200 | | | | | | |
|---|---|---|---|---|---|---|
| **SUBCATEGORY** | **2002** | **2008** | **2011** | **2014** | **2017** | **2020** |
| **Stationary** | | | | | | |
| MANUFACTURING AND INDUSTRIAL | 0.07 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 |
| SERVICE AND COMMERCIAL | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| OTHER (FUEL COMBUSTION) | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| LANDFILLS | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| OTHER (WASTE DISPOSAL) | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| LAUNDERING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DEGREASING | 2.28 | 2.38 | 2.46 | 2.54 | 2.60 | 2.67 |
| COATINGS AND RELATED PROCESS SOLVENTS | 0.80 | 0.86 | 0.93 | 1.00 | 1.07 | 1.12 |
| ADHESIVES AND SEALANTS | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| OTHER (CLEANING AND SURFACE COATINGS) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PETROLEUM REFINING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PETROLEUM MARKETING | 2.58 | 2.84 | 2.96 | 3.10 | 3.24 | 3.38 |
| OTHER (PETROLEUM PRODUCTION AND MARKETING) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CHEMICAL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FOOD AND AGRICULTURE | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| MINERAL PROCESSES | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 |
| METAL PROCESSES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WOOD AND PAPER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OTHER (INDUSTRIAL PROCESSES) | 0.08 | 0.09 | 0.09 | 0.10 | 0.11 | 0.11 |
| *Stationary Subtotal* | *6.04* | *6.49* | *6.76* | *7.06* | *7.34* | *7.62* |
| **Area-Wide** | | | | | | |
| CONSUMER PRODUCTS | 2.31 | 2.31 | 2.54 | 2.80 | 3.05 | 3.31 |
| ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS | 1.26 | 1.10 | 1.13 | 1.15 | 1.18 | 1.20 |
| PESTICIDES/FERTILIZERS | 0.20 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 |
| ASPHALT PAVING / ROOFING | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 |
| RESIDENTIAL FUEL COMBUSTION | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| FARMING OPERATIONS | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| CONSTRUCTION AND DEMOLITION | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PAVED ROAD DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UNPAVED ROAD DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FUGITIVE WINDBLOWN DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FIRES | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| MANAGED BURNING AND DISPOSAL | 0.31 | 0.34 | 0.36 | 0.38 | 0.40 | 0.42 |
| COOKING | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 |
| *Area-Wide Subtotal* | *4.38* | *4.38* | *4.65* | *4.97* | *5.27* | *5.58* |
| **On-Road Mobile** | | | | | | |
| LIGHT DUTY PASSENGER (LDA) | 4.64 | 3.24 | 2.79 | 2.18 | 1.82 | 1.58 |
| LIGHT DUTY TRUCKS - 1 (LDT1) | 1.16 | 0.84 | 0.70 | 0.56 | 0.45 | 0.38 |
| LIGHT DUTY TRUCKS - 2 (LDT2) | 1.78 | 1.58 | 1.56 | 1.40 | 1.32 | 1.25 |
| MEDIUM DUTY TRUCKS (MDV) | 1.02 | 0.86 | 0.87 | 0.82 | 0.78 | 0.75 |
| LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1) | 0.39 | 0.17 | 0.15 | 0.13 | 0.13 | 0.13 |
| LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2) | 0.05 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| MEDIUM HEAVY DUTY GAS TRUCKS (MHDV) | 0.09 | 0.04 | 0.03 | 0.02 | 0.01 | 0.01 |
| HEAVY HEAVY DUTY GAS TRUCKS (HHDV) | 0.03 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV) | 0.29 | 0.26 | 0.22 | 0.18 | 0.15 | 0.13 |
| MOTORCYCLES (MCY) | 0.58 | 0.85 | 0.86 | 0.90 | 0.97 | 1.05 |
| HEAVY DUTY DIESEL URBAN BUSES (UB) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HEAVY DUTY GAS URBAN BUSES (UB) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SCHOOL BUSES (SB) | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| OTHER BUSES (OB) | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 |
| MOTOR HOMES (MH) | 0.04 | 0.03 | 0.02 | 0.02 | 0.01 | 0.01 |
| *On-Road Subtotal* | *10.11* | *7.96* | *7.27* | *6.26* | *5.70* | *5.35* |
| **Other Mobile** | | | | | | |
| AIRCRAFT | 0.71 | 0.85 | 0.94 | 1.05 | 1.15 | 1.25 |
| TRAINS | 0.18 | 0.18 | 0.18 | 0.19 | 0.20 | 0.20 |
| RECREATIONAL BOATS | 0.23 | 0.21 | 0.19 | 0.18 | 0.17 | 0.17 |
| OFF-ROAD RECREATIONAL VEHICLES | 0.35 | 0.50 | 0.55 | 0.60 | 0.67 | 0.74 |
| OFF-ROAD EQUIPMENT | 2.13 | 1.85 | 1.67 | 1.53 | 1.41 | 1.33 |
| FARM EQUIPMENT | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| FUEL STORAGE AND HANDLING | 0.48 | 0.31 | 0.24 | 0.20 | 0.17 | 0.15 |
| SHIPS AND COMMERCIAL BOATS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Other Mobile Subtotal* | *4.09* | *3.90* | *3.78* | *3.75* | *3.76* | *3.84* |
| | | | | | | |
| **Grand Total** | **24.62** | **22.72** | **22.46** | **22.04** | **22.07** | **22.38** |

NOx:

| NOX - Antelope Valley - SUMMER PLANNING INVENTORY -- ADJUSTED FOR MEASURES THROUGH 31 DEC 2006 | | | | | | |
|---|---|---|---|---|---|---|
| **SUBCATEGORY** | 2002 | 2008 | 2011 | 2014 | 2017 | 2020 |
| **Stationary** | | | | | | |
| MANUFACTURING AND INDUSTRIAL | 1.13 | 1.22 | 1.26 | 1.32 | 1.38 | 1.43 |
| SERVICE AND COMMERCIAL | 0.37 | 0.39 | 0.40 | 0.40 | 0.41 | 0.41 |
| OTHER (FUEL COMBUSTION) | 0.20 | 0.18 | 0.17 | 0.16 | 0.15 | 0.15 |
| LANDFILLS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OTHER (WASTE DISPOSAL) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LAUNDERING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DEGREASING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| COATINGS AND RELATED PROCESS SOLVENTS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ADHESIVES AND SEALANTS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OTHER (CLEANING AND SURFACE COATINGS) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PETROLEUM REFINING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PETROLEUM MARKETING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OTHER (PETROLEUM PRODUCTION AND MARKETING) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CHEMICAL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FOOD AND AGRICULTURE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MINERAL PROCESSES | 0.13 | 0.14 | 0.15 | 0.16 | 0.18 | 0.19 |
| METAL PROCESSES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WOOD AND PAPER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OTHER (INDUSTRIAL PROCESSES) | 0.19 | 0.20 | 0.21 | 0.22 | 0.24 | 0.25 |
| *Stationary Subtotal* | *2.03* | *2.14* | *2.19* | *2.28* | *2.35* | *2.42* |
| **Area-Wide** | | | | | | |
| CONSUMER PRODUCTS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PESTICIDES/FERTILIZERS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ASPHALT PAVING / ROOFING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RESIDENTIAL FUEL COMBUSTION | 0.25 | 0.25 | 0.25 | 0.25 | 0.26 | 0.26 |
| FARMING OPERATIONS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CONSTRUCTION AND DEMOLITION | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PAVED ROAD DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UNPAVED ROAD DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FUGITIVE WINDBLOWN DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FIRES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MANAGED BURNING AND DISPOSAL | 0.12 | 0.13 | 0.14 | 0.15 | 0.16 | 0.16 |
| COOKING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Area-Wide Subtotal* | *0.37* | *0.38* | *0.39* | *0.40* | *0.41* | *0.42* |
| **On-Road Mobile** | | | | | | |
| LIGHT DUTY PASSENGER (LDA) | 3.03 | 1.87 | 1.58 | 1.18 | 0.93 | 0.75 |
| LIGHT DUTY TRUCKS - 1 (LDT1) | 0.89 | 0.59 | 0.49 | 0.38 | 0.29 | 0.23 |
| LIGHT DUTY TRUCKS - 2 (LDT2) | 2.22 | 1.59 | 1.43 | 1.17 | 0.99 | 0.85 |
| MEDIUM DUTY TRUCKS (MDV) | 1.39 | 1.05 | 0.96 | 0.80 | 0.69 | 0.58 |
| LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1) | 0.57 | 0.28 | 0.26 | 0.25 | 0.25 | 0.25 |
| LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2) | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| MEDIUM HEAVY DUTY GAS TRUCKS (MHDV) | 0.07 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |
| HEAVY HEAVY DUTY GAS TRUCKS (HHDV) | 0.09 | 0.07 | 0.06 | 0.05 | 0.04 | 0.03 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1) | 0.01 | 0.20 | 0.16 | 0.14 | 0.12 | 0.11 |
| LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2) | 0.16 | 0.15 | 0.12 | 0.10 | 0.09 | 0.07 |
| MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV) | 0.47 | 0.41 | 0.34 | 0.27 | 0.22 | 0.17 |
| HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV) | 4.46 | 3.68 | 3.03 | 2.30 | 1.74 | 1.35 |
| MOTORCYCLES (MCY) | 0.09 | 0.18 | 0.20 | 0.21 | 0.23 | 0.25 |
| HEAVY DUTY DIESEL URBAN BUSES (UB) | 0.07 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| HEAVY DUTY GAS URBAN BUSES (UB) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SCHOOL BUSES (SB) | 0.21 | 0.24 | 0.24 | 0.23 | 0.21 | 0.20 |
| OTHER BUSES (OB) | 0.06 | 0.08 | 0.07 | 0.07 | 0.06 | 0.05 |
| MOTOR HOMES (MH) | 0.16 | 0.14 | 0.13 | 0.11 | 0.09 | 0.07 |
| *On-Road Subtotal* | *13.99* | *10.67* | *9.20* | *7.39* | *6.08* | *5.08* |
| **Other Mobile** | | | | | | |
| AIRCRAFT | 0.60 | 0.72 | 0.79 | 0.88 | 0.97 | 1.05 |
| TRAINS | 2.34 | 1.78 | 1.36 | 1.45 | 1.56 | 1.68 |
| RECREATIONAL BOATS | 0.03 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 |
| OFF-ROAD RECREATIONAL VEHICLES | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| OFF-ROAD EQUIPMENT | 12.18 | 10.40 | 9.12 | 7.69 | 6.32 | 5.23 |
| FARM EQUIPMENT | 0.05 | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 |
| FUEL STORAGE AND HANDLING | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SHIPS AND COMMERCIAL BOATS | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Other Mobile Subtotal* | *15.21* | *13.00* | *11.37* | *10.12* | *8.93* | *8.05* |
| **Grand Total** | **31.60** | **26.18** | **23.16** | **20.19** | **17.78** | **15.97** |

# APPENDIX C - TRANSPORTATION CONFORMITY BUDGETS

## Antelope Valley - Western Mojave Desert Nonattainment Area

**Transportation Conformity Budgets**
**Summer Planning Emissions in Tons per Day***

| | 2008 | |
|---|---|---|
| | ROG | NOx |
| On-Road Emissions from EMFAC2007 | 22.7 | 82.0 |
| Adjustments to Baseline* | 0.0 | -4.4 |
| Net Inventory | 22.63 | 77.56 |
| Conformity Budget** | 23 | 78 |

* Reductions from adopted rules not reflected in EMFAC
** Budget is obtained by rounding up to the nearest ton.

## Antelope Valley - Western Mojave Desert Nonattainment Area

**Transportation Conformity Budgets**
**Summer Planning Emissions in Tons per Day***

| | 2011 | |
|---|---|---|
| | ROG | NOx |
| On-Road Emissions from EMFAC2007 | 19.8 | 70.5 |
| Adjustments to Baseline* | -0.1 | -4.4 |
| Net Inventory | 19.7 | 66.1 |
| Conformity Budget** | 20 | 67 |

* Reductions from adopted rules not reflected in EMFAC
** Budget is obtained by rounding up from two significant figures to the nearest ton.

## Antelope Valley - Western Mojave Desert Nonattainment Area

**Transportation Conformity Budgets**
**Summer Planning Emissions in Tons per Day***

| | 2014 | |
|---|---|---|
| | **ROG** | **NOx** |
| **On-Road Emissions from EMFAC2007** | **16.6** | **54.9** |
| **Adjustments to Baseline*** | **-0.1** | **-4.1** |
| **State Strategy Reductions** | **-3.4** | **-15.3** |
| **Net Inventory** | **13.0** | **35.5** |
| **Conformity Budget**** | **14** | **36** |

* Reductions from adopted rules not reflected in EMFAC

** Budget is obtained by rounding up from two significant figures to the nearest ton.

## Antelope Valley - Western Mojave Desert Nonattainment Area

**Transportation Conformity Budgets**
**Summer Planning Emissions in Tons per Day***

| | 2017 | |
|---|---|---|
| | **ROG** | **NOx** |
| **On-Road Emissions from EMFAC2007** | **14.5** | **43.1** |
| **Adjustments to Baseline*** | **-0.1** | **-3.9** |
| **State Strategy Reductions** | **-2.5** | **-14.1** |
| **Net Inventory** | **11.9** | **25.1** |
| **Conformity Budget**** | **12** | **26** |

* Reductions from adopted rules not reflected in EMFAC

** Budget is obtained by rounding up from two significant figures to the nearest ton.

# Antelope Valley - Western Mojave Desert Nonattainment Area

**Transportation Conformity Budgets**
**Summer Planning Emissions in Tons per Day***

| | 2020 | |
|---|---|---|
| | **ROG** | **NOx** |
| **On-Road Emissions from EMFAC2007** | **13.2** | **35.4** |
| **Adjustments to Baseline*** | **-0.1** | **-3.7** |
| **State Strategy Reductions** | **-1.7** | **-7.4** |
| **Net Inventory** | **11.4** | **24.2** |
| **Conformity Budget**** | **12** | **25** |

* Reductions from adopted rules not reflected in EMFAC

** Budget is obtained by rounding up from two significant figures to the nearest ton.

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# APPENDIX D - ANNUAL AMBIENT MONITORING DATA SUMMARY

Max 1-Hr Ozone (ppm)

| | Maximum | Design Value Trend |
|---|---|---|
| 1990 | 0.15 | 0.14 |
| 1991 | 0.14 | 0.14 |
| 1992 | 0.17 | 0.16 |
| 1993 | 0.16 | 0.16 |
| 1994 | 0.14 | 0.16 |
| 1995 | 0.14 | 0.141 |
| 1996 | 0.13 | 0.138 |
| 1997 | 0.12 | 0.129 |
| 1998 | 0.16 | 0.137 |
| 1999 | 0.10 | 0.137 |
| 2000 | 0.14 | 0.139 |
| 2001 | 0.15 | 0.128 |
| 2002 | 0.16 | 0.128 |
| 2003 | 0.16 | 0.13 |
| 2004 | 0.12 | 0.13 |
| 2005 | 0.13 | 0.127 |
| 2006 | 0.13 | 0.123 |

Max 8-Hour Ozone (ppm)

| | Maximum | Design Value Trend |
|---|---|---|
| 1990 | 0.106 | 0.105 |
| 1991 | 0.111 | 0.105 |
| 1992 | 0.137 | 0.11 |
| 1993 | 0.127 | 0.113 |
| 1994 | 0.112 | 0.113 |
| 1995 | 0.112 | 0.108 |
| 1996 | 0.104 | 0.103 |
| 1997 | 0.101 | 0.098 |
| 1998 | 0.118 | 0.097 |
| 1999 | 0.083 | 0.089 |
| 2000 | 0.117 | 0.092 |
| 2001 | 0.102 | 0.091 |
| 2002 | 0.107 | 0.100 |
| 2003 | 0.120 | 0.100 |
| 2004 | 0.101 | 0.100 |
| 2005 | 0.10 | 0.098 |
| 2006 | 0.11 | 0.096 |

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# APPENDIX E - ARB WEIGHT OF EVIDENCE ASSESSMENT

(prepared by CARB staff)

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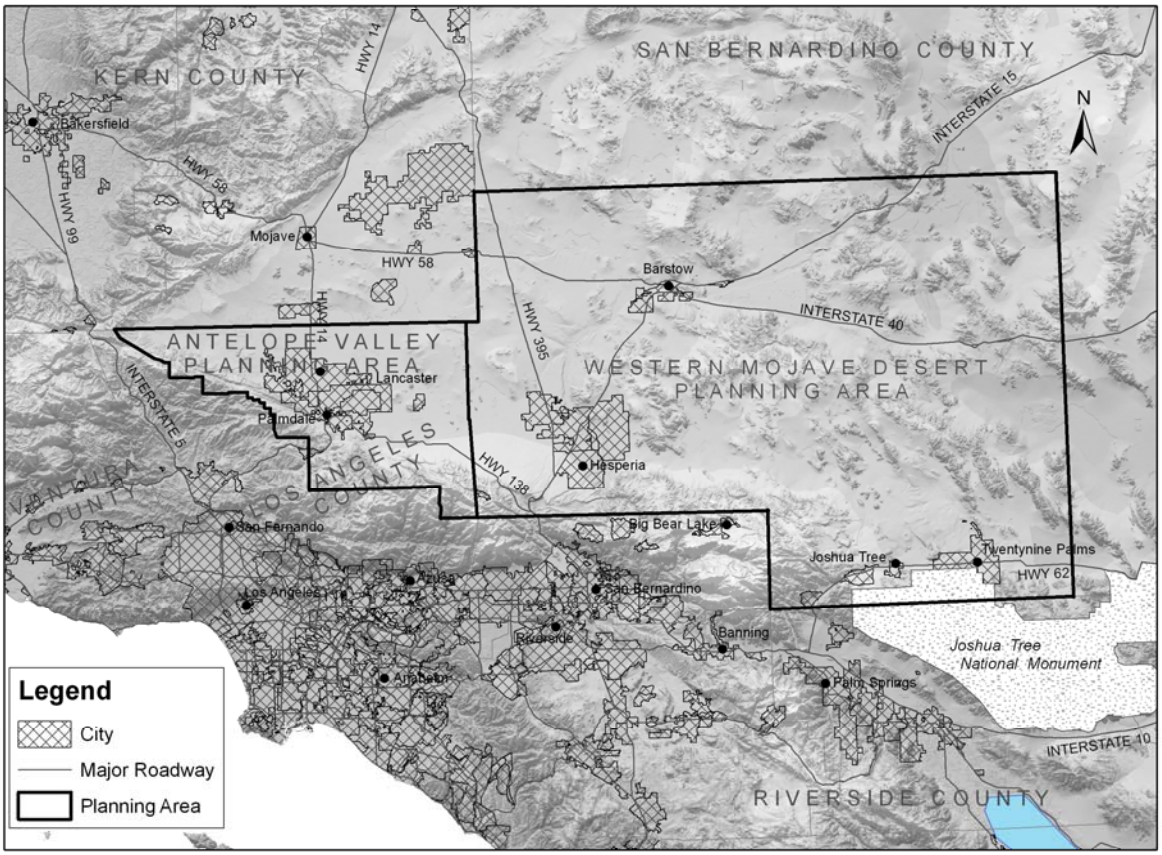
## Antelope Valley Weight of Evidence Assessment

### Introduction

For ozone planning purposes, the U.S. EPA has combined portions of Los Angeles and San Bernardino counties and designated them as the Western Mojave 8-Hour Ozone Nonattainment Area. The Nonattainment Area includes the northeast portion of Los Angeles County and the southwest portion of San Bernardino County, both of which are in the Mojave Desert Air Basin (refer to Figure 1). These two areas are managed by two separate jurisdictions. The Antelope Valley Air Quality Management District has jurisdiction over the Los Angeles County portion of the Nonattainment Area, while the Mojave Desert Air Quality Management District has jurisdiction over the San Bernardino County portion of the Nonattainment Area. This Weight of Evidence evaluation covers the Los Angeles County portion of the Nonattainment Area which is referred to as the Antelope Valley Planning Area in this document.

Figure 1: Antelope Valley Planning Area and Surrounding Region



The Antelope Valley Planning Area (Antelope Valley) is currently classified as a Moderate nonattainment area for the federal 8-hour ozone standard and has a nominal attainment deadline of June 15, 2010. However, air quality analyses, as well as photochemical modeling completed by the South Coast Air Quality Management District (South Coast District), indicate it is unlikely that Antelope Valley will attain by 2010, as required for Moderate areas.

Ozone air quality in the Antelope Valley can be significantly impacted by transport from both the South Coast Air Basin (South Coast) and the San Joaquin Valley Air Basin (San Joaquin Valley). As a result, attainment projections for Antelope Valley must consider not only local emissions, but also the impact of transported emissions and pollutants. An additional consideration for the Antelope Valley is its inclusion as part of a larger ozone nonattainment area. As mentioned previously, for federal planning purposes, the Antelope Valley and the southwestern portion of San Bernardino County are considered together as the Western Mojave 8-Hour Ozone Nonattainment Area (refer to Figure 1). Because the San Bernardino County portion of the Nonattainment Area has a higher design value, it dictates the attainment date for the entire region.

The proposed South Coast, San Joaquin Valley, and statewide emissions reduction strategies will lower ozone concentrations in both the Antelope Valley and southwestern San Bernardino County over the next several years. However, the expected level of emissions reductions will fall short of those needed to reach attainment in either area by 2010, as currently required. Therefore, both areas are requesting a reclassification. Photochemical modeling results show that the entire Western Mojave Ozone Nonattainment Area could attain by the 2021 deadline for a Severe-17 nonattainment area. Therefore, both districts are requesting a reclassification to Severe-17, with an attainment date of June 15, 2021. Although this later attainment date will apply throughout the entire Nonattainment Area, the Antelope Valley portion should reach attainment before that date.

## U.S. EPA Attainment Demonstration Requirements

The attainment demonstration portion of a SIP consists of the analyses used to determine whether a proposed control strategy provides the emissions reductions needed to meet the NAAQS by the attainment year. This attainment demonstration includes photochemical modeling, which predicts that projected emissions controls will result in an 8-hour ozone design value of 0.082 parts per million (ppm) for the Western Mojave Ozone Nonattainment Area by the end of 2020 (note: because the design value is based on a 3-year average, an area must have a design value that meets the standard at the end of the year prior to the attainment year; for example, an area with a June 15, 2021 attainment date must have a design value that meets the standard at the end of 2020). Because of the uncertainties inherent in photochemical modeling, the U.S. EPA allows states to supplement the modeling results with a “Weight of Evidence” (WOE) demonstration when the model predicts ozone levels of 0.082 ppm to 0.087 ppm.

As mentioned earlier, ozone concentrations and design values for the Antelope Valley are lower than those for the San Bernardino County portion of the Nonattainment Area. However, because these two areas are considered a single nonattainment area, the site with the highest design value dictates the region's attainment date. Photochemical modeling for the San Bernardino County portion of the Nonattainment Area does not show attainment until the end of 2020. However results for Lancaster, the only monitoring site in the Antelope Valley, show attainment before then, with a design value of 0.08 ppm at the end of 2017 and 0.074 ppm at the end of 2020.

The following assessment focuses on the Antelope Valley portion of the Nonattainment Area and comprises the WOE evaluation as of March 2008. It provides a set of analyses that include consideration of measured air quality, as well as evaluation of other air quality indicators and emissions. The scope of the WOE analysis is different for each nonattainment area. The level of detail appropriate for a particular area depends upon the complexity of the air quality problem, how far into the future the attainment deadline is, and the amount of data and modeling available. Because all analysis methods have inherent strengths and weaknesses, examining an air quality problem in a variety of ways helps offset the limitations and uncertainties that are inherent in each particular method.

## Physical Context

The Antelope Valley Planning Area comprises the northeast portion of Los Angeles County and is located in the Mojave Desert Air Basin. As shown in Figure 1, the region lies generally north of the San Gabriel Mountains and east of the Tehachapi Mountains. Covering approximately 1460 square miles, the triangular shaped Antelope Valley is one of the smaller planning areas in California. However, for federal purposes, it is included with a portion of San Bernardino County as part of the Mojave Desert Ozone Nonattainment Area (refer to Figure 1).

Most of the Antelope Valley is classified as high desert, although small portions extend into the San Gabriel Mountains. Elevations range from 2,300 to over 8,000 feet, and annual precipitation averages 7 inches in the desert portions of the Antelope Valley to over 20 inches in the mountain areas. At Lancaster, summer daily maximum temperatures average 96 degrees Fahrenheit, while winter daily maximum temperatures average 57 degrees.

The Antelope Valley has a total population of about 320,000 (2006 estimate). More than 280,000 people live in the cities of Lancaster and Palmdale (2005 estimate). The Antelope Valley is part of an important transportation corridor linking the eastern and southern portions of California. Highway 14 is the major roadway carrying commuter and truck traffic through the Antelope Valley on its way in and out of southern California.

## Transport Impacts

As mentioned earlier, ozone concentrations in the Antelope Valley are impacted by transport. Therefore, transport must be considered in evaluating the prospects for attainment. Prevailing winds can blow emissions and pollutants from the South Coast into the Antelope Valley. During the spring through fall ozone season, Soledad Canyon on the eastern edge of the San Gabriel Mountains is the major outlet for airflow from the Santa Clarita and San Fernando Valley areas in the South Coast to the Antelope Valley. State Highway 14 from Santa Clarita parallels the general flow of air into the area. Emissions and pollutants are also transported from the southern San Joaquin Valley, through the Tehachapi Mountains southeast of Bakersfield, and into the Antelope Valley.

Previous ARB transport assessments concluded that during 1-hour State ozone exceedances, the transport contribution from South Coast, as well as from San Joaquin Valley to the Lancaster area can be overwhelming (ARB 1990).[5] Although the transport impacts can be overwhelming, the frequency of the impacts has not been determined. However, more recent analyses indicate that ozone exceedances in the Antelope Valley continue to be transport impacted. Areas impacted by transport generally show ozone concentrations peaking in the late afternoon or evening hours. The 24-hour ozone profile for Lancaster (refer to Figure 2) shows this later peak, indicating that transport continues to be an important contributor to high ozone concentrations in this area.

Recent photochemical modeling completed for the Mojave Desert Ozone Nonattainment Area also evaluated the impact of transported emissions on air quality in the area. In general, results showed that without transport, emissions from within the Nonattainment Area would likely not be sufficient to generate an exceedance of the federal 8-hour ozone standard in future years.

The overall long-term trend in the design value for Lancaster is downward. As shown in Figure 3, the Lancaster trend is generally similar to the trends for both Santa Clarita in the South Coast and Edison in the San Joaquin Valley. The similarity of the trend lines provides another indication that ozone in the Antelope Valley is linked to the South Coast, as well as to the San Joaquin Valley, and that transport from these upwind areas is an important contributor to ozone air quality in the Antelope Valley. In future years, emissions controls implemented in the upwind basins should benefit ozone air quality in the Antelope Valley.

Figure 2: Hourly Average Ozone Concentrations on the Top Ten 1-Hour Ozone Days during 2006 at Lancaster

[5] Air Resources Board, 1990: Assessment and Mitigation of the Impacts of Transported Pollutants on Ozone Concentrations within California. ARB Staff Report prepared by the Technical Support Division and Office of Air Quality Planning and Liaison, June 1990.

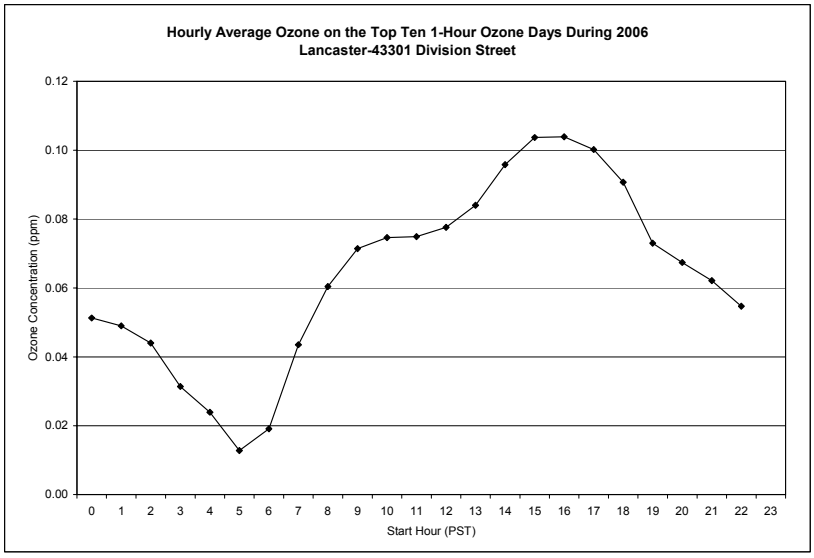
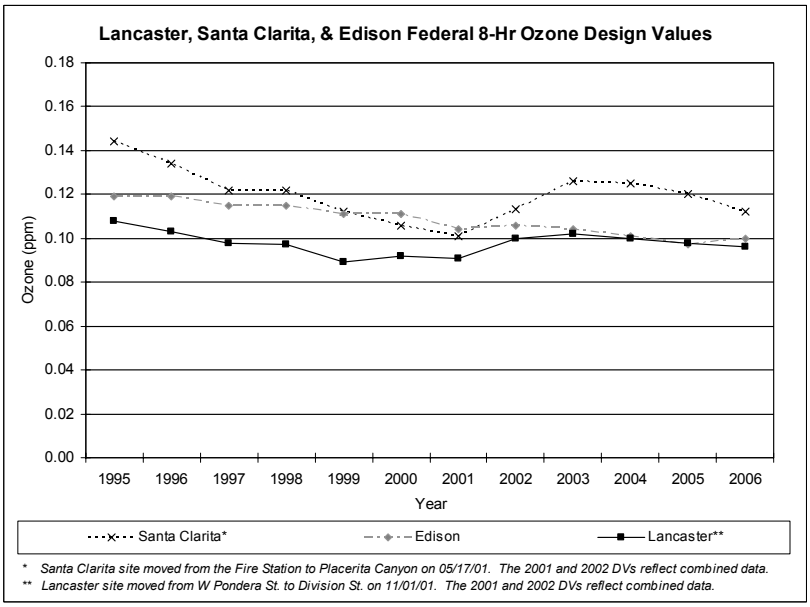



Figure 3: Federal 8-Hour Ozone Design Values for Lancaster, Santa Clarita, and Edison 1995 to 2006



## Ozone Air Quality Trends

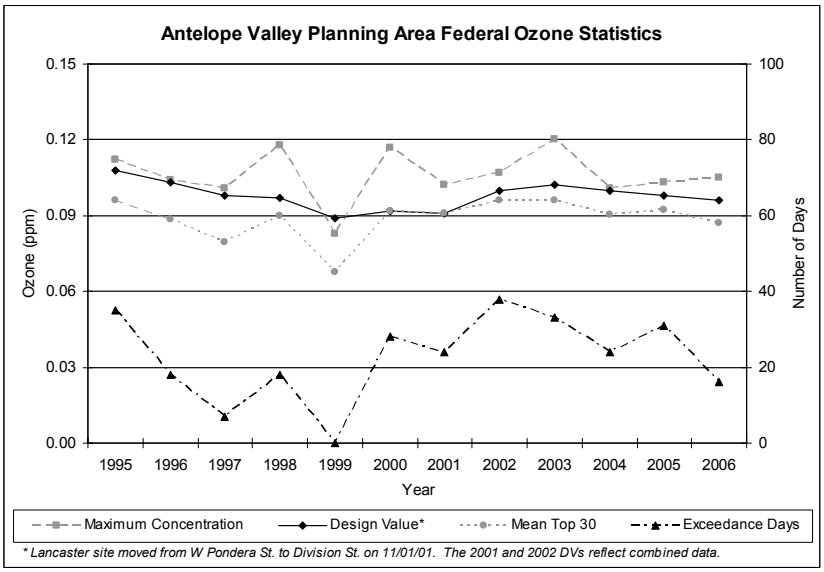
The following discussion is based on ozone air quality data collected at sites in the Antelope Valley from 1995 through the present. During this time period, ozone concentrations were monitored at two locations in the Lancaster area. The Lancaster-West Pondera Street site was operating in 1995 and continued operating through the 2001 ozone season. At the beginning of November 2001, the site was relocated to Lancaster-Division Street, where it continues operating today. Because the site was relocated after the 2001 ozone season, data in the following graphs generally reflect the West Pondera Street site from 1995 through 2001 and the Division Street site from 2002 through the present. The exceptions to this are the design values for 2002 and 2003. Since the design value is based on data for a 3-year period, the design values for these years use a combination of data from both sites. It should be noted that when the site was relocated to Division Street, concentrations appeared to be somewhat higher. This has an impact on some of the trend lines – in particular, those based on only one or just a few values each year (for example, maximum concentration and number of exceedance days). However, because there is no overlap in the monitoring records for the two sites, an evaluation of the differences in concentrations at the two sites is not possible. In addition to the Lancaster sites, a site operated in Palmdale during 1995 only. Because the Palmdale data are so limited, they are not included in the following discussion.

Ozone trend indicators for Lancaster from 1995 to 2006 are shown in Figure 4. As shown, all indicators have decreased since 1995, indicating overall improvements in the various measures of ozone air quality. Similar to many other areas of the State, the largest drop is seen in the number of exceedance days. Although the trend is quite variable over the years, the overall decrease is 55 percent (from 35 days in 1995 to 16 days in 2006). Data show a slightly lower value for 2007 – 14 exceedance days during the year.

While the improvement in exceedance days is substantial, the improvement in the other indicators is more modest. Overall, the design value and mean of the Top 30 daily maximum concentrations decreased 10 percent between 1995 and 2006, while the maximum concentration decreased a little more than 5 percent. Similar to exceedance days, all three of these indicators had slightly lower values for 2007 than for 2006 (maximum concentration = 0.101 ppm in 2007 *vs.* 0.106 ppm in 2006; design value = 0.095 ppm in 2007 *vs.* 0.096 ppm in 2006; mean Top 30 = 0.086 ppm in 2007 *vs.* 0.087 ppm in 2006). Currently, the design value for Antelope Valley is still close to 15 percent above the federal standard, but this compares with a design value nearly 30 percent above the standard in 1995. Thus, since 1995, the area has made 50 percent of the progress needed to attain the standard.

It is important to note that the trend lines for all four ozone indicators shown in Figure 4 increased in 2002, when compared with 2001. As mentioned

Figure 4: Ozone Indicators for the Antelope Valley Planning Area 1995 to 2006




previously, this is the same year the Lancaster site was relocated from West Pondera Street to Division Street, where concentrations appeared to be higher. Even so, the trend lines still show decreases from 2002 to the present. If the site had not been relocated, the overall decrease in the trend lines from 1995 to the present may have been greater.

Looking at the more recent years, the trend in the maximum concentration shows a slight overall decrease when comparing 2002 to 2006, but shows an increase during the last three years. Because the maximum concentration is based on only one value each year and can be highly influenced by meteorology, it is not a good indicator of progress, nor is it used to measure compliance with the standard. The recent upward trend in the annual maximum concentration contrasts with small, but fairly consistent decreases in the other three indicators. When looking at the distribution of daily maximum concentrations that are below the annual maximum (i.e., the second through thirtieth daily maximum concentrations), it is apparent that although the annual maximum changed little, the second through thirtieth daily maximum concentrations have decreased over the years. This explains why the other indicators, design value, mean Top 30, and exceedance days, have all decreased, even though the annual maximum concentration has increased.

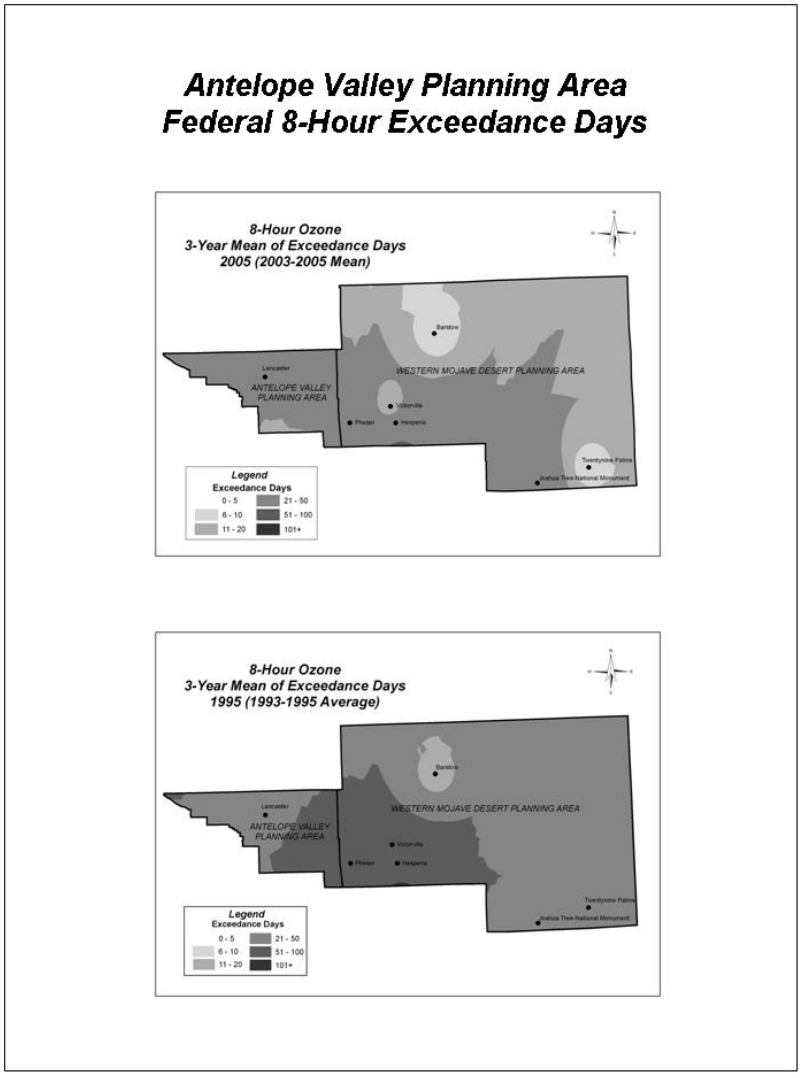
## Spatial Ozone Trends

Another way to look at the improvement in air quality is to map the change in the number of exceedance days. The maps in Figure 5 are based on monitoring data and show the reduction in the number of days exceeding the federal 8-hour standard over the last decade (1995 to 2005). This approach provides an estimate of the change in

the spatial extent of the ozone problem. Ten years ago (bottom 1995 map, based on 1993 to 1995 means), about half of the Antelope Valley experienced 51 to 100 exceedance days per year, while the other half experienced 21 to 50 days per year. Today (top 2005 map, based on 2003 to 2005 means), nearly all of the Antelope Valley falls in the 21 to 50 days per year category, with a small portion having 11 to 20 days per year.

The exceedance day maps clearly illustrate the influence of transport, particularly transport from the South Coast, on ozone air quality in both the Antelope Valley and southwest San Bernardino County areas. The highest count of exceedance

Figure 5: Antelope Valley Change in Federal 8-Hour Exceedance Days
1995 to 2005



days is found in the southern portion of these areas, adjacent to the South Coast Air Basin. Because of these transport impacts, emissions controls in the South Coast will be critical to attainment in the Mojave Desert Ozone Nonattainment Area. While areas closer to the South Coast still have the highest ozone concentrations, air quality in these areas has improved over time, and will continue to improve with the implementation of the South Coast and statewide emissions control strategies.

## Additional Air Quality Analyses

ARB staff conducted additional air quality analyses and also reviewed photochemical modeling for the Mojave Desert Ozone Nonattainment Area to assess whether the rate of progress historically, as well as the more modest progress in recent years, supports a 2021 attainment date.

### *Mean of the Top 30 Analysis*

The mean of the Top 30 represents the mean or average of the 30 highest daily maximum 8-hour ozone concentrations measured at a site during each year. Changes in this indicator over time reflect the change in the average ozone concentration on the 30 worst days. Because this indicator is based on a relatively large number of observations, it is more robust than other indicators, such as maximum concentration. Although the mean of the Top 30 is not directly related to the federal standard, it does provide a stable indicator that is not highly influenced by year-to-year changes in meteorology.

Figure 6 shows the trend in the mean of the Top 30 8-hour ozone concentrations for Antelope Valley. Since 1995, the mean of the Top 30 has declined 10 percent, from a concentration of 0.096 ppm in 1995 to 0.087 ppm in 2006. While there was a fairly substantial downward trend in the late 1990s, the trend line has been relatively flat since 2000.

As a way of gaining further insight into how the mean of the Top 30 has changed over time, ARB staff evaluated the rate of change, relative to the start year (1995). For this evaluation, 3-year averages of the annual mean Top 30 concentrations were normalized to the start year by calculating the ratio of the averaged Top 30 concentration for each year to the 1995 averaged Top 30 concentration. The normalized rate of progress values are plotted in Figure 7.

Overall, Lancaster has shown some progress towards lower mean Top 30 concentrations. There is a distinct change in the rate of progress from 2001 to 2002, which is the same time the Lancaster site was relocated. Since then, there has been progress, but the overall rate has been slight. Given the shape of the trend line since the site was relocated, it appears the downward trend will continue. However, given the slow rate of progress, the magnitude of emissions

reductions needed for attainment in the South Coast and San Joaquin Valley, and the timeframe for reducing these upwind emissions, it is unlikely that Antelope Valley will attain by 2010, its current deadline as a Moderate nonattainment area.

Figure 6: Mean of the Top 30 8-Hour Ozone Concentrations for Antelope Valley

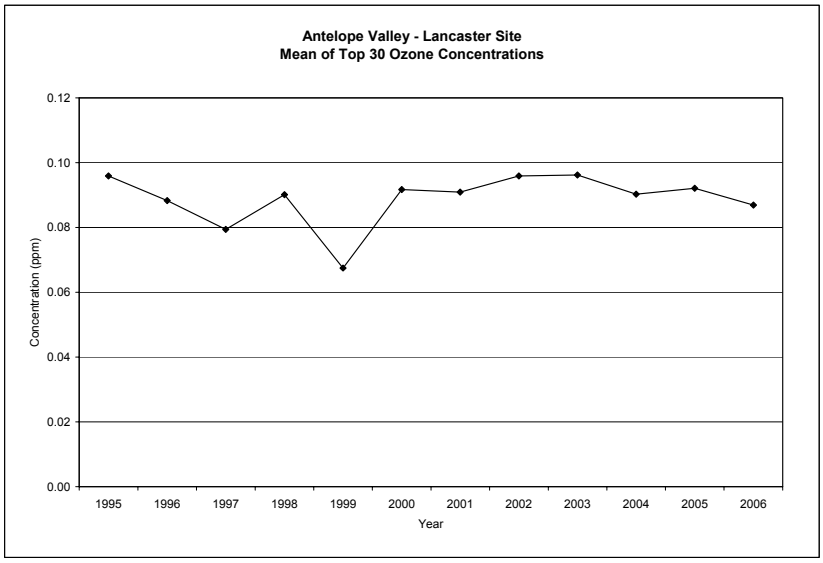
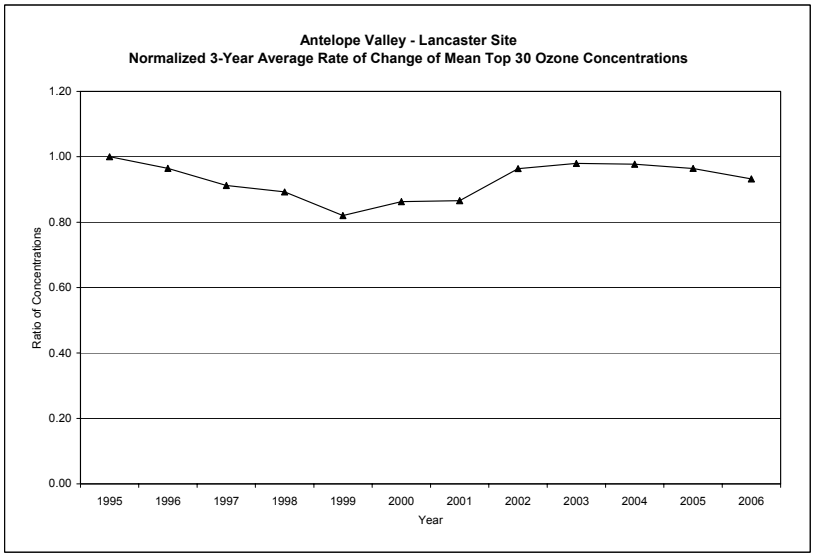



Figure 7: Mean of Top 30 8-Hour Ozone Concentrations at Lancaster Normalized to 1995 Start Year




***Modeling Evaluations and Regression Analyses***

As part of the photochemical modeling analyses, South Coast District staff evaluated the impacts of transport on attainment in the Mojave Desert Ozone Nonattainment Area. Using a gridded domain, South Coast District staff modeled several emissions reduction scenarios using two different 2005 modeling episodes. The scenarios included (1) removing emissions from the Mojave Desert Ozone Nonattainment Area; (2) removing emissions from Ventura and Santa Barbara counties; and (3) removing emissions from the South Coast. The results demonstrated that emissions from within the Mojave Desert Ozone Nonattainment Area were not sufficient to generate federal 8-hour ozone exceedances and that emissions from the South Coast have an overwhelming impact. Therefore, emissions reductions in the upwind area are critical to attainment.

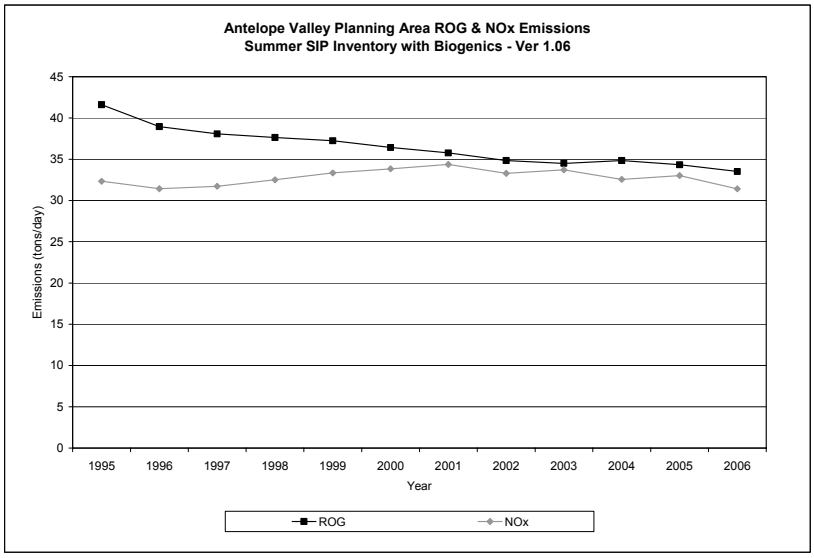
As additional analyses, ARB staff completed regression analyses of design values for the South Coast *versus* Antelope Valley, as well as the San Joaquin Valley *versus* Antelope Valley. Although there are a number of uncertainties associated with these analyses, the results suggest that the design value for Lancaster, in the Antelope Valley, will reach the level of attainment before either the South Coast or San Joaquin Valley, both of which have a 2024 attainment date. This lends further support to reclassifying, and therefore extending the attainment date for the Mojave Desert Nonattainment Area.

## Emissions Trends

In 2006, ROG emissions in the Antelope Valley were dominated by light duty passenger vehicles, petroleum marketing, degreasing, and consumer products. The main contributors of NOx emissions were off-road equipment, heavy duty diesel trucks, trains, and light duty passenger vehicles. Statewide and local emissions control measures have significantly reduced the amounts of both ROG and NOx emitted by various sources throughout California. However, emissions in Antelope Valley are overshadowed by emissions from the South Coast and San Joaquin Valley. Figure 8 shows the estimated trend in the Antelope Valley ozone precursor emissions from 1995 to 2006. The totals reflect estimates for the summer season in tons per day and include natural biogenic emissions.

ROG emissions for the Antelope Valley show a relatively steady decline over the entire period, with an overall decrease of 20 percent. In contrast, NOx emissions decreased less than 5 percent, overall. But again, the amounts of emissions generated in the Antelope Valley are dwarfed by those in the upwind areas. During 2006, South Coast ROG emissions and NOx emissions were each about 30 times greater than those for the Antelope Valley, while San Joaquin Valley ROG and NOx emissions were each about 20 times greater. Furthermore, as discussed previously, emissions and pollutants from the South Coast and San Joaquin Valley can have an overwhelming impact on ozone air quality in the Antelope Valley via transport.

Figure 8: Antelope Valley Estimated ROG and NOx Emissions 1995 to 2006




## Photochemical Modeling Results

The U.S. EPA (2005) provided criteria for calculating future year 8-hour ozone design values using air quality simulation results. Among these criteria were recommendations for air quality model performance, observed and simulated ozone concentration thresholds, and the number of simulated days used to calculate the relative response factor (RRF) used to scale reference year design values for future years. To meet these criteria, the South Coast District staff evaluated results from the simulation of six high ozone episode periods during 2004 and 2005.

Of the six episodes, the simulation results for the July 15 through 19, 2005 and the August 3 through 9, 2005 episode periods showed high concentrations and acceptable air quality model performance for ozone monitoring sites in the Mojave Desert Ozone Nonattainment Area. Therefore, subsequent analysis focused on these two periods. To evaluate future year ozone design values, the South Coast District staff simulated these episodes using emissions inventories developed for the years 2002 (the reference year for design values), 2005 (to evaluate ozone model performance), 2012, 2017 (for an attainment year of 2018), and 2020 (for an attainment year of 2021). Emissions totals were based on projections from the South Coast District's 2007 Air Quality Management Plan.

Based on the results, Phelan and Hesperia in the San Bernardino portion of the Nonattainment Area have the highest design values in 2017, but do not meet the federal 8-hour standard by then. The 2017 design value for Lancaster is predicted at 0.08 ppm, which is below the level of the standard. However, because all sites in the Nonattainment Area must have design values below the standard to be in attainment, a 2018 attainment date is not appropriate. In contrast, modeling predicted a design value

at Phelan of 0.080 ppm by the end of 2020, which does show attainment and is consistent with a June 15, 2021 attainment deadline. The predicted 2020 design value for Lancaster is 0.074 ppm. Based on the modeling analysis, all sites in the Mojave Desert Nonattainment Area show attainment by the end of 2020, as required for a Severe-17 nonattainment area and consistent with a June 15, 2021 attainment deadline.

## Summary

The Weight of Evidence package comprises a set of analyses that provide support for the attainment demonstration. Currently, the Mojave Desert Ozone Nonattainment Area is classified as Moderate with respect to the federal 8-hour ozone standard, with attainment required by 2010. Because of the transport impact of emissions and pollutants from the South Coast and San Joaquin Valley, as well as the expected timing of emissions reductions in these upwind areas, the Antelope Valley Air Quality Management District and the Mojave Desert Air Quality Management District are both requesting reclassification of their planning areas as Severe-17, with an attainment date of June 15, 2021. Based on the air quality and emissions analyses completed for the WOE assessment, attainment in the Antelope Valley portion of the planning area can be projected by 2021, based on the following factors:

- Since 1995, there has been a 55 percent decrease in exceedance days, a 10 percent decrease in design value and mean Top 30, and a 5 percent decrease in maximum concentration. Progress has slowed over the last five to six years. However, in spite of this, the ozone indicators, taken together, continue to show improvement, albeit at a slower rate over the last several years.

- The design value for Antelope Valley is now less than 15 percent above the level of the federal standard. Furthermore, since 1995, the area has achieved 50 percent of the progress needed to reach attainment.

- Transport and air quality analyses support a link between the South Coast and Antelope Valley, as well as the San Joaquin Valley and Antelope Valley, with respect to ozone air quality. ROG and NOx emissions in the upwind areas are 20 to 30 times the level of those in the Antelope Valley. Furthermore, the transport impact from the upwind areas is overwhelming on some days. Modeling analyses show that attainment in the Antelope Valley will be dependent on emissions reductions in the upwind areas.

- The South Coast, San Joaquin Valley, and statewide emissions control strategies are expected to result in massive emissions reductions over the next 15 years, with both of these areas expecting attainment by 2024. These emissions reductions will also facilitate attainment in downwind areas such as the Antelope Valley. Because ozone levels in the Antelope Valley are not as high as those in either the South Coast or San Joaquin Valley, the emissions reductions needed for attainment in the Antelope Valley are not as high. Therefore, attainment will occur earlier than 2024.

- Although there is a great deal of uncertainty in the regression analyses completed for the Antelope Valley, they do suggest that Antelope Valley will reach attainment before either the South Coast or San Joaquin Valley air basins.

- Photochemical modeling shows the Antelope Valley will not attain by 2010, but will have a design value that meets the federal standard by the end of 2017. However, because the Antelope Valley is considered with a portion of San Bernardino County as a single nonattainment area, it cannot be designated as attainment until all sites in the region meet the standard. Photochemical modeling results show that the entire Mojave Desert Ozone Nonattainment Area will attain by the end of 2020, with all sites having a design value of 0.082 ppm or less. At this time, the design value for Lancaster will be 0.074 ppm, which is well below the level of the federal standard.

Taken together, the results from all of these analyses indicate the Antelope Valley Planning Area will not attain the federal 8-hour ozone standard by 2010, the area's a current deadline as a Moderate ozone nonattainment area. However, given the recent trends, the transport impact from the South Coast and San Joaquin Valley, and the expected level and timing of emissions reductions in these upwind areas, the entire Mojave Desert Ozone Nonattainment Area can expect to reach attainment by the end of 2020, consistent with the June 15, 2021 attainment deadline for Severe-17 nonattainment areas.