

**Staff Report**  
**on**  
**Proposed Revisions to the PM2.5 and Ozone**  
**State Implementation Plans for the South Coast Air Basin**

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California Environmental Protection Agency



**Air Resources Board**

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## I. Introduction

The South Coast 2012 Air Quality Management Plan (AQMP) is a multi-pollutant strategy to improve the air quality in the South Coast. The 2012 AQMP amends the South Coast Air Quality Management District (District) State Implementation Plan (SIP) to address three health-based National Ambient Air Quality Standards (NAAQS or standards): the 24-hour PM<sub>2.5</sub> standard, the 8-hour ozone standard, and the 1-hour ozone standard.

Specifically, the 2012 AQMP:

- Demonstrates attainment of the 24-hour PM<sub>2.5</sub> standard of 35 micrograms per cubic meter (ug/m<sup>3</sup>) by 2014.
- Identifies measures and actions to fulfill 8-hour ozone SIP commitments approved by U.S. EPA to achieve emission reductions from advanced technologies.
- Demonstrates attainment of the 1-hour ozone standard by 2022.

In 2011 and 2012, the U.S. Environmental Protection Agency (U.S. EPA) approved South Coast SIP amendments for the annual average PM<sub>2.5</sub><sup>1</sup> and the 8-hour ozone<sup>2</sup> standards, respectively, see Appendices D and E. The attainment strategies were developed and adopted by the District and ARB and submitted to U.S. EPA in 2007 (2007 SIP). The approved strategies target NO<sub>x</sub> for ozone attainment, and NO<sub>x</sub>, SO<sub>x</sub> and direct PM<sub>2.5</sub> for PM<sub>2.5</sub> attainment.

The strategies in the 2007 SIP achieve most of the reductions necessary for the South Coast Air Basin to meet the 24-hour PM<sub>2.5</sub> standard by the attainment year of 2014. To achieve the additional reductions needed for attainment, the District is proposing enhanced control measures to reduce emissions from wood burning and open burning on days when high PM<sub>2.5</sub> levels are expected, in addition to reductions from char-broiler and livestock measures.

U.S. EPA has approved commitments by the District and ARB to adopt measures and achieve emission reductions needed for ozone attainment, including commitments to achieve emission reductions from advanced technologies as provided by Clean Air Act (CAA), section 182(e)(5). Technology has long been key to the State's air quality progress. The 2012 AQMP includes specific actions for the South Coast District and ARB to develop advanced technologies to achieve emission reductions through regulations, incentives, and other mechanisms to implement the federally approved commitments.

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<sup>1</sup> 76 FR 41562 (July 14, 2011)

<sup>2</sup> 77 FR 12674 (March 1, 2012)

The 2012 AQMP also includes a 1-hour ozone SIP revision with an attainment demonstration for 2022 that relies upon reductions from implementation of the 2007 8-hour ozone SIP, along with new District 8-hour ozone measures. The 1-hour ozone attainment demonstration in the 2012 AQMP includes emission reductions to be achieved through the same advanced technology measures and actions identified for the purposes of compliance with the 8-hour ozone standard.

Finally, the 2012 AQMP addresses other federal planning requirements including requirements for emissions inventories, contingency measures, transportation conformity budgets, VMT offset demonstrations, and Reasonably Available Control Measure analysis.

#### **A. South Coast PM2.5 SIP**

PM2.5 air quality in the South Coast air basin is steadily improving with attainment of both the annual and 24-hr PM2.5 standards projected by 2014. The SIP for the annual standard was approved by U.S. EPA in 2011. The 2012 AQMP includes the required attainment demonstration for the 24-hour PM2.5 standard of 35 ug/m<sup>3</sup>.

The air quality trend from 2001 through 2011 shows sharp reductions in PM2.5 concentrations over that ten-year period. The three year averages or design values, dropped from 76 ug/m<sup>3</sup> to 38 ug/m<sup>3</sup>. Without additional controls, the air quality modeling in the AQMP shows attainment by 2019. With the new SIP measures, the modeling projects that the 2014 design value will be 34.3 ug/m<sup>3</sup>, advancing the attainment date from 2019 to 2014.

All of the sites in the South Coast with the exception of Mira Loma meet the 24-hour PM2.5 standard by 2014 with the current control program. The new measures are necessary to bring this last site into attainment by 2014. The PM2.5 attainment strategy is primarily focused on directly-emitted PM2.5 and NOx reductions that can be feasibility achieved by the attainment date of 2014.

The District's new PM2.5 control measures include stationary source controls, episodic controls, technology assessments, and educational programs. The key measures will reduce directly-emitted PM2.5 are:

- enhancing the residential wood burning curtailment program;
- enhancing open burning restrictions.

The air quality modeling done for the AQMP was performed according to U.S. EPA guidelines, producing the results needed to develop the attainment demonstration. The first modeling exercise demonstrated that the region would attain the standard by 2019 with implementation of current control programs. The next step was to focus on controls that would be most effective in reducing

PM2.5 to accelerate attainment. This effort involves determining the relative value of PM2.5 precursor reductions.

The modeling done for the federally approved South Coast SIP for the annual PM2.5 standard established a set of factors to relate regional precursor per ton reductions to PM2.5 air quality improvements. The modeling for the 2012 AQMP provided a similar set of factors. Directly emitted PM2.5 reductions were the most effective, about 15 times more effective than NOx. Reductions in SOx were about eight times more effective than NOx. The contribution of ammonia emissions is imbedded as a component of the SOx and NOx factors since ammonium nitrate and ammonium sulfate are the particles formed in the atmosphere and contribute to PM2.5 concentrations. The analysis showed that reductions in VOC are the least effective per ton reduction, about one-third the benefit of NOx reductions.

Further attainment modeling was done to project a 2014 future year design value based on adopted control measures that will be implemented by 2014. The result was a predicted design value of 37.3 ug/m<sup>3</sup> which fails to meet the federal standard. New SIP measures were then developed bringing the modeled design value for 2014 to below 35.4 ug/m<sup>3</sup> which meets the federal standard.

U.S. EPA's modeling guidance recommends the use of corroborating evidence to support the SIP attainment demonstration. The weight of evidence demonstration in the AQMP includes discussions of PM2.5 levels, emission trends, and future year PM2.5 predictions. The PM2.5 trend shows about a 50 percent decrease in PM2.5 concentrations between 2001 and 2011. The rate of improvement is just under four ug/m<sup>3</sup> per year. If that trend is extended beyond 2011, the projection suggests attainment in 2013. This is corroborative evidence to support the modeling projection of attainment by 2014.

The AQMP weight of evidence discussion also shows the relationship between reductions in emissions of PM2.5 and NOx, and the downward trend in PM2.5 concentrations. Between 2002 and 2008, NOx emissions declined 31 percent and directly emitted PM2.5 was reduced 19 percent. During this same timeframe, the 24-hour average PM2.5 concentrations declined 27 percent showing the effectiveness of current control strategies.

Since the attainment demonstration need only show an attainment year concentration below 35.4 ug/m<sup>3</sup>, any measures leading to improvement in air quality beyond this level can serve to meet contingency measure requirements. The AQMP shows that with the new SIP measures, the 2014 design value is 34.28 ug/m<sup>3</sup> providing an excess air quality improvement of 1.2 ug/m<sup>3</sup> which can be used for contingency purposes.

The excess air quality improvements beyond those needed to demonstrate attainment are also expressed in terms of emission reductions. The AQMP

includes a calculation showing that a portion of the new PM<sub>2.5</sub> and NO<sub>x</sub> reductions are reserved for contingency purposes.

## **B. South Coast Ozone SIP**

Ozone air quality in the South Coast air basin is improving with attainment of both the 1-hour and 8-hour ozone standards projected by 2022 and 2023 respectively. The SIP for the 8-hour ozone standard was approved by U.S. EPA in 2011. While the 1-hour ozone standard was revoked once the more health protective 8-hour standard<sup>3</sup> was adopted, U.S. EPA recently took action to require the submittal of an attainment demonstration for the 1-hour ozone standard of 0.125 parts per million (ppm). The 2012 AQMP includes an attainment demonstration for the 1-hour ozone standard showing attainment by the deadline of 2022.

South Coast ozone air quality continues to improve, with the number of days exceeding ozone standards dramatically reduced in portions of the basin. The number of exceedances is lowest in the coastal areas, increasing towards the Riverside and San Bernardino valleys and adjacent mountain areas. The highest concentrations are also declining as emissions are reduced throughout the air basin. The central San Bernardino mountains recorded the greatest number of exceedances of ozone standards, with 8 days over the 1-hour standard and 84 days over the 8-hour standard. Peak 1-hour ozone concentrations are also much lower than a decade ago. The three-year average, or design value, used in 1-hour ozone attainment demonstration is 0.142 ppm for 2011 compared to a design value of 0.170 ppm in 2001.

The ozone portions of the 2012 AQMP share a common strategy to attain both the 1-hour and 8-hour ozone standards. The attainment deadlines are nearly aligned, with a 2022 deadline for the 1-hour standard and 2023 for the 8-hour standard. The amount of reductions needed is different, but substantial new emissions reductions are needed to meet both ozone standards in the same general timeframe.

As in previous AQMPs, the strategy to reduce ozone is a dual NO<sub>x</sub>/VOC approach. While the strategy is more heavily weighted toward reducing NO<sub>x</sub> emissions, continuing VOC reductions remain important. The emphasis on NO<sub>x</sub> reductions is two-fold, one, because the science shows that generally in the South Coast NO<sub>x</sub> reductions currently provide greater benefit to reducing ozone, and two, because NO<sub>x</sub> is also a precursor for PM<sub>2.5</sub>.

The ozone strategy in the 2012 AQMP includes near-term NO<sub>x</sub> and VOC measures that rely on currently available and feasible technologies. New District short-term measures in the AQMP include:

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<sup>3</sup> 62 FR 38856



- VOC reductions from coatings, solvents, adhesives, lubricants and fugitive emissions;
- NOx reductions from RECLAIM facilities, commercial heating and biogas Flares.

However, reductions from existing District and ARB programs, including stringent controls on diesel engines, plus these new near-term measures, are not sufficient to bring the air basin into attainment for ozone standards. The necessary reductions beyond what the near-term measures will accomplish are large, 150 tons per day (tpd) of NOx for the 1-hour ozone attainment demonstration and 241 tpd of NOx for the 8-hour ozone attainment demonstration.

The control strategy to attain both the 1-hour ozone and 8-hour ozone standards includes the approved commitment to achieve emission reductions from advanced technologies approved in the 2007 SIP. Collaborative work by District and ARB staff, led to the inclusion in the 2012 AQMP of a number of actions intended to increase the penetration of zero-emission and near zero-emission technologies into a variety of applications including:

- Passenger cars, medium-duty and heavy-duty trucks
- Off-road equipment
- Freight and passenger locomotives
- Marine vessels
- Cargo handling equipment

Implementing these actions will take the combined efforts of the District, ARB, and U.S. EPA, in cooperation with many stakeholders including the ports and regulated industries. The availability of funds to support technology development, demonstration and pilot projects and larger-scale implementation will be critical to successful implementation of the identified actions.

During development of the AQMP, U.S. EPA commented that the State needs to provide periodic reports on the efforts to achieve emission reductions from advanced technologies relied upon under CAA section 182(e)(5). In its resolution adopting the 2012 AQMP, the District Board directed staff to work with ARB to provide annual reports to U.S. EPA describing progress towards meeting Section 182(e)(5) emission reduction commitments. ARB and District staff are collaborating on activities to research, develop, and deploy advanced technologies and will include the annual report in the joint staff work effort.

## **II. Implementing the 2007 SIP Strategy**

The control strategy in the AQMP relies on reductions of NOx and VOC to meet the 1-hour and 8-hour ozone standards. PM2.5 pollution is more complex, requiring reductions in directly-emitted PM2.5 as well as the PM2.5 precursors

NO<sub>x</sub>, SO<sub>x</sub>, and VOC. Because mobile sources are the largest contributors to PM<sub>2.5</sub> and ozone-forming emissions, reducing emissions from passenger vehicles, trucks, and a variety of off-road engines is key to attaining the PM<sub>2.5</sub> and ozone standards. In developing the 2007 SIP for meeting the annual PM<sub>2.5</sub> standard by 2014 and the 8-hour standard by 2023, the biggest challenge was cleaning up the existing fleets of diesel engines. The mobile source strategy includes two distinct components – more stringent standards for new engines, and cleaning up fleets through accelerated introduction of cleaner engines or by retrofitting existing engines. This core strategy is carried forward in the 2012 SIP.

Over the past five years, ARB adopted a number of regulations aimed at reducing emissions of diesel particulate matter and oxides of nitrogen from freight transport sources like heavy-duty diesel trucks, and off-road sources like large construction equipment. Phased implementation of these regulations will produce increasing emission reduction benefits over time, as the regulated fleets are retrofitted, and as older and dirtier portions of the fleets are replaced with newer and cleaner models at an accelerated pace.

ARB's longstanding programs to reduce emissions from passenger vehicles, along with the smog check program, provide continuing benefits needed for attainment of the 24-hour PM<sub>2.5</sub> standard and both ozone standards. Implementation of the ARB 2007 State Strategy approved by U.S. EPA<sup>4</sup> is providing new reductions included in the AQMP. Since development of the 2007 State Strategy, the ARB measures listed in Table 1 have been adopted and improvements to California's smog check and vehicle retirement programs have been made.

**Table 1:  
Measures in the 2007 State Strategy**

<b>Passenger Vehicles</b>
Smog Check Improvements
Expanded Vehicle Retirement (AB 118)
Modifications to Reformulated Gasoline Program
<b>Trucks</b>
Cleaner In-Use Heavy-Duty Trucks
<b>Goods Movement Sources</b>
Auxiliary Ship Engine Cold Ironing & Other Clean Tech
Cleaner Main Ship Engines and Fuel

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<sup>4</sup> 76 FR 41562 (July 14, 2011)

Port Truck Modernization
Accelerated Intro. of Cleaner Line Haul Locomotives
Clean Up Existing Harbor Craft
<b>Off-Road Equipment</b>
Cleaner In-Use Off-Road Equipment
<b>Other Off-Road Sources</b>
Enhanced Vapor Recovery for Above-Ground Storage Tanks
Additional Evaporative Emission Standards
<b>Areawide Sources</b>
Consumer Products Program

#### A. Clean New and In-Use Heavy-Duty Trucks

The central element of ARB's 2007 State Strategy is increasingly stringent standards for new trucks as shown in the Table 2. New heavy-duty trucks sold since 2010 must emit 98 percent less NOx and PM2.5 than new trucks sold in 1986.

**Table 2:  
Phase-in of truck engine standards**

Model Year	Applicable Standard g/bhp-hr	
	NOx	PM
1986 and older	10.7	0.60
1987-2006	From 6.0 to 2.0	From 0.6 to 0.10
2007-2009	1.1	0.01
2010	0.2	0.01

However, older, higher-emitting trucks with long service lives would stay on the road for many years to come. With attainment of the PM2.5 standards required soon after the cleanest trucks were introduced, the typically slow replacement of older trucks on the road with the latest models would not provide emission reduction benefits soon enough.

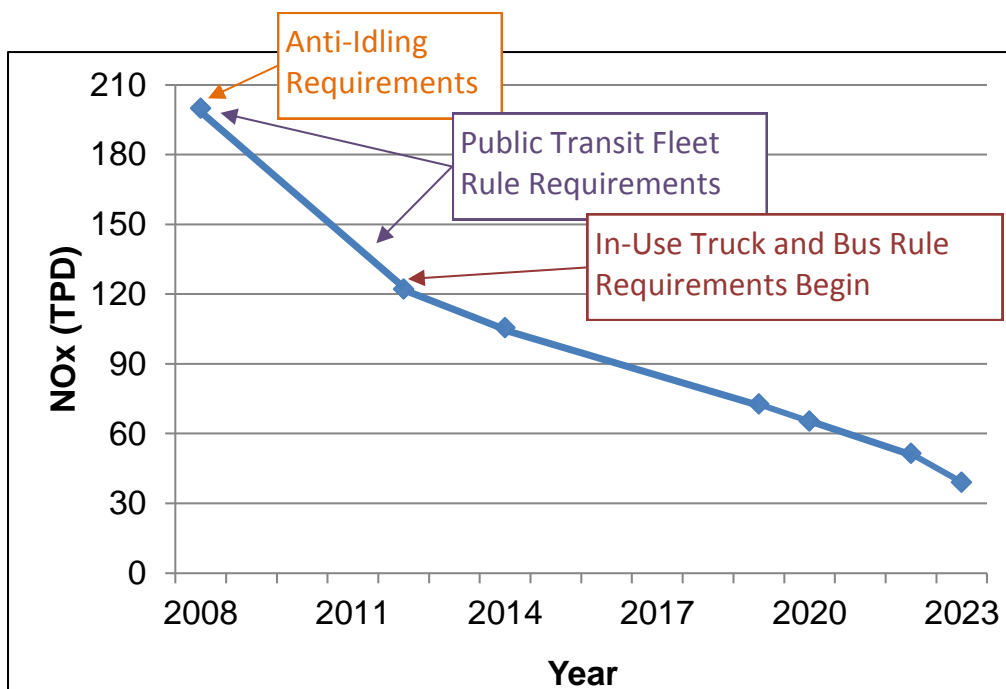
To address this, ARB developed the Cleaner In-use Heavy-duty Truck SIP measure. This measure leverages the benefits provided by new truck emission standards by accelerating introduction of the cleanest trucks. The Truck and Bus Regulation was adopted in December 2008, and amended in December 2010 to account for the reduced emissions resulting from the economic effects of the

recession. This rule represents a multi-year effort to turn over the legacy fleet of engines and replace them with the cleanest technology available.

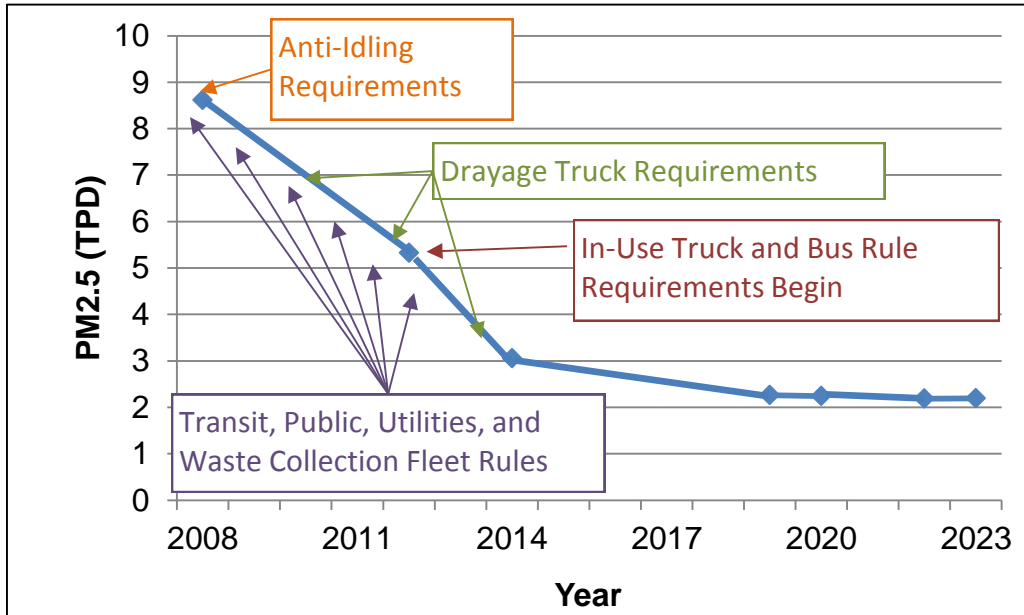
Starting in 2012, the Truck and Bus Regulation phases in requirements so that by 2023 nearly all vehicles will meet 2010 model year engine emissions levels. The regulation applies to nearly all diesel fueled trucks and buses with a gross vehicle weight rating greater than 14,000 pounds that are privately or federally owned, including on-road and off-road yard goats, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases or rents affected vehicles. The regulation also establishes requirements for any in-state or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation's potential applicability to buyers of the vehicles.

Figures 1 and 2 below portray reductions in NOx and PM2.5 emissions from in-use trucks within the South Coast, and show the benefits of ARB's mobile strategy.

**Figure 1:  
South Coast Heavy-duty Diesel Truck NOx Emissions**



**Figure 2:  
South Coast Heavy-duty Diesel Truck PM2.5 Emissions**



In addition to the Truck and Bus Regulation, separate regulations reduce emissions from other public fleets, solid waste collection trucks and transit buses. Trucks that transport marine containers must comply with the drayage truck regulation.

## **B. Cleaner In-Use Off-Road Equipment**

As with trucks, the strategy for off-road equipment is based on increasingly stringent new off-road diesel engines. As a result of these standards for new engines, new construction, mining, industrial and oil drilling equipment will become progressively cleaner. The requirements vary according to the power rating of engines. Table 3 shows the schedule for phasing in tiered requirements for new off-road engines with a power rating between 175 and 300 horsepower (hp). Beginning in 2014, new Tier 4 construction equipment with the power rating shown below must emit about 96 percent less NOx and PM than new Tier 1 equipment sold in the year 2000.

**Table 3:  
Phase-in of off-road engine standards**

Model year	Level of Control	Applicable Emission Standard for New Off-road Engines 175<hp<300 g/bhp-hr	
		NOx	PM
1996-2002	Tier 1	6.9	0.4
2003-2005	Tier 2	4.9*	0.15
2006-2010	Tier 3	3.0*	0.15
2011-2013	Tier 4 interim	1.5	0.015
2014+	Tier 4 final	0.3	0.015

\*Reflects combined limit for non-methane hydrocarbons and NOx

However, large diesel off-road equipment typically remains in use for long periods of time. As with heavy-duty trucks, this long life means that newer, lower-emitting engines would be introduced into fleets relatively slowly. The impact of this is that emission reductions and associated health benefits from these cleaner engines would also be fairly slow to materialize. To address this, the 2007 SIP included the Cleaner In-use Off-road Equipment measure.

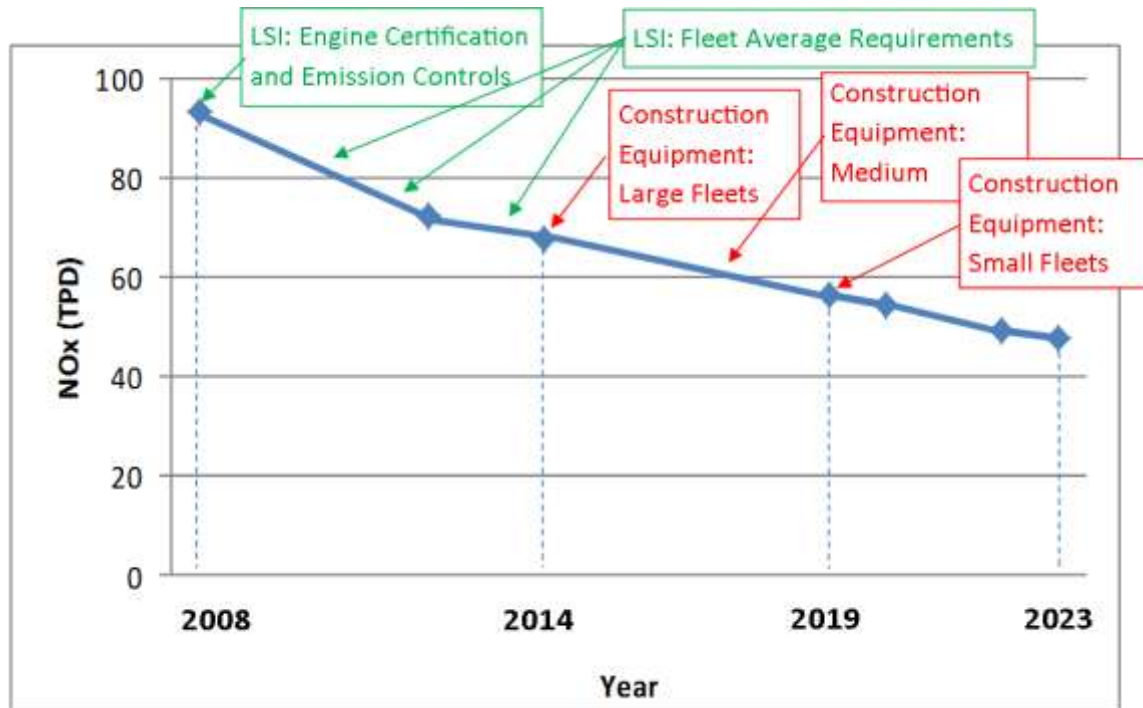
First approved in 2007, the Off-Road Regulation was amended in 2010 in light of the impacts of the economic recession. Affected off-road equipment is used in construction, manufacturing, the rental industry, road maintenance, airport ground support and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NOx from the over 150,000 in-use off-road diesel vehicles that operate in California by requiring their owners to modernize their fleets and install exhaust retrofits. The regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize their fleets by replacing older engines or vehicles with newer, cleaner models, retiring older vehicles or using them less often, or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The regulation also requires that all vehicles be reported to ARB and labeled, restricts the addition of older vehicles into fleets, and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Figure 3 below portrays reductions in NOx emissions from off-road equipment within the South Coast, and shows the benefits of ARB's mobile strategy.

**Figure 3:  
South Coast Off-Road Equipment NOx Emissions**



### C. Passenger Cars

The Board established California's Low Emission Vehicle (LEV) program in 1990, and the LEV2 program in 1998. Additionally, ARB's Zero Emission Vehicle (ZEV) regulation which affects passenger cars and light-duty trucks, has spurred movement towards commercialization of advanced clean cars and light-duty trucks. As a result, many new gasoline engines now emit at extremely low emission levels of smog forming emissions. Conventional hybrid electric vehicles have been commercialized, and the number of models offered for sale is quickly expanding. Recently, battery electric vehicles and plug-in hybrid electric vehicles have been introduced for sale, and fuel cell electric vehicles are expected to follow.

ARB's Advanced Clean Cars (ACC) Program, approved in January 2012, is a pioneering approach of a 'package' of regulations, that although separate in construction, are related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect.

The ACC program approved by ARB in January 2012 included amendments affecting the current ZEV regulation through the 2017 model year in order to enable manufacturers to successfully meet 2018 and subsequent model year requirements. The ZEV amendments for 2018 and subsequent model years in the ACC program approved by ARB in January 2012 are intended to achieve commercialization through simplifying the regulation and pushing technology to higher volume production in order to achieve cost reductions.

The ACC Program will produce increasing benefits over time as new cleaner cars enter the fleet displacing older and dirtier vehicles. In this manner, the benefits in 2023 will be realized through the cumulative reduction in emissions achieved by new cars entering the fleet in 2017 through 2023. This program will continue to provide benefits well after 2025 as vehicles meeting the new standards replace older, higher-emitting vehicles.

Many additional programs are currently in place to reduce emissions from the passenger car legacy fleets and accelerate fleet turn over. The Smog Check Program ensures that passenger vehicles stay clean as they age and on-board diagnostic systems identify smog control problems. The Smog Check Program is continuously being improved to provide additional emission reductions such as requiring stricter inspection standards and annual inspection of older vehicles. ARB is also active in encouraging consumers with older dirtier vehicles to retire them early. Replacing older dirtier vehicles with cleaner new vehicles provides permanent emission reductions.

#### **D. Reducing Emissions from Ocean-going Vessels**

Emissions from ocean-going vessels (OGV) impact coastal areas, especially densely populated regions hosting ports for international trade. The 2007 SIP relied on a suite of state, local, national, and international programs to reduce OGV emissions, which are summarized below.

The two major regulations adopted by ARB to reduce emissions from OGVs address shorepower and cleaner fuels. In December 2007, the Board adopted the OGV Shorepower Regulation. This rule reduces emissions from diesel auxiliary engines on container ships, passenger ships, and refrigerated-cargo ships while berthing at a California port.

In 2008, the Board adopted a comprehensive OGV Clean Fuel Regulation which requires vessel operators to use cleaner distillate fuels in their main engines, auxiliary engines, and auxiliary boilers within 24 nautical miles (nm) of the California coastline and islands. The regulation also includes a "Phase II" fuel standard requiring the use of 0.1 percent sulfur fuel in 2014. The use of these cleaner fuels is resulting in dramatic reductions in diesel PM and SOx emissions, as well modest reductions in NOx emissions.



Port authorities in California have also developed a number of measures for OGVs visiting their ports, which are typically implemented through incentive programs or lease agreements. The Ports of Los Angeles and Long Beach (Ports) have the most comprehensive program. In 2006, the Ports adopted the San Pedro Bay Ports Clean Air Action Plan, designed to reduce the emissions from a variety of port sources, including OGVs. The plan was updated in 2010. Currently, the Ports are working on developing the infrastructure and lease agreements to support the statewide shorepower regulation, implementing voluntary vessel speed reduction, and supporting the demonstration and deployment of advanced OGV emission control technologies. While the Ports handle most of the local programs for OGVs, the District also has rules to control VOC emissions from tankers during loading and lightering operations.

The 2007 SIP includes, as part of the U.S. EPA approved annual PM<sub>2.5</sub> and 8 hour SIPs, a “backstop” measure for sources of pollutants at the ports, MOB-03. That measure is to be implemented through district rulemaking, which would include the setting of appropriate emissions targets that would trigger implementation were those targets to be exceeded. No District rulemaking or further SIP revisions happened between 2007 and 2012 to implement MOB-03 for either the PM annual or 8-hour standards.

In the 2012 SIP, the District proposed to include a backstop measure, IND-01, that would ensure that emissions targets assumed for port-related sources, intended to help attain and maintain the 24-hour PM<sub>2.5</sub> standard, are actually achieved. Responding to concerns raised during the public AQMP development process and testimony at its December 7, 2012, meeting, the District Board did not include the proposed measure in the SIP revision. It directed the issue to an existing committee of the District Board that deals with port-related issues. As a result, there is currently no inclusion of the port backstop measure at this time for the 24-hour PM<sub>2.5</sub> SIP. The District Board is considering the adoption of IND-01 at its February meeting, and if the District Board decides to include measure IND-01 in the 24-hour PM<sub>2.5</sub> SIP, it would be forwarded to CARB at a later date for inclusion in the SIP.

### **III. Control Strategy and Attainment Demonstrations**

The control strategies and SIP measures in the 2007 SIP are carried forward in the 2012 AQMP, and included in the attainment demonstrations for the 24-hour PM<sub>2.5</sub> standard and the 1-hour ozone standard. In addition to the 2007 SIP measures, the AQMP includes several new District control measures needed for attainment of the PM<sub>2.5</sub> standard by 2014, and to make progress on the meeting the 1-hour and 8-hour ozone standards.

## A. 2007 SIP Emission Reduction Commitments

The control strategy to attain the 24-hour PM<sub>2.5</sub> standard in 2014 and the 1-hour ozone standard in 2022 rely on the U.S. EPA approved commitments for emission reductions made by ARB for sources under its regulatory authority.

U.S. EPA acknowledged in the Federal Register Notice approving the South Coast 8-hour ozone SIP that ARB made enforceable commitments to achieve aggregate emissions reductions in the South Coast for the years of 2014, 2020 and 2023. Table 4 taken from the Federal Register shows the ARB commitment reductions in those years.<sup>5</sup>

**Table 4:  
Emission Reductions (TPD) in 2014, 2020 and 2023**

Year	NOx	VOC
2014	152	46
2020	144	52
2023	141	54
2023 CAA 182(e)(5)	241	40

While the 2007 SIP strategy included estimates of the emission reductions from each of the individual new measures, the commitment in the 2007 SIP was to achieve the aggregate emission reductions identified from the existing strategy and adopted SIP. Therefore, if a particular measure does not get its expected emission reductions, the State is still committed 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 2007 SIP, the actual emission decreases may be counted toward meeting ARB's total emission reduction commitments.

In the 2012 AQMP, the District quantified reductions for 1-hour ozone attainment in 2022 from measures included in the 2007 SIP. The District calculated reductions from seven of these approved control measures (four on-road mobile source measures and three off-road measures) carried forward from the 2007 8-hour ozone SIP. The expected benefits from these seven measures in 2022 were calculated by interpolating between their expected reductions in 2020 and 2023. The quantified reductions from these measures are part of the already approved commitment for aggregate emission reductions in 2020 (see table 4) two years prior to 2022 attainment deadline. The commitment to achieve aggregate reductions is consistent with the 2007 SIP adopted in September 2007 and revised in April 2009<sup>5</sup>. While expected reductions were calculated for each measure, the enforceable commitment is for the aggregate reductions,

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<sup>5</sup> 77 FR 12674 at 12692 (March 1, 2012)

recognizing the reality that individual measures may result in more or less reductions than expected.

The 182(e)(5) advanced technology actions identified for the 1-hour ozone attainment demonstration are also proposed in the AQMP to advance commitments made in the 2007 8-hour ozone SIP.

## **B. Attainment Demonstrations for PM2.5 and Ozone**

The 2012 AQMP demonstrates attainment of the 24-hour PM2.5 standard by 2014 and the 1-hour ozone standard by 2022, the applicable deadlines for each pollutant. The 2012 AQMP attainment demonstrations for both the 24-hour PM2.5 and 1-hour ozone were conducted using photochemical dispersion and meteorological modeling tools and procedures developed according to U.S. EPA modeling guidelines. Air quality modeling is used to establish a "carrying capacity" – a combination of precursor emissions that the air basin can accommodate without exceeding the health-based standard – thus setting targets that the control strategy must meet to attain the federal standards.

The air quality modeling performed for the 2012 AQMP has undergone scientific peer review and was made available for public review. ARB and South Coast District staffs worked together on the modeling for this plan, including development of a gridded modeling inventory and meteorological and geological data inputs, model performance analysis, and validation of the attainment demonstrations.

U.S. EPA's PM2.5 modeling guidance recommends the use of corroborating evidence to support the future year attainment demonstration. The weight of evidence demonstration for the 2012 AQMP includes brief discussions of the observed 24-hour PM2.5 levels, emissions trends, and future year PM2.5 predictions. The weight of evidence discussion in Chapter 5 of the 2012 AQMP focuses on the trends of 24-hour PM2.5 and key precursor emissions to provide justification and confidence that the Basin will meet the federal standard by 2014.

No specific modeling guidance applies to the 1-hour ozone analysis since the standard has been revoked. The 1-hour ozone attainment demonstration is based on the deterministic modeling approach to directly predict future year concentrations. The alternate relative reduction factor approach, applied using a stratified or tiered approach to develop station specific projections of 2022 1-hr ozone concentrations, is used as part of the weight of evidence discussion in Section 5 of Appendix VII of the 2012 AQMP.

## **C. Actions to Achieve Reductions from Advanced Technologies**

The 2007 SIP included a commitment to achieve reductions from the use of advanced zero and near-zero emission technologies in the on-road and off-road

fleets to meet emission reductions needed for the federal ozone standard in 2023. This provision of the Act, section 182(e)(5), reflects the need for new development and deployment of new technologies in regions with the most severity ozone air quality problems.

The CAA section 182(e)(5) provision is available to areas classified as extreme, if feasible technology does not exist for areas to meet the ozone standard by the applicable deadline. In its approval of the South Coast 2007 8-hour ozone SIP, U.S. EPA stated that:

*“EPA interprets this provision to mean that the measures approved under section 182(e)(5) may include those that anticipate future technological developments as well as those that require complex analyses, decision making and coordination among a number of government agencies.”*<sup>6</sup>

The 2012 AQMP identifies actions to reduce mobile source emissions through programs to accelerate the penetration and deployment of partial zero-emission and zero-emission vehicles and to accelerate retirement of older gasoline and diesel powered vehicles. The 2012 AQMP also lays out actions for the deployment of zero and near-zero technologies for goods movement related sources, including on- and off-road vehicles and equipment, locomotives, cargo handling equipment, commercial harbor craft, OGVs, and aircraft engines. The actions implement and do not amend the existing U.S. EPA approved SIP commitment.

Specifically, these actions include:

- accelerating the penetration of on-road partial zero-emission and zero-emission light and heavy-duty electric, hybrid and other clean alternative fuel vehicles;
- accelerating the retirement of older light, medium, and heavy-duty vehicles through financial incentives;
- repowering or replacing older Tier 0 and Tier 1 off-road equipment;
- targeting emission reductions from heavy-duty vehicles serving near-dock railyards;
- reducing emissions from locomotives by accelerated use of Tier 4 locomotives for freight, the replacement of existing Tier 0 passenger locomotives with Tier 4 locomotives, and the development and deployment of zero-emission and near-zero emission technologies for locomotives;
- reducing emissions from ships, by reducing emissions from ocean-going marine vessels while at berth, initiating an incentives program for cleaner ocean-going vessels to call at the ports, demonstrating control technologies that could be deployed on commercial harbor craft, and

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<sup>6</sup> 77 FR 12674 at 12686 (March 1, 2012)

- demonstrating control technologies to further reduce emissions from ocean-going vessels;
- advancing the development and deployment of zero- and near-zero emission technologies for cargo handling equipment;
- advancing the development of retrofit technologies to further reduce emissions from older off-road equipment; and
- developing cleaner aircraft engines through the Federal Aviation Administration's Continuous Lower Energy, Emissions and Noise Program, and mechanisms to route the cleanest aircraft to serve the South Coast Air Basin.

#### **D. Consumer Products**

Under State law, ARB has regulatory responsibility for reducing VOC emissions from consumer products. Currently, ARB's Consumer Products Regulation exempts low vapor pressure (LVP) substances when determining compliance with VOC limits. During AQMP development, the District considered a measure proposing that research be done to determine if the exemption should be modified. This proposal was based on testing conducted by the District indicating that some LVP-VOCs may readily evaporate and available to participate in ozone or organic aerosol formation.

At its December 7, 2012, meeting, the District Board removed the proposed measure regarding LVP research from the AQMP. Instead, the District Board directed District staff to request that ARB undertake research to determine whether some of the exempt substances contribute to ozone and should be further controlled for ozone attainment. ARB staff has already begun to design a research effort. Potential research tasks include laboratory chamber studies to further evaluate ozone and aerosol impacts, quantification of volatilization rates under ambient conditions, and evaluation of the environmental fate of LVP-VOCs emissions.

### **IV. Other Clean Air Act Planning Requirements**

In addition to the core requirement for a control strategy and an attainment demonstration, the CAA specifies submittal of an emission inventory, contingency measures, transportation control conformity budgets, a VMT offset demonstration, and a Reasonably Available Control Measure (RACM) analysis.

#### **A. Emission Inventory**

An emission inventory consists of a systematic list of the sources of air pollutants with an estimate of amount of pollutants from each source or source category over a given period of time. The inventories used in the South Coast 2012 AQMP were developed using the most recent planning assumptions and the best

available technical information and meet the requirements of the Act following U.S. EPA guidance. The 2008 and 2014 baseline annual and summer inventories can be found in Chapter 3 of the South Coast 2012 AQMP. The 2022 baseline summer planning inventory can be found in Appendix VII of the South Coast 2012 AQMP.

ARB and District staff worked jointly over a two-year period to develop the emission inventory for the South Coast 2012 AQMP. This included efforts to ensure that the growth projections reflected the economic recession and the emissions reflected the unique nature of the 24-hour PM<sub>2.5</sub> problem. The inventory includes updated growth profile data using sector specific forecasts, new methodologies and adopted rules, along with updated on-road mobile source activity from SCAG.

## **B. Contingency Measures**

The Act requires that the SIP provide for contingency measures in the event of a failure to attain the 24-hour PM<sub>2.5</sub> or the 1-hour ozone standard by the applicable attainment date. Additionally, extreme ozone nonattainment areas relying on CAA section 182(e)(5) provisions must provide contingency reductions should associated advanced technology reductions fail to materialize. These contingency measures must be already be adopted, take effect without further ARB or air district action, not be relied upon to demonstrate attainment for the time in which they serve as contingency measures, and should contain trigger mechanisms for implementation. U.S. EPA guidance states that the contingency measure requirements can be satisfied with an already adopted control measure provided those controls will achieve emission reductions above and beyond what is needed to demonstrate attainment.

The attainment contingency measure demonstration for the 24-hour PM<sub>2.5</sub> standard is included in Chapter 6 of the 2012 AQMP and represents a sufficient margin of “about one year’s of progress” and “generally linear” progress to satisfy federal contingency measure requirements. Control Measure CMB-01 Phase I seeks to achieve an additional two tons per day of NO<sub>x</sub> emissions reductions from the RECLAIM market if the 24-hour PM<sub>2.5</sub> standard is not attained by 2014. The CMB-01 Phase I measure is scheduled for near-term adoption and includes the appropriate automatic trigger mechanism and implementation schedule consistent with CAA contingency measure requirements.

In order to rely on CAA section 182(e)(5), federal law requires that a State commit to submit no later than three years before the attainment deadline, SIP revisions containing contingency measures. The contingency measures are to be implemented should the anticipated technology measures approved under section 182(e)(5) not achieve the planned reductions. Under section 172(c)(9), the CAA also requires that a State commit to submit contingency measures three

years before the attainment deadline that would be triggered should the State fail to attain the standard on time.

As a result, in compliance with the CAA for the South Coast 8-hour SIP, ARB has made an enforceable commitment to submit, no later than 2020, contingency measures that meet the contingency requirements for both attainment and advanced technologies. For the 1-hour ozone standard with a 2022 attainment date, ARB will also submit the required contingency measures by the deadline of 2019.

### **C. Transportation Conformity Budgets**

Under section 176(c) of the Act, transportation activities that receive federal funding or approval must be fully consistent with the SIP. U.S. EPA's transportation conformity rule details requirements for establishing motor vehicle emission budgets (budgets) in SIPs for the purpose of ensuring the conformity of transportation plans and programs with the SIP.

The 2012 AQMP establishes on-road motor vehicle emission budgets and a trading mechanism for the 24-hour PM<sub>2.5</sub> standard. Emission budgets for direct PM<sub>2.5</sub> and the PM<sub>2.5</sub> precursors VOC and NO<sub>x</sub>, were calculated for the 2014 attainment year using EMFAC2011 and reflect annual average emissions. The emission budgets established in the 2012 AQMP fulfill the requirements of the Act and U.S. EPA regulations to ensure that transportation projects will not interfere with progress and attainment of the 24-hour PM<sub>2.5</sub> standard. Additional detail on the on-road motor vehicle budgets can be found in chapter 6 of the 2012 AQMP.

### **D. Ozone VMT Offset Demonstration**

The 2012 AQMP includes a VMT offset demonstration that fully addresses the CAA requirements under section 182(d)(1)(A), and is responsive to U.S. EPA guidance developed in response to a 2011 Ninth Circuit Court of Appeals ruling on this section of the Act. Appendix VIII of the 2012 AQMP demonstrates that emissions due to VMT growth are appropriately offset by transportation control strategies and transportation control measures in the attainment years of 2022 for the 1-hour ozone demonstration in the 2012 AQMP, and 2023 for the approved 8-hour ozone SIP. The 2012 AQMP also includes an additional demonstration that VMT emission reductions for the 8-hour ozone meet an alternative VMT offsets methodology proposed by U.S. EPA.

### **E. Reasonably Available Control Measures Analysis**

As specified in the Act, SIPs shall provide for the implementation of all Reasonably Available Control Measures (RACM) as expeditiously as practicable, including at minimum Reasonably Available Control Technology (RACT), and

shall provide for attainment of the standards. U.S. EPA has decided to interpret this as those measures that are technologically and economically feasible and when considered in aggregate, would advance the attainment date by at least one year.

The District RACM/RACT demonstration includes a comparison of stationary source measures the District has implemented or plans to implement with measures implemented by other agencies within and outside of the State. For the majority of stationary and area source categories, the District rules are the most stringent in California. Where necessary, the District identified for adoption by the district additional measures in the 2012 AQMP.

Based U.S. EPA guidance, the District concluded the 2012 AQMP meets the RACM/RACT requirements of the CAA, and the U.S. EPA's PM<sub>2.5</sub> Implementation Rule<sup>7</sup>. These requirements include a demonstration that no additional feasible measures could be identified that could, in aggregate, accelerate attainment by one year. The complete RACM and RACT assessment is provided in Appendix VI of the 2012 AQMP.

In addition, U.S. EPA's RACM guidelines call for an analysis of transportation control measures proposed in the plan. Consequently, the Southern California Association of Governments (SCAG) has completed a RACM determination for transportation control measures that can be found in Appendix IV-C of the 2012 AQMP.

California's comprehensive mobile source program continues to be RACM as it expands and further reduces emissions. Given the significant emission reductions needed for attainment in California, ARB has adopted the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them. These measures provide a significant amount of emission reductions needed for the South Coast Air Basin to attain the PM<sub>2.5</sub> standard.

For 1-hour the RACM demonstration, the District staff's analysis, found in Attachment 2 of Appendix VII, concluded that it has developed effective controls to meet the 1-hour ozone attainment date as expeditiously as possible.

## **F. Environmental Impacts**

The South Coast Air Quality Management District prepared a Draft Program Environmental Impact Report (Draft Program EIR) for the 2012 AQMP. The Draft Program EIR was released for a 45-day public review and comment period from September 7, 2012 to October 23, 2012. The Draft Program EIR concluded that the 2012 AQMP has the potential to generate significant adverse environmental

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<sup>7</sup> 72 FR 20586



impacts to the following environmental topic areas: construction air quality, energy (increased electricity and natural gas demand), hazards and hazardous materials, water demand, construction noise, and transportation and traffic.

Measures were identified to mitigate to the maximum extent feasible potentially significant adverse impacts to all environmental topics identified above. In spite of implementing all feasible mitigation measures, impacts to all environmental topics remained significant. In addition, the Draft Program EIR included an analysis of potentially significant adverse cumulative environmental impacts and identified and evaluated the relative merits of four project alternatives, including a No Project Alternative. The District included the comment letters received on the Draft Program EIR and written responses in Appendix G of the Final Program EIR.

At the December 7, 2012 public hearing when the District Governing Board adopted the 2012 AQMP, it also certified and adopted the Final Program EIR, and adopted a Statements of Findings and Overriding Considerations and a Mitigation Monitoring Plan.

## **V. Staff Recommendations**

ARB staff recommends that the Board:

1. Approve the South Coast Air District Air Quality Management Plan as a revision to the California SIP with attainment demonstrations for the 24-hour 35 PM<sub>2.5</sub> standard by 2014 and the 1-hour ozone standard by 2022;
2. Direct staff to work with the District staff on implementation of the actions identified in the AQMP to accelerate use of advanced technologies to fulfill the existing 182(e)(5) SIP commitments;
3. Direct staff to work with the District to staff to provide annual reports to U.S. EPA describing progress toward meeting section 182(e)(5) emission reduction commitments;
4. Direct the Executive Officer to submit the South Coast 2012 AQMP to U.S. EPA as a revision to the California SIP.