

## **4. PROPOSED NEW SIP MEASURES – Descriptions**

### **Introduction**

ARB staff is proposing a comprehensive and far reaching set of new measures to achieve emission reductions needed to address California's most challenging ozone and PM2.5 problems. These measures are designed to make maximum progress toward the federal 8-hour ozone standard in the South Coast and the San Joaquin Valley. The measures include aggressive near-term NOx and SOx emission reduction goals, reflecting the nature and scope of the PM2.5 problem in these regions. To achieve the emission reductions needed for both ozone and PM2.5, the State Strategy proposes new near-term actions that can be completed by 2010 or soon thereafter.

### **Need for Fleet Modernization**

More than any other air pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. California has dramatically tightened emission standards for new on-road and off-road mobile sources and fuels. As new engines have become cleaner and cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. For example, by 2014, heavy-duty trucks 14 years or older will produce 51 percent of total heavy-duty truck NOx emissions while only traveling 20 percent of total truck miles. The same holds true for all on-road vehicles combined, where vehicles over 14 years old will produce almost 60 percent of total NOx emissions by 2014 but just 20 percent of total miles traveled.

While California has made significant strides in reducing emissions from mobile sources as they age, the benefits of in-use control programs are limited by the underlying engine technology and controls. The majority of new measures in the State Strategy are in-use measures – programs to help clean up or replace older, dirtier vehicles and equipment. We simply cannot wait for the natural turnover of older vehicles and equipment (1-5 percent annual turnover depending on vehicle or equipment type) being replaced with newer, cleaner vehicles. The challenge is that these measures have a much more direct impact on businesses and individuals in California than do engine standards that have a more direct impact on manufacturers. ARB's fleet rules will affect owners of public and private vehicles and equipment that operate in nonattainment areas throughout the State.

Compliance flexibility has historically been included in ARB regulations – allowing the most cost-effective methods to be used by those who must meet emission requirements. And while lower-cost emission control devices will likely play an important role in lowering emissions from existing mobile fleets, a certain degree of more costly engine and vehicle replacements will be needed to lower fleet

emissions. This will place a larger financial burden on owners of vehicles and equipment, so the appropriate role of incentive funds will be an issue. It will be important to prioritize the use of any incentive funds in a way that generates maximum emission reductions and health protection benefits, while helping to reduce the burden for those most in need of financial assistance. It is also important to recognize that public funds can pay for only a relatively small portion of the cost for necessary modernization of California's diesel engine fleets.

The nature of the proposed new measures (enforceable rules) and California's history of supportive financial incentives provide a sound basis for reductions from incentive programs to meet federal requirements for SIP approval.

### **Accountability for Emission Reductions**

California's SIP must outline the plan for meeting air quality standards in all of its nonattainment areas. When ARB staff proposes its SIP State Strategy for Board approval, it will include an enforceable commitment to achieve the overall goals set. The details of each new measure are publicly considered during separate formal rulemaking processes. If a particular measure does not ultimately achieve the emission reductions estimated in the SIP, the State is still bound to achieve the total aggregate emission reduction commitment, whether this is realized through additional reductions from other new measures, or from alternative control measures or incentive programs.

### **Summary of Proposed New SIP Measures**

#### **ON-ROAD SOURCES**

#### **Passenger Vehicles**

#### **Improvements and Enhancements to California's Smog Check Program**

**Low Pressure Evaporative Test.** Require low pressure evaporative system testing and repair of evaporative system leaks for all vehicles subject to Smog Check inspection.

**More Stringent Cutpoints.** Set more stringent pass/fail cutpoints to ensure more cars would have more complete and durable repairs.

**Annual Inspections for Older Vehicles.** Inspect older vehicles annually rather than every two years. Older vehicles tend to have greater deterioration of emission controls, and consequently, higher emissions.

**Annual Inspections for High Annual Mileage Vehicles.** Inspect annually, rather than every two years, vehicles that accrue very high mileage on an annual basis. High mileage vehicles tend to have greater deterioration of emission controls and, consequently, higher emissions.

**Add Visible Smoke Test.** As part of the Smog Check test, include a check for visible smoke to identify vehicles with excess particulate matter (PM) emissions.

**Inspection of Light- and Medium-Duty Diesels.** Include light- and medium-duty diesel vehicles in the Smog Check program to provide for improved maintenance and reduced emissions for this part of the fleet, and require the repair of poorly maintained or old emission systems.

**Inspection of Motorcycles.** Include motorcycle inspections as part of Smog Check. Studies indicate that motorcycles are subject to high rates of exhaust system tampering.

**Expanded Passenger Vehicle Retirement.** Increase the number of vehicles that are voluntarily retired by implementing a scrappage program for vehicles that are off-cycle from their Smog Check inspections.

**Modifications to Reformulated Gasoline Program.** Modify California's Reformulated Gasoline Program to offset ROG emissions due to the increased use of ethanol. This rulemaking activity is currently underway and is intended to fully mitigate the emission increase, which has been incorporated in the current emissions inventory.

## **Trucks**

**Cleaner In-Use Heavy-Duty Trucks.** This proposed measure is a comprehensive in-use diesel truck emissions reduction program that includes a fleet modernization rule and an enhanced screening and repair program. Fleet modernization would focus on overcoming the typically slow rate of heavy-duty truck turnover by requiring truck owners to meet specified emission levels through replacing or cleaning up the oldest trucks in their fleets, and would also include a program for out-of-state trucks. ARB's roadside heavy-duty vehicle inspection program would be expanded to more effectively identify and screen trucks that need emission control system repairs.

## **GOODS MOVEMENT SOURCES**

**Auxiliary Ship Engine Cold Ironing and Other Clean Technology.** Reduce emissions from ships at berth with at-dock technologies such as cold ironing (electrical power) and other clean technologies.

**Cleaner Main Ship Engines and Fuel.** Further reduce emissions from main engines through added retrofits such as selected catalytic reduction. Support efforts by ports and appropriate local entities to accelerate use of cleaner ships and rebuilt engines through other tools such as lease restrictions. Require ships

to use low sulfur diesel fuel in main engines when operating within 24 nautical miles of shore.

**Port Truck Modernization.** Retrofit or replace older heavy-duty diesel trucks that service ports. Work with port authorities to prevent adding older trucks to the fleet. ARB rulemaking process for this proposed measure has begun.

**Accelerated Introduction of Cleaner Line-Haul Locomotives.** Replace existing locomotive engines with cleaner Tier 3 engines beginning in 2012 and conduct concurrent rebuilds of older engines to Tier 2.5 standards. This measure can only occur if U.S. EPA adopts Tier 3 engines standards for locomotives.

**Clean Up Existing Commercial Harbor Craft.** Require owners of existing commercial harbor craft to replace old engines (both propulsion and auxiliary) with newer cleaner engines and/or add emission control technologies that clean up engine exhaust. ARB rulemaking for this proposed measure is underway.

## **OFF-ROAD SOURCES**

### **Construction and Other Equipment**

**Cleaner In-Use Off-Road Equipment.** Establish fleet average emission limits for off-road equipment (over 25 horsepower) that would require older, dirtier engines to be replaced with engines reflecting current technologies or retrofitted with emission control devices. ARB rulemaking for this proposed measure is in process.

### **Agricultural Equipment**

**Agricultural Equipment Fleet Modernization.** Accelerate the modernization of the fleet of agricultural equipment used in California, removing older, dirtier equipment from service to be replaced with engines reflecting cleaner technologies.

### **Evaporative and Exhaust Strategies**

**New Emission Standards for Recreational Boats.** Adopt catalyst-based standards (5 g/kW-hr) for new outboard engines and evaporative emission standards to address all sources of recreational boat evaporative emissions.

**Off-Road Recreational Vehicle Expanded Emission Standards.** Adopt exhaust and evaporative emission standards to reduce the amount of ROG from off-highway motorcycles and all-terrain vehicles.

**Portable Outboard Marine Tank Evaporative Standards.** Set evaporative standards for removable fuel tanks used on outboard recreational boats.

**Refueling Gasoline Tank Evaporative Standards.** Set evaporative standards for refueling gasoline tanks typically mounted on pickups and large recreational vehicles and used to refuel equipment and other smaller vehicles.

**Gas Station Refueling Hose Evaporative Standards.** Set evaporative standards for gas station pump hoses.

**Enhanced Vapor Recovery for Above Ground Storage Tanks.** Implement an enhanced vapor recovery certification process and new performance standards and specifications for large fuel tanks used extensively in agricultural operations.

## **AREAWIDE SOURCES**

### **Consumer Products**

**Tighten Standards.** Tighten standards or require product reformulation for consumer products categories through several rulemakings through 2010.

### **Pesticides**

**New Pesticide Strategies.** The California Department of Pesticide Regulation will further reduce emissions from commercial and agricultural pesticide use in California through reformulation, reduced usage, and innovative technologies and practices.

## **Improvements and Enhancements to California's Smog Check Program**

California's passenger vehicle emissions standards have been extremely effective -- a new 2005 car was 97 percent cleaner than a new 1980 car. In order to reduce the emissions necessary to reach air quality goals, however, the focus must shift to keeping vehicles clean over their lifetimes. The Smog Check program is the cornerstone of this effort, keeping over 400 tons of smog-forming emissions from entering the air each day.

The State Strategy envisions an even stronger Smog Check program, adding tests that will reduce excess emissions and including vehicle types that are now exempt to better ensure that all passenger vehicles in California keep running clean. Staff has estimated that adding the following tests to Smog Check will reduce ROG and NOx emissions from passenger vehicles 10 percent in 2014. This equates to reducing 11 tons per day of ROG and 13 tons per day of NOx in the South Coast in 2014.

### **Low Pressure Evaporative Test**

Over half of smog-forming emissions from 1976 through 1995 cars comes from fuel evaporating from leaks in the fuel system. A functional check of the gas cap is currently included in Smog Check, but not a check of the vehicle's fuel tank and vapor lines, which play an important part in controlling evaporative emissions. This measure would add a low pressure evaporative test to Smog Check to examine for leaks in the fuel tank and vapor lines.

### **More Stringent Cutpoints**

One approach to getting more complete repairs and lower emissions is to increase the stringency of the inspection standards (cutpoints) used to determine if the vehicle initially passes or fails. This measure would set more stringent cutpoints which would ensure more cars would have more complete and durable repairs.

### **Annual Inspections for Older Vehicles**

Vehicles that are 15 years or older have a failure rate that is more than twice the average. This measure would require older vehicles to be tested annually which would shorten the time that they are emitting excess emissions prior to being repaired.

### **Annual Inspections for High Annual Mileage Vehicles**

About 3 percent of cars are driven over 25,000 miles per year. These vehicles fail Smog Check at about twice the average rate. This measure would require high-mileage vehicles to be tested annually which would shorten the time that they are emitting excess emissions prior to being repaired.

**Add Visible Smoke Test.**

Excess soot from smoking passenger vehicles is estimated at about one and a half tons per day statewide and is a public health concern. An inspection for excessive smoke is currently not part of the Smog Check program, but soon will be due to newly enacted legislation (AB 1870, Lieber, Chapter 761 of 2006) that establishes visible smoke as a cause for Smog Check failure.

**Inspection of Light- and Medium-Duty Diesels.**

There are over 200,000 diesel passenger cars and trucks in California. While diesel vehicles have low ROG emissions, they emit higher levels of NOx and particulate matter than gasoline vehicles. Diesel vehicles, however, are not currently required to take part in the Smog Check program. This measure would develop a Smog Check inspection program for diesel passenger cars and trucks that would allow identification and repair of high emitting diesel vehicles.

**Inspection of Motorcycles.**

There are about 400,000 motorcycles registered in California. They are currently exempt from Smog Check. While motorcycles do not have a high rate of emission control deterioration, surveys indicate a high level of exhaust system tampering. This measure would require some form of motorcycle Smog Check inspections to help reduce excess motorcycle emissions.

## Estimated Emission Reductions

### South Coast

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	245	138	109	98
	Emission reductions:				
	Low Pressure Evaporative Test		4.1	3.2	2.2
	More Stringent Cutpoints		0.8	0.6	0.6
	Annual Inspect Older Vehicles		3.1	2.5	2.3
	Annual Inspection for High Annual Mileage Vehicles		0.5	0.4	0.4
	Inspection of Motorcycles		2.0	2.0	2.0
	<b>Total potential reductions</b>			<b>10.5</b>	<b>8.7</b>
<b>NOx</b>	Baseline emissions	243	128	88	74
	More Stringent Cutpoints		2.0	1.4	1.1
	Annual Inspect Older Vehicles		7.2	4.9	4.2
	Annual Inspection for High Annual Mileage Vehicles		1.6	1.1	0.9
	Inspection of Light- and Medium-Duty Diesels		0.6	0.3	0.1
	Inspection of Motorcycles		0.6	0.6	0.6
	<b>Total potential reductions</b>			<b>12.0</b>	<b>8.3</b>
<b>PM2.5</b>	Baseline emissions	6.2	7.8	9.0	9.4
	Add Visible Smoke Test		0.2	0.2	0.2
	Inspection of Light- and Medium-Duty Diesels		0.02	0.01	< 0.01
	<b>Total potential reductions</b>			<b>0.2</b>	<b>0.2</b>



### San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	77	48	36	34
	Low Pressure Evaporative Test		0.8	0.6	0.4
	More Stringent Cutpoints		0.2	0.2	0.2
	Annual Inspect Older Vehicles		0.7	0.5	0.5
	Annual Inspection for High Annual Mileage Vehicles		0.2	0.1	0.1
	Inspection of Motorcycles		1.0	1.0	1.0
	<b>Total potential reductions</b>			<b>2.9</b>	<b>2.2</b>
NOx	Baseline emissions	68	40	28	24
	More Stringent Cutpoints		0.4	0.3	0.2
	Annual Inspect Older Vehicles		1.5	1.1	0.9
	Annual Inspection for High Annual Mileage Vehicles		0.8	0.5	0.5
	Inspection of Light- and Medium-Duty Diesels		0.3	0.2	0.2
	Inspection of Motorcycles		0.3	0.3	0.3
	<b>Total potential reductions</b>			<b>3.3</b>	<b>2.4</b>
PM2.5	Baseline emissions	1.4	1.8	2.1	2.4
	Add Visible Smoke Test		0.05	0.05	0.05
	Inspection of Light- and Medium-Duty Diesels		< 0.01	< 0.01	< 0.01
	<b>Total potential reductions</b>			<b>0.05</b>	<b>0.05</b>

Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004 and emission reductions from the Carl Moyer Program.

Baseline emissions are for all light- and medium-duty passenger cars, SUVs and trucks, and all gasoline heavy-duty trucks. Reductions have been estimated in the following manner:

Low Pressure Evaporative Test—ARB staff has estimated the potential emission reductions from the low pressure test using before and after repair data collected by ARB and U.S. EPA.

More Stringent Cutpoints—The reductions are based on more stringent initial inspection standards (cutpoints), taken from a study by Sierra Research using failure rate data collected from the California, Arizona, and Wisconsin inspection programs.

Annual Inspections for Older Vehicles—Staff used the EMFAC emissions model to estimate the emissions reductions of an annual inspection compared to biennial inspection.

Annual Inspections for High Annual Mileage Vehicles—The estimated reductions from 20,000 taxicabs were ratioed to the assumed 3 percent of the enhanced program area fleet driven high mileage. We assumed that one-half of the 3 percent of the fleet that are high annual mileage vehicles would be identified as accruing high annual mileage, tested annually, and repaired, resulting in emission reductions.

Visible Smoke Test—Based on a study by Eastern Research Group, we have estimated that approximately 200,000 smoking gasoline vehicles are driven daily statewide. We are assuming that half of these vehicles would fail the current tailpipe test in Smog Check. We have estimated benefits for the visible smoke test by assuming it would fail 100,000 vehicles per biennial cycle, which equals 50,000 failures per year. Reductions statewide are based on repairing 50,000 vehicles driving 30 miles per day with a 0.25 gram/mile total PM reduction.

Inspection of Motorcycles—Benefits are based on an inspection program less stringent than the current program for gasoline cars and trucks. We are assuming a motorcycle inspection program would get half of the percent reduction in emissions that the current enhanced Smog Check program is achieving.

## **Timing**

Action: 2007-2008

Expected Implementation: 2010

## Expanded Passenger Vehicle Retirement

The bulk of emissions from passenger vehicles comes from older vehicles. The Smog Check program helps older California cars run cleaner. To meet clean air goals, however, we need to reduce emissions from these older vehicles even more. Owners of vehicles that fail Smog Check inspections are currently given the option of fixing their vehicles or receiving a monetary incentive for voluntarily retiring them. This measure would expand the Smog Check vehicle retirement program to vehicles that are off-cycle from their Smog Check inspections.

It is estimated that the vehicle retirement program could increase its scope from the current 18,000 vehicles per year statewide to approximately 50,000 per year in the South Coast and 10,000 per year in the San Joaquin Valley, which reflects retiring about half of one percent of vehicles subject to Smog Check in each region. The annual retirement of these vehicles in the South Coast and San Joaquin Valley would result in combined ROG and NOx emissions benefits of 2 percent of passenger vehicle emissions in 2014.

Funding for vehicle retirement at both State and local program levels comes from fees on newer cars exempt from Smog Check. Increasing the scope of the program would require additional State or local funding.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	206	112	86	76
	Potential reductions		<b>2.8</b>	<b>1.2</b>	<b>0.5</b>
<b>NOx</b>	Baseline emissions	204	101	65	53
	Potential reductions		<b>2.4</b>	<b>1.3</b>	<b>0.2</b>
<b>PM2.5</b>	Baseline emissions	9.4	7.7	8.6	9.0
	Potential reductions		<b>0.05</b>	<b>0.06</b>	<b>0.06</b>

#### San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	62	37	27	24
	Potential reductions		<b>0.7</b>	<b>0.3</b>	<b>0.1</b>
<b>NOx</b>	Baseline emissions	58	31	19	16
	Potential reductions		<b>0.5</b>	<b>0.3</b>	<b>0.04</b>
<b>PM2.5</b>	Baseline emissions	2.1	1.8	2.0	2.2
	Potential reductions		<b>0.01</b>	<b>0.01</b>	<b>0.01</b>

Baseline emissions include emissions from light- and medium-duty passenger cars, trucks and sport utility vehicles. Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The

adjustments include emission reductions from the Carl Moyer Program and criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004.

Emission reductions were estimated assuming a 3-year credit life and that, on average, 16-year-old vehicles will be replaced with 8-year-old vehicles.

### **Timing**

Action: By 2010

Expected Implementation: By 2010

## Modifications to Reformulated Gasoline Program

Gasoline fuel combustion is the major source of energy for passenger transportation. Since 1992, ARB has worked to ensure the use of cleaner burning gasoline to improve air quality throughout the state. One of the many components of the most recent gasoline reformulation program, CaRFG3, was the removal of the oxygenate MTBE due to concerns with groundwater contamination. However, the substitute oxygenate, ethanol, has resulted in greatly increased evaporative emissions due to fuel system permeation.

This proposed measure would make modifications to the CaRFG3 program to eliminate or offset all ethanol permeation effects. The effects on ROG emissions from all gasoline-fueled on-road vehicles are estimated to be a 3 percent increase in the South Coast and a 6 percent increase in the San Joaquin Valley. The effects are greater in the San Joaquin Valley due to much higher overall temperatures that affect permeation.

ARB is scheduled to consider modifications to the CaRFG3 program in 2007.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	245	138	109	97
	Potential reductions		<b>4.4</b>	<b>3.0</b>	<b>2.5</b>

#### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	77	48	36	34
	Potential reductions		<b>2.9</b>	<b>1.6</b>	<b>1.3</b>

Baseline emissions are the emissions from all gasoline-fueled on-road vehicles. The estimated reductions are the incremental ROG emissions resulting from ethanol permeation which will be offset by this measure.

### Timing

Action: 2007

Expected Implementation: 2008

## Cleaner In-Use Heavy-Duty Trucks

Federal and State engine standards will ensure that by 2010 all new diesel heavy-duty trucks are 90 percent cleaner than new 2006 trucks. This tremendous progress is on top of a 65 percent reduction in NOx and an 85 percent reduction in particulate matter since 1990. Since trucks last a long time, we must bring newer trucks into the fleet at a faster pace, clean up older dirtier trucks, and keep the clean trucks clean longer to help meet clean air goals.

This proposed measure is a comprehensive in-use diesel truck emission reduction program estimated to reduce heavy-duty truck NOx emissions 33 percent in the South Coast and San Joaquin Valley by 2014. The measure would accomplish these reductions through a fleet modernization rule and an enhanced screening and repair program.

### Fleet modernization

Newer heavy-duty trucks are typically used in long-haul service. After seven or eight years, they are often sold and their service is typically shifted to shorter-haul work. These trucks may remain in service within a given region for another twenty years or more.

A truck fleet modernization measure would focus on overcoming the typically slow rate of heavy-duty truck turnover. The most comprehensive way to accomplish this would be through an in-use fleet rule that would require truck owners to meet specified emission levels and could further target putting new and/or cleaner trucks into regional service within specific nonattainment areas. The proposed measure would also tackle reducing emissions from trucks registered outside of California. While these trucks are typically newer and cleaner, we estimate that they contribute about 25 percent of statewide truck miles on a daily basis. The emission reduction impact of the proposed fleet modernization program would be equivalent to replacing by 2014 approximately 30 percent of the oldest trucks with 2010 models year or newer trucks.

ARB staff has recently begun informational workshops on an in-use heavy-duty truck fleet rule and has started to identify and explore the many emissions inventory, technology, financial, and logistical issues involved in crafting the most effective rule possible. ARB staff will be studying and requesting feedback from stakeholders on many issues, including: the characteristics of trucks registered outside of California; cost implications, especially to truck owner-operators, and ways to avoid any competitive disadvantage for various categories of truck owners; and the most efficient use of limited public incentive funds to achieve maximum emission benefits and lessen financial burden on truck owners.

## Excess Emissions Program

An estimate of deterioration of emission controls has historically been built into ARB's projections of future emissions. As new engine technologies are introduced over the next few years, we need to ensure that the complex engine electronics and control devices used to make trucks so much cleaner are not more prone to failure, and deterioration does not reduce some of the benefits of the new standards. It is estimated that about 30 percent of all truck emissions in 2014 will be from control device deterioration, lack of maintenance, and tampering. So, there is a big need for a program to keep these ultra-clean trucks running cleaner longer. The proposed concept needs to be developed into a proposed measure as we develop more data.

Under an existing program, heavy-duty trucks are inspected at random roadside locations to ensure they have the appropriate emission control labels, are tested for excessive smoke, and are inspected for tampered emission control systems. Owners of vehicles that do not pass these inspections are issued citations that require prompt repairs and carry civil penalties. This measure could include an expansion of this program.

While the design and evaluation of the specific program features has yet to be determined, ARB staff estimates that this concept might reduce NOx deterioration emissions by approximately 40 percent by 2014.

## **Estimated Emission Reductions**

### **South Coast**

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	16	10	7	6
	Potential reductions		<b>5.1</b>	<b>2.6</b>	<b>1.7</b>
<b>NOx</b>	Baseline emissions	238	131	79	65
	Potential reductions		<b>47.3</b>	<b>26.9</b>	<b>18.3</b>
<b>PM2.5</b>	Baseline emissions	10.2	5.3	3.3	2.8
	Potential reductions		<b>3.0</b>	<b>1.5</b>	<b>1.0</b>

### **San Joaquin Valley**

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	20	13	9	8
	Potential reductions		<b>6.4</b>	<b>3.3</b>	<b>2.3</b>
<b>NOx</b>	Baseline emissions	277	150	88	72
	Potential reductions		<b>61.4</b>	<b>30.2</b>	<b>21.2</b>
<b>PM2.5</b>	Baseline emissions	11.4	5.5	3.2	2.6
	Potential reductions		<b>3.6</b>	<b>1.6</b>	<b>1.2</b>

Baseline emissions represent emissions from diesel-fueled medium- and heavy heavy-duty trucks. (Note: Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include sleeper truck idling restrictions, diesel engine software upgrade, and emission reductions from the Carl Moyer Program.)

Reductions have been estimated in the following manner:

Emission reductions for fleet modernization were estimated assuming replacement of 30 percent of the oldest, pre-2010 trucks with 2010 model year or newer trucks by 2014. Estimates consider out-of-state truck fleets that are on average newer than in-state fleets. Emission reductions for the excess emissions program were calculated as 50 percent of anticipated deterioration emissions from medium- and heavy heavy-duty diesel trucks.

### **Timing**

Action: 2007-2008

Expected Implementation: 2010-2014



## **Ships**

### **Auxiliary Engine Cold Ironing and Other Clean Technology Cleaner Main Engines and Fuel**

Ships bring the majority of internationally traded goods to California. Due to the international nature of goods movement, marine vessels are subject to international and national standards set by the International Maritime Organization and U.S. EPA. However, ships are historically a largely unregulated sector. In 2006, ship emissions ranked as the largest contributor to SO<sub>x</sub> emissions, fifth largest contributor to NO<sub>x</sub> emissions, and seventh largest contributor to directly emitted PM<sub>2.5</sub> in the South Coast. With the predicted quadrupling of goods movement through California by 2020 (especially through the Ports of Los Angeles and Long Beach), emissions from ships are expected to increase significantly.

In April 2006, ARB adopted the Emission Reduction Plan for Ports and Goods Movement in California. The plan calls for aggressive measures to reduce emissions from ships and other port-related sources, and ARB has already begun working toward meeting the goals in the goods movement plan. In December 2005, ARB adopted an Auxiliary Engine Fuel Rule that will phase in cleaner low-sulfur fuel from 2007 to 2010. This rule will reduce SO<sub>x</sub> emissions from auxiliary engines by 96 percent, PM emissions by 83 percent, and NO<sub>x</sub> emissions by 6 percent beginning in 2010.

The proposed measures outlined below will continue to work toward the goals outlined in the goods movement plan to considerably reduce ship emissions. Marine fuel standards, cold ironing (port electrification), vessel speed reduction, and retrofitted diesel engines will ensure cleaner air around ports and reduced regional emissions. These measures are split by the type of engine used on a ship. Typically, ships use auxiliary engines while they are docked at the port or to run lights and other amenities while they are transiting. Main engines and boilers are used when ships are maneuvering within port waters or transiting throughout open waters.

#### **Auxiliary Engine Measures**

In addition to the Auxiliary Engine Fuel Rule, a new proposed measure for reducing auxiliary engines emissions is at-dock modifications including cold ironing and other advanced pollution reduction systems such as the “hood”. Cold ironing allows ships to turn off their auxiliary engines and instead plug into an electrical system for power when they are docked at the port. This is extremely beneficial to surrounding communities as it reduces exposure to multiple pollutants. The “hood” is a device that fits onto a ship’s exhaust stack and cleans the emissions. This measure would phase in the number of ships that will be capable of using cold ironing and technologies such as the “hood”. A combination of cold ironing and other at-dock technologies would reduce SO<sub>x</sub>

emissions by 54 percent in 2014 and 72 percent in 2023 and both NOx and PM emissions by 65 percent in 2014 and 82 percent in 2023.

### **Main Engine and Boilers**

A Main Engine Fuel Rule, patterned after the Auxiliary Engine Fuel Rule, would help reduce emissions by introducing a cleaner, low-sulfur fuel beginning no later than 2010. This proposed rule would apply to ships using their main engine while maneuvering and transiting near the California coast and would reduce SOx emissions by 96 percent, PM emissions by 83 percent, and NOx emissions by 6 percent no later than 2010.

A highly effective measure to reduce main engine emissions would be to increase the use of cleaner new engines or retrofitted engines. The measure could be implemented via regulation, incentives, voluntary agreements, or a combination of these approaches. By 2014, ships visiting California ports would have either new engines or a mix of retrofit technology (e.g., technology similar to a catalytic converter on a passenger car) that would achieve an overall reduction of NOx and PM of 30 percent. In 2023, ships visiting California would be equipped with an even cleaner technology mix, resulting in a 70 percent reduction of NOx, 50 percent reduction of PM, and 40 percent reduction of SOx.

Vessel Speed Reduction (VSR) is an additional measure that would reduce main engine ship emissions. Presently, ships entering the Ports of Los Angeles and Long Beach have voluntarily agreed to reduce their speed to 12 knots within 24 nautical miles of the ports. It is estimated that there is a 48 percent compliance rate associated with this voluntary measure. In order to further reduce main engine emissions, ARB would require ships to reduce their speeds to 12 knots within 40 nautical miles of the Ports of Los Angeles and Long Beach. The efficacy of the VSR program in reducing emissions changes over time as the vessel speeds are a function of the vessel type. It is estimated that ships will get larger and therefore, their speeds will change. VSR is 30-35 percent effective in reducing SOx emissions, 40-50 percent effective in reducing PM2.5 emissions, and 35-50 percent effective in reducing NOx emissions over time.

## Estimated Emission Reductions

(tons per day ship emissions 0-100 nautical miles from the California coast)

### South Coast (Auxiliary Engines)\*

	(tons per day)	2006	2014	2020	2023
<b>SOx</b>	Baseline emissions	17.2	1.1	1.5	1.8
	Potential reductions	<b>0.0</b>	<b>0.4</b>	<b>0.7</b>	<b>0.7</b>
<b>NOx</b>	Baseline emissions	26.6	37.2	48.7	56.3
	Potential reductions	<b>0.0</b>	<b>18.5</b>	<b>28.3</b>	<b>30.8</b>
<b>PM2.5</b>	Baseline emissions	2.2	0.6	0.8	0.9
	Potential reductions	<b>0.0</b>	<b>0.3</b>	<b>0.4</b>	<b>0.5</b>

\*The ARB 2005 Auxiliary Engine Fuel Rule emission reductions are accounted for in the baseline.

### South Coast (Main Engines and Boilers)

	(tons per day)	2006	2014	2020	2023
<b>SOx</b>	Baseline emissions	14.7	20.7	26.3	29.7
	Potential reductions	<b>0.0</b>	<b>19.7</b>	<b>25.4</b>	<b>28.8</b>
<b>NOx</b>	Baseline emissions	24.4	33.4	41.4	46.3
	Potential reductions	<b>0.0</b>	<b>20.0</b>	<b>32.3</b>	<b>39.9</b>
<b>PM2.5</b>	Baseline emissions	1.8	2.6	3.3	3.7
	Potential reductions	<b>0.0</b>	<b>2.4</b>	<b>3.1</b>	<b>3.6</b>

Since the control measures apply to the same source, the control percentages were applied sequentially to calculate total reductions.

### Timing

#### *Main Engine Fuel ATCM*

Action: 2007

Expected Implementation: No later than 2010.

#### *Cold Ironing*

Action: 2007

Expected Implementation: Starting in 2010 – 10 percent by 2010, 60 percent by 2014, and 80 percent by 2020.

#### *Cleaner Engines (New and Retrofits)*

Action: 2009

Expected Implementation: Phase-in starting in 2010.

## Port Truck Modernization

Trucks serving California ports are a vital part of the goods movement system. Trucks transfer incoming cargo containers from the ports to intermodal distribution centers for transport via long-haul rail or truck to their ultimate destination in California or throughout the U.S. Trucks also carry agricultural products from the Central Valley and other farming regions, and exports, to the ports for shipment overseas. Port-related truck activity is growing. The number of containers carried by truck to and from the Ports of Los Angeles and Long Beach, for example, is expected to grow by a factor of 2.5 within twenty years. Because trucks in port service tend to be older and dirtier than the truck fleet as a whole, it is important that the impact of these vehicles be mitigated more quickly to address community health issues and to meet air quality goals.

This proposed measure would reduce NOx and diesel PM2.5 emissions from the existing port truck fleet, as well as additional trucks entering port service. The basis for this strategy closely follows the goals outlined in the Emission Reduction Plan for Ports and Goods Movement in California (April 2006). Rulemaking is currently in progress for the port truck modernization rule, which would take place in two phases.

In the first phase, by 2011, trucks in regular port service that are model year 1993 and older would be replaced with 1998 and newer trucks. In addition, all trucks in regular port service would be retrofitted with verified devices that reduce diesel PM by 85 percent or more. Retrofits that also provide NOx reductions would be used to the greatest extent feasible. The second phase would require pre-2003 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2017, and pre-2007 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2019. Additionally, the proposal would require trucks entering port service for the first time between 2008 and 2011 to meet or exceed 2003 federal engine standards and be equipped with diesel particulate filters. Trucks entering port service between 2012 and 2014 would need to meet or exceed 2007 federal engine standards, and trucks entering port service in 2015 and later would need to meet or exceed 2010 federal engine standards.

This proposed measure would reduce port truck NOx emissions in the South Coast Air Basin by about 10 percent in 2014 and 50 percent in 2023. Also, diesel PM emissions from port trucks in the South Coast Air Basin would be reduced by more than 50 percent in 2014 and by more than 30 percent in 2023.

The reductions from this measure would complement the reductions achieved by the proposed cleaner in-use heavy-duty truck measure. The regulation currently being developed for port trucks would apply only to those heavy heavy-duty trucks in primary port service. The Private Fleet rule currently under development would provide the reductions cited for the in-use heavy-duty truck

measure by including the heavy heavy-duty trucks not in port service, and all of the medium heavy-duty trucks.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>NOx</b>	Baseline emissions	22	18	15	15
	Potential reductions		<b>2</b>	<b>8</b>	<b>7</b>
<b>PM2.5</b>	Baseline emissions	1.0	0.8	0.6	0.6
	Potential reductions		<b>0.5</b>	<b>0.3</b>	<b>0.3</b>

Baseline emissions are for port trucks, based on inventories developed for the Emission Reduction Plan for Ports and Goods Movement. Emission reduction estimates are based on the assumption that port trucks are older, on average, than the fleet as a whole (age distribution was based on a 2002 study by Starcrest International). The number of trucks in regular port service is projected to grow from approximately 12,000 in 2005 to 15,000 in 2010, 18,000 in 2015 and 21,000 in 2020. Staff assumed that port trucks make trips of lower average speed (35 mph), owing to short hauls to distribution centers and congested conditions near the ports.

Emission reductions were estimated for the San Joaquin Valley but found to be insignificant. Goods movement-related emissions from trucks in the San Joaquin Valley are generated primarily by line-haul trucks and not port trucks. Line-haul truck emissions are significantly reduced in the proposed cleaner, in-use heavy-duty truck measure.

#### Timing

Action: 2007

Expected Implementation: 2008-2020

## Accelerated Introduction of Cleaner Line-Haul Locomotives

Line-haul locomotives used to pull rail cars long distances account for about 95 percent of total train emissions. U.S. EPA is expected to propose new Tier 3 standards that are anticipated to reduce NOx and PM emissions by 90 percent. These emission standards would build on existing federal requirements for using low sulfur diesel fuel by all trains beginning 2012. They would include new engine standards and rebuild standards and are expected to require aftertreatment technology. Since the useful life of a locomotive can exceed 30 years, the accelerated use of Tier 3 or equivalent technology could provide significant diesel PM and NOx reductions. ARB is pushing U.S. EPA to adopt the most stringent standards possible.

The proposed measure calls for replacing existing locomotive engines with Tier 3 engines beginning 2012 and conducting concurrent rebuilds of older engines to Tier 2.5 standards. Each year 10 percent of the existing engines would be replaced by Tier 3 engines and 5 percent upgraded to Tier 2.5 standards until 100 percent of the statewide fleet has been upgraded. All of this can only occur once U.S. EPA adopts Tier 3 engine standards for locomotives. It is estimated that by 2023, this measure would reduce NOx by 70 percent and direct PM2.5 by about 75 percent.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	2.30	2.30	2.4	2.5
	Potential reductions		<b>0.7</b>	<b>1.8</b>	<b>1.9</b>
<b>NOx</b>	Baseline emissions	26.7	18.3	21.0	22.6
	Potential reductions		<b>4.3</b>	<b>13.4</b>	<b>15.6</b>
<b>PM</b>	Baseline emissions	0.78	0.71	0.72	0.75
	Potential reductions		<b>0.20</b>	<b>0.30</b>	<b>0.56</b>

### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	1.6	1.5	1.6	1.6
	Potential reductions		<b>0.5</b>	<b>1.2</b>	<b>1.3</b>
<b>NOx</b>	Baseline emissions	21.5	19.9	20.6	21.1
	Potential reductions		<b>7.2</b>	<b>15.6</b>	<b>16.4</b>
<b>PM</b>	Baseline emissions	0.58	0.53	0.53	0.54
	Potential reductions		<b>0.18</b>	<b>0.42</b>	<b>0.46</b>

Baseline emissions represent line-haul and switcher locomotives.

### Timing

Action: U.S. EPA adopts Tier 3 standards in 2007. Voluntary agreement to accelerate implementation – 2008.

Expected Implementation: Introduction of 10 percent Tier 3 and upgrades to Tier 2.5 at 5 percent are expected to begin 2012.

## **Clean Up Existing Commercial Harbor Craft**

Commercial harbor craft are marine vessels that operate primarily along California's coastline and inland waterways. They include tugboats, work boats, crew/supply boats, ferries, excursion boats, and other harbor vessels. The diesel propulsion and auxiliary engines used on these vessels were built for long life and have essentially uncontrolled emissions.

U.S. EPA adopted harbor craft engine standards that apply to new engines beginning in 2004. The engines meeting the new U.S. EPA standards have roughly 50 percent less NO<sub>x</sub> than uncontrolled engines. Since the useful life of harbor craft vessels is so long, it will take a long time before emissions can be noticeably reduced from fleet turnover. However, many of these vessels can be repowered with newer, cleaner engines.

There are also emission control technologies, called "add-on" controls or retrofits, that clean engine exhaust and can reduce both NO<sub>x</sub> and diesel particulate matter (PM). Retrofit control technologies have been shown to dramatically reduce emissions when used with heavy-duty diesel engines in land-based operations and can be adapted to marine applications.

ARB is in the process of developing a regulation that would require owners of existing commercial harbor craft to replace old engines with newer cleaner engines and/or to add emission control technologies that clean up engine exhaust. It would address both propulsion and auxiliary engines. The regulation would take into account the fact that harbor craft vessel types are diverse and may require various combinations of emission reducing strategies and that some vessel configurations may not accommodate retrofits. Fishing boats in particular will be difficult to retrofit and also face difficult economic times. The proposed regulation is one of the measures in ARB's Goods Movement Plan and is scheduled for adoption in 2007. ARB staff estimates that the regulation will reduce ROG, NO<sub>x</sub>, and PM emissions 25 percent by 2010, 30 percent by 2014, and 40 percent by 2020.



## Estimated Emission Reductions

### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	2.3	1.6	1.3	1.3
	Potential reductions		<b>0.5</b>	<b>0.5</b>	<b>0.6</b>
<b>NOx</b>	Baseline emissions	23.1	15.7	12.7	12.7
	Potential reductions		<b>4.6</b>	<b>5.1</b>	<b>5.9</b>
<b>PM2.5</b>	Baseline emissions	1.1	0.7	0.6	0.6
	Potential reductions		<b>0.2</b>	<b>0.2</b>	<b>0.3</b>

The baseline harbor craft inventory is taken from the Emission Reduction Plan for Ports and Goods Movement, April 2006. Direct PM2.5 numbers reflect diesel PM. Emission reduction estimates assume the regulation will reduce emissions 25 percent by 2010, 30 percent by 2014, and 40 percent by 2020. (Emission reductions were estimated for the San Joaquin Valley but found to be insignificant.)

### Timing

Action: 2007

Expected Implementation: 2008-2018

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

Emission standards for new off-road diesel engines have become increasingly more stringent over the past decade, ensuring that new construction, mining, industrial and oil drilling equipment become progressively cleaner. However, large diesel off-road equipment with more than 25 horsepower remain in use for long periods of time, sometimes up to 60 years. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with the result that the emission reductions and associated health benefits from these cleaner engines will also be slow to materialize. There are opportunities for significant emission reductions by accelerating the introduction of cleaner engines and emissions control technologies into the statewide fleet.

This proposed measure would require owners of equipment larger than 25 horsepower to meet a stringent average emissions level across all of their equipment. The fleet average approach provides equipment owners flexibility in how they will comply, including: swapping older, dirtier engines with newer, cleaner engines; purchasing newer equipment (with cleaner engines); and adding emission control devices to older engines. Equipment owners could also restrict unnecessary equipment idling.

ARB staff is currently in the process of developing a statewide regulation which could require an initial emissions average to be met, with increasingly lower emissions averages over time. Additional reductions needed in the South Coast to reach attainment could be achieved through regional rulemakings above and beyond the statewide rule. This measure would reduce NO<sub>x</sub> emissions from large diesel off-road equipment in the South Coast Air Basin by approximately 15 percent in 2014 and by about 25 percent in 2023.

ARB staff began work on an in-use off-road equipment rule in 2004 as part of the Diesel Risk Reduction Program. During early SIP development work in 2006, staff identified the need for large NO<sub>x</sub> emission reductions from off-road equipment and other diesel sources to meet the health-based federal air quality standards. Consequently, staff revised the control concept extensively to meet California's clean air needs relative to diesel particulates, ozone, and PM<sub>2.5</sub>.

## Estimated Emission Reductions

### South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	20.0	13.1	9.2	8.0
	Potential Reductions		<b>2.2</b>	<b>2.1</b>	<b>2.0</b>
NOx	Baseline Emissions	141.7	94.8	58.1	45.7
	Potential Reductions		<b>13.8</b>	<b>13.2</b>	<b>12.2</b>
PM2.5	Baseline Emissions	8.0	4.8	2.6	1.8
	Potential Reductions		<b>2.5</b>	<b>1.7</b>	<b>1.5</b>

### San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	6.1	4.2	3.1	2.7
	Potential Reductions		<b>0.8</b>	<b>0.8</b>	<b>0.8</b>
NOx	Baseline Emissions	47.6	32.8	21.6	17.7
	Potential Reductions		<b>4.8</b>	<b>4.9</b>	<b>4.7</b>
PM2.5	Baseline Emissions	2.3	1.5	0.8	0.6
	Potential Reductions		<b>0.8</b>	<b>0.6</b>	<b>0.5</b>

Baseline emissions are the same inventory being used in ARB's current rulemaking process.

Emission reduction estimates are based on expected emission reductions from ARB's proposed In-Use Off-Road Diesel Vehicle rule currently under development. Although restrictions on unnecessary idling are included in the proposed rule, emission reductions from the idling restrictions have not been adequately characterized and therefore are not included in the estimated reductions above. Because the proposed rule is under development, the estimated reductions are subject to change.

The emission reduction estimate calculated what the emissions reductions would be if most of the oldest, dirtiest engines were replaced by new, cleaner engines. (However, the means for achieving the reductions are left to the equipment owners to decide.) Because the proposed rule would be fully implemented in 2020, emission reduction estimates for 2023 were calculated by assuming the same level of control in 2023 as was realized in 2020.

### Timing

Action: 2007

Expected Implementation: Phase-in starting 2008

## Cleaner In-Use Agricultural Equipment

New engines used in agricultural operations must meet the same standards as other off-road engines, ensuring that new equipment become progressively cleaner. Just as in other off-road applications, diesel agricultural equipment can remain in use for long periods of time. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with a direct impact on the pace that emission reductions materialize.

The cleanup of agricultural in-use equipment is primarily an issue in the San Joaquin Valley with its large agricultural economy. Natural turnover of the agricultural fleet will reduce emission significantly by the Valley's expected 2024 ozone attainment deadline. Modeling for the Valley's PM2.5 SIP due in 2008 will show what accelerated fleet modernization may be needed. Once that information is available, ARB staff will quantify reductions from this measure. ARB staff is also supporting efforts to obtain additional incentive funding to accelerate progress, and will assess a modernization program as part of its development of long-term concepts for ozone attainment.

### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline Emissions	13	7	4	3
	Potential Reductions				
<b>NOx</b>	Baseline Emissions	62	38	23	18
	Potential Reductions				
<b>PM2.5</b>	Baseline Emissions	3.5	2.0	1.1	0.7
	Potential Reductions				

## New Emission Standards for Recreational Boats

Recreational boat engines are broadly divided into two categories: outboard boats/personal water craft (PWC) and inboard/sterndrive. Outboard and PWC motors until recently were predominantly 2-stroke engines. Inboard/sterndrive engines are typically automotive spark-ignition engines adapted for boats that must now comply with a 5.0 g/kW-hr exhaust standard by 2009, which can be achieved with three-way catalytic converters and oxygen sensor feedback controls. Although ARB previously adopted exhaust emission standards for outboard/PWC engines, lower exhaust standards to further reduce emissions are possible by adapting the emission control technology used for inboard/sterndrive engines. This measure calls for the implementation of a tighter, catalyst-based exhaust standard of 5.0 g/kW-hr for outboard/PWC engines to be phased-in beginning in 2013. Only 4-stroke engines are expected to be able to comply with this tighter standard.

Evaporative emissions represent about one fourth of the total ROG emissions from recreational boat engines. (There are no state or federal evaporative emission standards for any type of recreational boats.) This measure also calls for an evaporative emission standard that will address all sources of boat evaporative emissions (tank, carbon canisters, fuel lines, etc.). The technology needed to achieve evaporative standards for boats is readily adaptable from that used in automobiles and small off-road equipment.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	55.6	45.1	42.6	43.0
	Potential Reductions		<b>4.2</b>	<b>12.8</b>	<b>17.7</b>
NOx	Baseline Emissions	3.1	4.2	5.2	5.7
	Potential Reductions		<b>0.4</b>	<b>1.6</b>	<b>2.4</b>

#### San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	15.8	13.2	12.8	13.1
	Potential Reductions		<b>1.2</b>	<b>3.8</b>	<b>5.3</b>
NOx	Baseline Emissions	0.8	1.1	1.4	1.5
	Potential Reductions		<b>0.1</b>	<b>0.4</b>	<b>0.6</b>

The baseline estimates are comprised of summer average exhaust and evaporative emissions for outboard boats and personal watercraft from the OFFROAD2007 model.

Exhaust emission reduction estimates are based on the percent reduction estimates from ARB's 2001 regulation for inboard/sterndrive engines, which reduced the exhaust standards by the same increment (from 16 to 5 g/kW-hr).

Evaporative emission reductions are based on an estimated 70 percent control of evaporative emissions for all recreational boats of model year 2012 and newer.

### **Timing**

Action: Exhaust standard by 2010; evaporative standard by 2009.

Expected Implementation: Exhaust standard by 2013; evaporative standard by 2012.

## **Off-Road Recreational Vehicle Expanded Emission Standards**

### Exhaust Standards

ARB has controlled exhaust emissions from off-road recreational vehicles to a much lesser extent than on-road motorcycles or on-road cars and trucks with the result that off-highway recreational vehicle emissions are projected to increase contrary to the emission trends for other motor vehicles.

In 1994, ARB approved exhaust emission standards and test procedures for off-road recreational vehicles, including off-highway motorcycles and all terrain vehicles (ATVs). In 1998, ARB revised the rules to allow non-compliant vehicles to be sold and operated either annually or seasonally depending on local area ozone levels.

Off-road recreational vehicles have not achieved their potential exhaust emission reductions as technical issues, cost, and tampering difficulties have limited exhaust emission reductions. Another concern is that the California market is not large enough for off-road recreational vehicle manufacturers to justify producing vehicles that would comply with more stringent California exhaust standards. The likely result could be that consumers either purchase off-road recreational vehicles out-of-state or falsely certify that the vehicles they purchase are intended for use in competition. The most effective strategy would be for U.S. EPA to establish tighter exhaust standards for all off-road recreational vehicles, thereby precluding the potential for California consumers to purchase and operate non-complying (and higher emitting) vehicles.

This measure calls for reducing exhaust emissions by 50 percent from new off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle exhaust emission reduction technologies. ARB staff estimates that the regulation will reduce total ROG exhaust emissions from off-road recreational vehicles by 21 percent by 2014 and 38 percent by 2023.

### Evaporative Standards

In 2002, U.S. EPA approved a rule that required all off-road recreational vehicles to comply with evaporative standards beginning with 2008 vehicles. However, the standards only control permeation from the fuel tank and hoses. In July 2006, ARB approved evaporative emission standards that harmonized with existing U.S. EPA regulations.

This measure will reduce ROG evaporative emissions by 50 percent from off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle evaporative emission reduction technologies. With Board adoption by 2009, ARB staff estimates that the regulation will reduce ROG evaporative emissions by 7 percent by 2014 and 12 percent by 2023.

## Estimated Emission Reductions

### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	23	28	32	35
	Potential reductions		<b>7.8</b>	<b>14.5</b>	<b>17.4</b>

### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	6	8	9	10
	Potential reductions		<b>2.2</b>	<b>4.0</b>	<b>4.8</b>

Baseline emissions (exhaust + evaporative) are for all off-road motorcycle and ATVs in each region. Emission reduction estimates are from ARB's off-road motor vehicle emissions model programmed to calculate the potential impact of reducing new engine exhaust emissions by 50 percent beginning in 2012.

### Timing

Action: By 2010

Expected Implementation: By 2012-2014



## Portable Outboard Marine Tank Evaporative Standards

Portable outboard marine tanks (OMT) are small-capacity tanks (usually less than 12 gallons) that supply fuel to marine outboard engines. Unlike larger vessels with permanently mounted fuel tanks, many small and medium size outboard boats use removable tanks to allow both the engine and fuel tank to be removed for transport or storage. OMTs are not subject to any emission standards and as a result have relatively high evaporative emissions. DMV and other data indicate that there were approximately 200,000 registered outboard vessel owners in California in 2005. If we assume one tank per outboard, the statewide inventory would be 200,000 OMTs with statewide emissions of approximately six tons per day. The emissions for the South Coast, estimated at 2.4 tons per day (40 percent of statewide totals), were scaled from the ratio of the statewide inventory for outboard boat engines of 10 or less horsepower to the South Coast inventory of similar boats.

Diurnal and permeation standards for OMTs and associated equipment with approximately the same emission reduction efficiency as required by ARB's 2005 regulation for portable fuel containers would reduce emissions by 50 percent in 2014 and 75 percent in 2023.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	2.6	3.6	4.7	5.3
	Potential reductions	--	<b>1.8</b>	<b>2.9</b>	<b>4.0</b>

#### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	0.6	0.7	0.8	0.9
	Potential reductions	--	<b>0.4</b>	<b>0.5</b>	<b>0.7</b>

### Timing

Action: 2007

Expected Implementation: 2010

## Refueling Gasoline Tank Evaporative Standards

Refueling gasoline tanks (from 30 to 100 gallons) are usually mounted on a vehicle and used to refuel other motor vehicles. Some examples include tanks on recreational vehicles, like toy haulers, for fueling off-highway recreational vehicles or tanks on pickup trucks for fueling off-road or agricultural equipment. There are an estimated 150,000 refueling tanks in California. Evaporative emissions from refueling tanks include standing or storage loss emissions, working loss emissions, and permeation emissions from hoses.

ARB staff are currently conducting surveys to determine accurate populations as well as testing to calculate more accurate emissions. Rough preliminary statewide estimates of evaporative emissions from refueling gasoline tanks are approximately six tons per day. Setting evaporative standards for refueling tanks would reduce ROG emissions by 60-70 percent, depending on which technology is utilized. Control technologies being considered include passive purge carbon canisters and insulation.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	2.3	2.7	3.20	3.5
	Potential reductions	--	<b>1.6</b>	<b>1.9</b>	<b>2.1</b>

#### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	0.8	0.9	1.1	1.2
	Potential reductions	--	<b>0.5</b>	<b>0.7</b>	<b>0.7</b>

Baseline emission numbers are the statewide inventory for refueling tanks scaled to regions based on the percentage of recreational vehicles. Potential reductions are based on 60 percent control expected to be achieved through control technology.

### Timing

Action: 2008

Expected Implementation: 2010

## Gas Station Refueling Hose Evaporative Standards

Gas station refueling hoses are co-axial hoses that transfer fuel from the filling station pump to a vehicle's fuel tank and return displaced gasoline vapors from the vehicle fuel tank to the gasoline storage tank. Evaporative emissions occur during the fueling process through the hose material. There are an estimated 150,000 gas station refueling hoses statewide with estimated emissions of four tons per day.

Setting evaporative standards for gas station refueling hoses would reduce ROG emissions by 70-98 percent, depending on which technology is utilized. These estimates are based on previous standards for low permeation vehicle fuel hose and initial ARB and industry testing results.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	2.0	2.2	2.3	2.4
	Potential reductions	--	1.5	1.6	1.7

#### San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	0.2	0.3	0.4	0.4
	Potential reductions	--	0.2	0.2	0.3

#### Statewide

	(tons per day)	2006	2014	2020	2023
<b>ROG</b>	Baseline emissions	4.1	4.5	4.9	5.0
	Potential reductions	--	3.2	3.4	3.5

Baseline emissions are the statewide emissions inventory for gas station refueling hoses, scaled to regions based on the percentage of vehicle refueling emissions. Potential reductions are based on 70 percent control achieved through control technology.

### Timing

Action: 2008

Expected Implementation: By 2012

## Enhanced Vapor Recovery for Above Ground Storage Tanks

Above ground storage tanks are large gasoline storage tanks used extensively in agricultural operations. Typical tanks have capacities ranging from 250 to 12,000 gallons. Above ground storage tanks are becoming increasingly popular due to their superior leak detection capabilities. Because these tanks are exposed to ambient air temperatures, emissions are greater than from underground tanks. Annual statewide ROG emissions from all tanks in 2004 totaled 3.1 tons per day. Emission reductions are possible and feasible with an enhanced vapor recovery certification process and new performance standards and specifications.

This proposed measure calls for reducing emissions by 90 percent from new above ground storage tanks by 76 percent from retrofitting existing non-agricultural tanks and by 60 percent from retrofitting existing agricultural tanks. This measure would be implemented beginning in 2007 and by 2011 would reduce statewide ROG emissions from tanks by two tons per day. ARB staff is currently analyzing what the emission reductions would be for each region.

### Estimated Emission Reductions

#### Statewide

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	3.2	3.5	3.8	3.9
	Potential reductions	--	2.3	2.4	2.4

### Timing

Action: 2007

Implementation: Phase-in starting 2007

## Consumer Products Program

Chemically formulated consumer products such as automotive care products, household care products, and personal care products have been regulated as a source of ROG emissions in five rulemakings since 1989. As a result of these measures, statewide emissions from consumer products will be reduced by over 170 tons per day in 2010, a 40 percent reduction. Despite this progress, population growth in the years ahead is expected to reverse the downward trend of emissions from consumer products as early as 2008, after the latest standards become effective. Even though the average photochemical reactivity of the ROG emissions from the consumer product sector is approximately one-third that of motor vehicle exhaust, the magnitude of emissions from this sector indicates that additional controls for this sector will remain important. Consumer products are expected to become the largest source of ROG emissions in the South Coast Air Basin, and the third largest source in the San Joaquin Valley Air Basin by 2020.

This proposed measure would continue ARB's commitment to reduce ROG emissions from consumer products. The current program uses industry surveys to gather information about sales trends and product formulations. Staff uses survey data along with trade journals, patents, and other technical information to propose mass-based ROG limits. Staff will continue to investigate any and all opportunities for emission reductions from mass-based limits by taking advantage of emerging low-emitting technologies. However, the ability to achieve significant reduction from mass-based standards is waning, so staff will likely be shifting the focus to other potential emission reduction opportunities. One such measure would include investigating emission reduction opportunities through reactivity-based standards in most categories. A reactivity-based approach relies on the scientific principle that different chemical compounds form different amounts of ozone in the atmosphere, rather than the mass-based approach that reduces ozone formation by reducing all volatile organic compounds.

In the future, it is likely that further emission reductions from the consumer products source category will not be feasible using conventional approaches. We will work with stakeholders to explore alternative market-based mechanisms that would encourage the development, distribution, and purchase of cleaner, very low, or zero emitting products. Examples of mechanisms to explore are a multi-media labeling program, programs where companies set their own emissions reduction goals, and the use of the media for public education. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Examples of alternative approaches are the purchase of ROG credits and the funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

The above approaches could be implemented through several rulemakings and would achieve approximately 30-40 tons per day ROG reductions statewide, equivalent to 13-17 tons per day in the South Coast, in the 2008 to 2014 timeframe. The 2006 measure was adopted by the ARB Board in November 2006 with phase-in implementation from 2008 to 2010.

### Estimated Emission Reductions

#### South Coast

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	103.42	102.63	107.38	109.54
	Potential reductions	--	<b>12.9</b>	<b>13.5</b>	<b>13.7</b>

#### San Joaquin Valley

	(tons per day)	<b>2006</b>	<b>2014</b>	<b>2020</b>	<b>2023</b>
<b>ROG</b>	Baseline emissions	23.58	25.52	28.38	29.89
	Potential reductions	--	<b>3.2</b>	<b>3.6</b>	<b>3.8</b>

### Timing

#### Consumer Products Regulations

Action: 2007-2008

Expected Implementation: By 2010

Action: Between 2010 and 2012

Expected Implementation: By 2012-2014

## **Department of Pesticide Regulation's 2008 Pesticide Plan**

The Department of Pesticide Regulation's (DPR) 2008 Pesticide Plan is a strategy to reduce ROG emissions from pesticides through enforceable regulations that prohibit high emission practices and by requiring products that contribute less to ozone formation. The regulatory efforts will be supplemented by an overall strategy to reduce the reliance on pesticides and the promotion of low emission technologies.

A major regulatory component will involve the reduction in emissions from fumigants. Fumigants account for about one-fourth of all pesticide pounds applied annually. In 2008, DPR will implement regulations that require use of low-emission practices for field fumigation, such as deep injection, tarping, irrigation, and application through drip irrigation systems, as appropriate. In addition, DPR will utilize the regulatory structure established by these field fumigation regulations to achieve further emission reductions in subsequent years as appropriate. Also, regulations will be enacted in the future to eliminate 90 percent of the emissions from agricultural and non-agricultural practices such as those in chambers and structural settings.

Regarding other pesticide products, specifically liquid emulsifiable concentrates, in 2005 DPR initiated an effort to reformulate pesticide products to reduce their smog forming potential, pursuant to its authority to reevaluate current product registrations. This reevaluation will continue as part of the 2008 Plan.

While the Pesticide Plan will be implemented statewide, the resulting reductions will vary in different areas. Only certain air quality management areas will rely on reductions from the Pesticide Plan. For example, current rough estimates indicate that the initial field fumigation regulations would result in between four and five tons per day reduction in ROG emissions in the San Joaquin Valley area. Estimated reductions will be refined and will likely change once the proposed regulation package is complete. DPR will account for the reductions from reformulation, any further field fumigation regulation and chamber fumigation regulation in the future.

DPR's 2008 Plan will be supplemented by a strategy that promotes the use of innovative technologies and integrated pest management systems that will result in lower emissions from pesticides. DPR will look for opportunities to build strategic partnerships with the agricultural, pest control and research communities to explore new ROG reduction opportunities. DPR will track and account for reductions achieved through such efforts as those programs develop.

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