

Brent Newell  
00-11-3

December 8, 2008

Chairwoman Mary Nichols and Members of the Board  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95812

**RE: Proposed Statewide Truck and Bus Regulation**

Dear Chairwoman Nichols and Board Members:

On behalf of Association of Irrigated Residents, Center on Race, Poverty & the Environment, and [other organizations listed here], we write to encourage the Air Resources Board (Board) to adopt a strong On-Road In-Use Truck and Bus Rule that protects the public health and meets the Board's previous commitments to regulate diesel truck emissions in the South Coast air basin. Many of the undersigned organizations are a part of a larger coalition that submitted a letter in support of the On-Road In-Use Truck and Bus Rule and the Greenhouse Gas Truck Regulation, but we have additional concerns regarding the Board's previous commitments to achieve reductions in diesel truck emissions and the ability to meet the 1-hour ozone standard by 2010.

Specifically, we draw the Board's attention to Resolution 03-22, which the Board adopted in 2003.<sup>1</sup> The resolution directed ARB staff to adopt rules to achieve major reductions from diesel trucks by 2010. The resolution requires reductions in the South Coast air basin of 49 tons per day (tpd) of VOC and 37 tpd of NOx reductions through 2006 and approximately 97 tons per day of NOx and VOC by 2010. It also included reductions between 118 and 233 tpd of VOC and up to 159 tpd of NOx in long-term commitments by 2010.<sup>2</sup> Unfortunately, the proposed rule does not effectuate the commitments made by the Board, as it does not deliver reductions until well after 2010, forcing the public to bear this extra pollution for longer. The Board must ensure that these targets are met in order to protect public health in the South Coast and the San Joaquin Valley air basins and assure attainment of the 1-hour ozone standard by 2010.

Even though EPA revoked the 1-hour standard in 2005, EPA policy, which has been upheld by the courts, requires that mandatory control measures to attain the 1-hour standard remain in place to attain the eight-hour standard.<sup>3</sup> Further, the South Coast and the San Joaquin Valley are

<sup>1</sup> See Resolution 03-22, Attachments A-3 and A-7 attached; October 23, 2003.

<sup>2</sup> While staff has withdrawn Resolution 03-22 from EPA consideration without Board approval (as it relates to the South Coast Air Basin), the Board has not rescinded or otherwise amended Resolution 03-22.

<sup>3</sup> 69 Fed. Reg. 23951, 23954 (Apr. 15, 2004). Discretionary control measures must remain in place unless a State can show "removal or modification will not interfere with attainment of or progress toward the 8-hour ozone NAAQS (or any other applicable requirement of the CAA)." The D.C. Circuit Court of Appeals affirmed this EPA policy and held that EPA's decision to remove "one hour penalties, rate-of-progress milestones, contingency plans, and motor vehicle emissions budgets" and New Source Review violated the CAA. See *South Coast Air Quality Management District v. United States Environmental*

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unlikely to achieve the critically needed relief from air pollution that would result from attaining the 1-hour ozone standard by 2010.<sup>4</sup> Failure to attain that standard by 2010 will impose harsh penalties, including a fee on major stationary sources (\$5,000 per ton in 1990 dollars for emissions greater than 80% of a source's 2010 baseline). We would like to see specific documentation of the annual reductions expected from implementation of the On-Road In-Use Truck and Bus Rule in comparison to the reduction of PM, NOx, and VOC committed to in the SIP and Resolution 03-22, including both attainment and reasonable further progress (RFP) commitments.

It is imperative that the On-Road In-Use Truck and Bus Rule meet and preferably exceed the commitments made in Resolution 03-22 and in the 2007 Ozone Plan or exacerbated health effects and millions of dollars in fees on businesses will result. We hope that the Board takes this opportunity to strengthen the On-Road In-Use Truck and Bus Rule to protect the public's health and honor its previous commitments to reduce diesel emissions in the South Coast air basin.

Sincerely,

Tom Frantz  
Association of Irrigated Residents

Sofia Sarabia  
Center on Race, Poverty & the Environment

Angelo Logan  
East Yard Communities for Environmental Justice

Ryan Wiggins  
EndOil

Jesse N. Marquez  
Coalition For A Safe Environment

Renee Nelson  
Clean Water and Air Matter

Martha Guzman Aceves  
California Rural Legal Assistance Foundation

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*Protection Agency*, 472 F.3d 882, 900 (D.C. Cir. 2006).

<sup>4</sup> *See, e.g.*, Proposed Modifications to the Draft 2007 AQMP ("By 2010, this plan shows that the Basin will still exceed the federal 1-hour ozone standard by more than 30 percent despite implementation of the 2007 AQMP control measures.")



**ATTACHMENT A-3  
REVISED ON-RD HVY-DUTY-3**

- c. **ON-RD HVY-DUTY-3: Pursue Approaches to Clean Up the Existing and New Truck/Bus Fleet -- In-Use Emission Control, Engine Software Upgrade, On-Board Diagnostics, Manufacturers' In-Use Compliance, Reduced Idling**

**Time Frame:** Adopt 2003-2006; Implement 2004-2010

**Responsible Agency:** ARB

**Proposed Strategy:**

New engine standards, together with compliance and enforcement programs designed to ensure that new engines maintain their low emission levels, will provide significant reductions over time. In addition to implementing programs that target new engines and vehicles, ARB must also focus its efforts on reducing emissions from the existing heavy-duty diesel vehicle fleet in order to improve air quality and benefit public health in the near-term. The measures discussed here form a comprehensive strategy to reduce harmful emissions from both the new and in-use heavy-duty vehicle fleet and to ensure that ARB's heavy-duty vehicle program achieves maximum emission benefits.

In 1998, ARB revised the South Coast SIP to replace measure M7, Accelerated Retirement of Heavy-Duty Vehicles, with measure M17, In-Use Reductions from Heavy-Duty Vehicles. M17 described two strategies to reduce emissions from in-use heavy-duty vehicles – incorporating NOx screening into existing roadside smoke inspection to identify malmaintained vehicles for repair and developing an in-use compliance testing and recall program (including the potential use of on-board diagnostic systems). The measure also included market-based incentives as a supplement to ensure that the emission reduction commitments in M17 were met. U.S. EPA has not approved this SIP revision. Since 1998, ARB staff has investigated the two strategies described in M17. Results from field tests indicate that repairing malmaintained heavy-duty engines is not an effective strategy – sometimes leading to post-repair increases in NOx emissions. ARB staff believes that engine software upgrades (described below) are a more effective means of reducing emissions from trucks that are already on the road. ARB staff is continuing to pursue programs aimed at requiring on-board diagnostic systems and in-use vehicle testing. These programs are incorporated into this measure.

***In-Use Emission Controls:*** In February 2000, ARB adopted a fleet rule that requires public transit agencies to aggressively reduce NOx and PM emissions from their urban buses. The use of hardware-based retrofit systems verified through ARB's Diesel Emission Control Strategy Verification Procedure to reduce PM emissions is an important part of the transit bus rule. As called for in the Diesel Risk Reduction Plan, which was adopted by the Board in September 2000, ARB is expanding its opportunities

to achieve PM reductions, and in most cases, ROG reductions, through the implementation of additional rules targeting specific heavy-duty diesel trucks. The in-use emissions control rules were originally envisioned as primarily PM control measures; however, because of the statewide need for NOx reductions and the need to minimize impacts on affected heavy-duty diesel fleets, the ARB is now committing to an integrated approach to achieve PM, NOx, and ROG reductions.

PM, NOx, and ROG emission reductions may be achieved through a variety of strategies, including engine repowers, accelerated fleet turnover, and retrofits with verified emission control strategies. The use of cleaner fuels, including alternative fuels, low sulfur diesel fuel, and alternative diesel fuels (such as diesel water emulsions) may also contribute to emission reductions. As with other ARB regulations, the in-use rules will not prescribe the emission control strategies that fleet operators must use. The strategies that operators select, however, must use ARB-verified technology and ARB-certified engines, and must meet the emission reduction targets specified by the in-use rules.

Depending on the strategy chosen by operators, the use of low-sulfur diesel fuel may be an integral strategy component. Most catalyst-based diesel particulate filters provide the greatest emission reductions when used with low-sulfur diesel fuel (sulfur content of 15 ppmw or less), and some NOx retrofit systems may require the use of low sulfur diesel fuel as well. One retrofit system that requires the use of low-sulfur diesel fuel combines a lean NOx catalyst with a diesel particulate filter; this system has already been verified by the ARB for use on limited engine families produced by two engine manufacturers.

Through the Diesel Emission Control Strategy Verification Procedure, ARB adopted a multi-level approach for categorizing strategies based on their verified PM emission reductions. "Level 1" verification applies to strategies that achieve at least a 25 percent PM reduction; "Level 2" verification applies to strategies that achieve at least a 50 percent PM reduction; and "Level 3" verification applies to strategies that achieve at least an 85 percent PM reduction, or reduce exhaust PM levels to no more than 0.01 g/bhp-hr. The verification procedure also allows for strategy verification based on a minimum 15 percent NOx emission reduction when coupled with at least a Level 1 PM verification. Together with regulations that will require the use of retrofits or other strategies verified to the highest level possible, this multi-level approach ensures the development of high-efficiency control strategies. At the same time, it allows for lower level reductions in applications where higher level options are not yet available, thus ensuring that diesel PM and NOx emissions are reduced in a timely manner when and where they can be realized.

The in-use emission reduction rules are intended to provide a flexible and progressive in-use emission control program that achieves the highest level of PM emission control possible while also achieving significant NOx reductions. As stated previously, the in-use rules were originally intended to focus primarily on PM reductions. The staff also expected the rules to achieve some level of ROG reductions. The

currently verified diesel particulate filters, for instance, achieve ROG reductions commensurate with the level of PM reductions achieved. The staff now also expects the fleet rules to achieve NOx reductions. NOx reductions will be based on a particular strategy's verified NOx reduction capability; strategies verified for NOx reductions must achieve a minimum 15 percent reduction and may be verified for greater NOx reductions in 5 percent increments.

Table II-B-7 presents staff's estimate of the range of emission benefits for the South Coast Air Basin that would be achieved through implementation of the fleet rules.

**Table II-B-7**  
**ON-RD HVY-DUTY-3: Pursue Approaches to Clean Up the**  
**Existing and New Truck/Bus Fleet: In-Use Emission Control**  
**Estimated Emission Reductions**  
**(South Coast, Summer Planning, tpd)**

Pollutant	2005	2006 (Annual Average)	2008	2010	2020
ROG	0.04 – 0.09	0.09-0.3	0.8 – 2.6	1.4 – 4.5	0.5 – 1.7
NOx	Not Quantified			8 - 10	NQ
PM10	0.02 – 0.04	0.03 – 0.2	0.2 – 1	0.4 – 1.6	0.2 – 0.5
CO	Not Quantified			6 - 18	NQ

**Engine Software Upgrade:** ARB staff is proposing to require the installation of low NOx software in heavy-duty diesel vehicles with 1993 through 1998 model year engines for which low NOx software was developed under the Consent Decrees. The installation of low NOx software is also known as engine recalibration, chip reflash or engine software upgrade. In this procedure, the engine's electronic control module (ECM) is reprogrammed to reduce NOx emissions from levels achieved during typical in-use driving conditions.

Prior to installing low NOx software, the 1993 through 1998 model year engines emit "off-cycle" NOx. Off cycle NOx are emissions greater than the emissions allowed in the engine certification process; these off-cycle emissions occur when the ECM recognizes that the engine is not being driven in accordance with the federal test procedure used for engine certification.

Upgrading the software on a heavy-duty diesel engine's ECM provides opportunities to reduce NOx emissions. To comply with the Low NOx Rebuild Program contained in the federal Consent Decrees and similar state Settlement Agreements, engine manufacturers were required to provide engine dealers and distributors with low NOx rebuild kits to reduce the off-cycle emissions from specified engines. Under the provisions of the Consent Decrees, these kits implement certain software and/or minor hardware changes to achieve the necessary NOx reductions. To date, the available low

NOx rebuild kits have relied only on engine software upgrades; the kits have not included hardware changes. In general, the engine software upgrade reduces NOx emissions by eliminating advanced computer controls – “defeat devices” – that produce excess off-cycle NOx emissions during steady-state vehicle operation, such as on-highway driving.

When the Consent Decrees were signed, it was assumed that the low NOx rebuild kits would be installed at the time of normal engine rebuild, typically around 200,000 to 300,000 miles of service. The engine manufacturers have complied with the provisions of the Low NOx Rebuild Program requiring them to provide dealers and distributors with low NOx rebuild kits (i.e., engine software upgrade kits). ARB staff, however, estimates that only four to ten percent of the low NOx rebuild kits have been installed in applicable engines. As diesel engines have become increasingly durable, fewer rebuilds are being performed or are performed at higher mileage intervals. As such, the Low NOx Rebuild Program has not yet achieved its expected emission benefits.

The ARB staff believes that off-cycle NOx emissions should be eliminated now. To ensure that emission benefits are achieved, ARB staff will propose to the Board in October 2003 a mandatory heavy-duty diesel engine software upgrade measure to reduce NOx emissions. We estimate that there are about 100,000 California-registered heavy-duty diesel vehicles with engines eligible for the software upgrades. Implementation of this measure would begin in 2004. This measure would expand upon the original requirements of the Low NOx Rebuild Program by requiring the installation of software upgrades on applicable engines. The proposed mandatory measure would not require any engine hardware changes. The reductions associated with this proposed measure are necessary to mitigate a portion of the off-cycle emissions that occurred due to the use of “defeat devices.”

Table II-B-8 below shows the estimated NOx reductions that could be achieved through the implementation of a mandatory engine software upgrade measure. These reduction estimates are based on the assumption that software upgrades are installed on all applicable 1993 through 1998 model year heavy heavy-duty diesel and medium heavy-duty diesel engines in vehicles registered in California. The estimates presented below were calculated using confidential emissions data obtained during the Consent Decree negotiations, and VMT estimates provided by the Southern California Association of Governments. ARB staff intends to propose that engines in heavy-duty diesel vehicles registered out of state also be subject to this regulatory measure; the staff is now in the process of finalizing any additional emission benefits that may be achieved.

**Table II-B-8**  
**ON-RD HVY-DUTY-3: Pursue Approaches to Clean Up the Existing**  
**and New Truck/Bus Fleet: Mandatory Engine Software Upgrade**  
**Estimated Emission Reductions for MHDDE and HHDDE**  
**California Registered Trucks**  
**(South Coast, Summer Planning, tpd)**

Pollutant	2005	2006 (Annual Average)	2008	2010	2020
NOx	13 - 17	12 - 16	11 -14	8 - 10	0 - 1

***On-Board Diagnostics (OBD):*** As ARB implements more stringent emission standards, engine manufacturers are incorporating into their engine designs more sophisticated emission control devices such as exhaust gas recirculation systems, fuel injection rate shaping techniques, particulate filters, NOx adsorbers, and other electronic controls. To maintain low emission levels over time, these emission control devices must continue to perform properly throughout each vehicle's life.

One strategy to ensure that sophisticated emission controls perform adequately over time is to require a comprehensive OBD system on all heavy-duty vehicles. The current diagnostic systems voluntarily implemented by manufacturers are designed primarily to detect gross failures of components (e.g., disconnections and other circuit failures, rather than deterioration or reduced performance) without regard to the emission level associated with the malfunction. The measure proposed here would require OBD systems to detect malfunctions of virtually every component that can cause an emission increase before the emissions exceed a specified level. While discussed here primarily as a heavy-duty diesel engine strategy, it would also apply to heavy-duty gasoline engines used in vehicles with a GVWR greater than 14,000 pounds.

The comprehensive OBD system would alert the vehicle operator of the malfunction through a dashboard light; valuable information about the malfunction would be stored in the on-board computer to assist technicians in diagnosing and repairing the malfunction. As with light-duty vehicles, an OBD system for heavy-duty vehicles would likely not require the addition of many new sensors or components. Instead, the OBD system would consist primarily of software in the existing on-board computer and would use many of the existing engine and emission control sensors.

Because the heavy-duty vehicle fleet is predominantly diesel-fueled, the benefits of an OBD program would primarily be associated with heavy-duty diesel vehicles with GVWRs greater than 14,000 pounds. Nonetheless, the potential OBD strategy would also apply to gasoline heavy-duty vehicles with GVWRs greater than 14,000 pounds, and would also provide additional emission benefits from heavy-duty gasoline vehicles.

ARB staff is working closely with U.S. EPA on developing an OBD program for heavy-duty engines and vehicles. ARB staff expects to present a proposal to the Board in the 2003 to 2004 timeframe with implementation beginning in 2007. Because many trucks in interstate commerce are registered outside of California, it is also necessary for U.S. EPA to adopt the same regulatory requirements. We expect U.S. EPA adoption in 2004 with federal implementation also beginning in 2007.

**Manufacturer-Required In-Use Vehicle Testing:** This proposed measure would require manufacturers of heavy-duty diesel engines to test a specific number of engines per engine family by procuring and testing in-use vehicles at various mileage intervals. The responsibility for procuring and testing vehicles would be on the engine manufacturers, not on ARB. If the vehicles tested do not meet applicable emission standards, the engine manufacturer may be required to test additional vehicles to determine if an engine recall is required. This program component may also include mechanisms to streamline the engine certification process in order to ease engine manufacturers' testing burden. ARB is working closely with U.S. EPA to develop this measure. ARB staff expects to propose this measure to the Board in 2004, the same timeframe in which U.S. EPA is expected to adopt an in-use compliance program. Beginning in 2005, a pilot program in California will be used to generate data and gain experience in testing heavy-duty diesel engines on-road with on-board measurement systems. A fully implemented and enforceable manufacturer-run in-use compliance program for both ARB and U.S. EPA will begin in 2007.

**Reduced Truck and Bus Idling:** To date, ARB's heavy-duty emission control program has focused on engine emission standards without specifically targeting idling emissions. Nonetheless, ARB staff recognizes that idling emissions pose a serious air quality and health threat, particularly at warehouse/distribution centers located in areas that may already be disproportionately impacted by pollution, or at school bus stops populated by young children who are particularly sensitive to the impacts of pollution.

During idle operations, heavy-duty vehicles consume large amounts of diesel fuel, increase emissions, and produce noise. While idling practices vary among truck drivers by season and geographic location, a study by the Argonne National Laboratory indicates that long-haul trucks in the United States idle between five hours and ten hours per day, depending on the season. This same study also estimates that the average heavy-duty long-haul truck idles about six hours per day for 303 days annually<sup>1</sup>. When resting or sleeping, truck drivers may keep the engine running at idle to heat or cool the sleeper and/or cab, and to provide power to operate on-board appliances such as refrigerators, microwaves, television sets, and laptop computers. Heavy-duty trucks are also typically operated at idle to keep the engine block and diesel fuel warm for easy start-up during the winter months.

Some proactive trucking firms implement their own voluntary restricted-idling programs, and certain cities and municipalities already enforce ordinances that prohibit

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<sup>1</sup> Stodolsky, F.; Gaines, L.; Vyas, A. *Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks*; Argonne National Laboratory; ANL/ESD-43. June 2000.

extended idling. ARB staff is now developing measures expanding upon these local efforts to reduce idling emissions from both new and in-use heavy-duty diesel vehicles.

New Vehicles: For new vehicles, ARB staff plans to present to the Board a proposal in the 2003-2004 timeframe that would require idle-limiting devices on California-registered new heavy heavy-duty vehicles (diesel vehicles with GVWRs greater than 33,000 pounds) starting with the 2007 model year. These vehicles are typically used in line haul service and provide the greatest opportunities for reductions in idling emissions. The idle-limiting devices could range from systems that automatically shut down an engine after a specific time, to stop/start systems that automatically stop and start the engine as necessary to maintain engine and cab temperature and battery voltage within pre-set limits. Different idle-limiting technologies would be fully evaluated during ARB's public process for regulatory development. This regulatory strategy could also incorporate the use of alternative power systems, such as auxiliary power units, thermal storage systems, and truck stop electrification, to supply power for cab and on-board appliance functions as necessary.

Based on staff estimates, NOx emissions would be reduced by less than one ton per day in the SCAB in 2010. This estimate is based on the assumption that the average idling time for a heavy heavy-duty diesel truck would be reduced by 25 percent to 50 percent through the use of an idle-limiting device.

In-Use Vehicles: ARB in December 2002 adopted an Airborne Toxic Control Measure (ATCM) to reduce idling emissions from school buses, thereby reducing toxic diesel PM and other associated toxic air contaminants. The ATCM also includes provisions to limit idling from other heavy-duty vehicles operating near and on school grounds. While the ATCM provides some modest emission benefits that would reduce region-wide exposure to unhealthy exhaust emissions, the main purpose of the measure is to reduce localized exposure to diesel PM and other toxic air contaminants in the vicinity of schools.

To address heavy-duty vehicles operating at locations other than schools, ARB staff also plans to conduct an assessment to identify possible approaches for reducing diesel PM emitted from heavy-duty trucks and transit buses during idling operations. ARB staff plans to complete this assessment by the end of 2003. This assessment would examine the magnitude of current and future idling emissions, the level of human exposure, and possible approaches for reducing idling emissions. Staff would examine a wide range of approaches. Approaches to be examined would include operator education programs, public information, and fleet operator training programs. Additional approaches to be examined would include local ordinances restricting idling, no-idle zones, and requiring idle-limiting devices for certain fleets. Development of an airborne toxic control measure would be pursued to implement the regulatory aspects of this effort.

Alternatively, ARB staff may consider the feasibility of a legislative approach to restrict heavy-duty vehicles throughout the State from idling for extended time periods at loading docks, bus stops, and other areas where idling emissions occur. Similar to the regulatory approach, this strategy would restrict idling at various sources, thus reducing toxic diesel PM emissions and other associated toxic air contaminants.

Table II-B-9 shows the estimated emission benefits from all the approaches in this measure in the San Joaquin Valley. The staff has not yet estimated the additional NOx reductions that could be achieved in the San Joaquin Valley through implementation of the in-use emission control fleet rules. As such, the additional NOx reductions are not reflected in the table below.

**Table II-B-9**  
**ON-RD HVY-DUTY-3: Pursue Approaches to Clean Up the Existing and New**  
**Truck/Bus Fleet –In-Use Emission Control, Engine Software Upgrade, On-**  
**Board Diagnostics, Manufacturers’ In-Use Compliance, Reduced Idling**  
**Estimated Emission Reductions**  
**(San Joaquin Valley, Winter Planning, tpd)**

Pollutant	2010
ROG	1.5
NOx	4
PM10	0.1

**SIP Commitment for Measure ON-RD HVY-DUTY-3**

**South Coast 2003 SIP Commitment:**

ARB staff proposes to commit to bring this measure to the Board between 2003 and 2006. The measure as proposed to the Board will, at a minimum, achieve between 1.4 and 4.5 tpd of ROG reductions and between 16 and 21 tpd of NOx reductions in the South Coast Air Basin in 2010.

**San Joaquin Valley 2003 PM10 SIP Commitment:**

On June 26, 2003, the Board approved State commitments for the San Joaquin Valley’s PM10 SIP. ARB staff commits to bring this measure to the Board between 2003 and 2006. Emission reductions from this measure will be used toward meeting ARB’s commitment to adopt new measures between 2002 and 2008 that reduce emissions by an additional 10 tpd NOx and 0.5 tpd direct PM10 in the San Joaquin Valley by 2010.

**Commitments for Future SIPs:**

As other areas of the State develop attainment SIPs that require additional emission reductions to show progress and/or attainment, we will work with the appropriate local air districts to determine which State and/or federal measures are appropriate to include for federal approval.



## ATTACHMENT A-7

### **Achieve Further Emission Reductions from On-Road and Off-Road Mobile Sources and Consumer Products**

**Time Frame:** Action 2005-2008; Implement 2006-2010

**Responsible Agency:** ARB

**Proposed Strategy:**

This measure proposes to achieve additional emission reductions from on- and off-road mobile sources and consumer products. Such emission reductions are needed to ensure expeditious progress and attainment of federal ambient air quality standards.

The emission reduction target set forth herein is in addition to that specified for other short-range measures to be implemented by ARB. To implement this measure and achieve the overall emission reduction target, ARB — contingent upon their feasibility as evaluated as specified in the first paragraph of Attachment A-1 of Resolution 03-22 — will develop and adopt regulations for on- and off-road mobile sources and consumer products between 2005 and 2008, with implementation in 2006-2010. These regulations and other actions may include any of the following items or other actions as deemed appropriate by staff and the Board.

- Light and Medium-Duty Vehicles
  - Replacement of catalytic converters/carbon canisters on all applicable models at approximately 100,000 mile intervals.
  - Enhance the I & M program for light and medium-duty vehicles by using remote sensing to identify high emitters.
  - 4-wheel/all wheel-drive exemption from loaded mode testing.
  - New reformulated gasoline standards that primarily reduce sulfur contents, cap RVP, lower distillation temperatures, and olefins.
- Heavy-Duty Diesel Trucks/Buses
  - Retrofit of applicable in-use vehicles with add-on controls such as lean-NOx catalysts.
- Recreational Marine
  - Replacement of 2-stroke recreational marine engines with cleaner 4-stroke engines through an incentive program such as a buy-back program.
  - Retrofit applicable 4-stroke recreational marine engines with catalytic converters.

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- Construction/Industrial Diesel
  - Require or incentivize the repowering of existing off-road diesel construction and industrial equipment with engines meeting new engine emission standards.
- Residential Lawn and Garden
  - Phase-in of zero-emitting residential lawn mowers and garden equipment.
- Consumer Products
  - Additional reductions from consumer products through the transfer of low and ultra-low VOC stationary source technologies to consumer products such as clean-up solvents.
- Ships
  - Cold ironing for ships calling on the Ports of Long Beach and Los Angeles.
- Trains
  - Non-MOU switcher and short-haul locomotives to use low-emission units such as LNG and battery/diesel hybrids.

The following table presents the additional emission reductions targeted in this control measure. ARB commits to achieve, at minimum, the ROG and NOx reduction target in this control measure through adoption and implementation of any combination of feasible control strategies affecting on-road and off-road mobile sources and consumer products.

**Achieve Further Emission Reductions from On-Road and Off-Road  
Mobile Sources and Consumer Products  
(South Coast, Summer Planning, tpd)**

Pollutant	2010
ROG + NOx	97

**SIP Commitment to Achieve Further Emission Reductions from  
On-Road and Off-Road Mobile Sources and Consumer Products**

**South Coast 2003 SIP Commitment:**

ARB staff proposes to implement this measure beginning in 2005. The measure will achieve a combined 97 tpd of ROG and NOx reductions in the South Coast Air Basin in 2010.